Accounting for the Social Impacts of Animal Disease:

The Case of Bovine Tuberculosis

A thesis submitted in fulfilment of the requirements for the degree of Doctor of Philosophy

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DECLARATION

This work has not been submitted in substance for any other degree or award at this or any other university or place of learning, nor is being submitted concurrently in candidature for any degree or other award.

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ABSTRACT

Bovine Tuberculosis (bTb) continues to cause turmoil for farmers and their businesses where farmers have endured the impact of the disease for extensive periods of time such is the longevity of the problem. Connections between animal disease and its social impact on humans were recognised widely during the outbreak of foot and mouth disease (FMD) in 2001. However, despite the apparent impact of bTB on farmers and the rural community, there are few studies that seek to explore and measure these social impacts. The aim of this study is to investigate problems associated with the social impacts of bTB on farmers where levels of personal well-being and farmer's productivity are measured to establish their quality of life and its relationship with bTB.

A conceptual framework was drawn up to capture the themes rising from the literature review considered as vital in establishing the social effects of bTB. This framework was used as the basis in developing a mixed methods structure to the research. This approach combined qualitative interviews and participant observation over a longitudinal time frame of eighteen months with farmers and a quantitative postal survey of a sample of farmers across Wales. The qualitative interviews were undertaken with farmers on sixteen farms within four high risk disease areas in Wales. Its aim was to understand the meaning of well-being to farmers and to identify key factors which influence it and their quality of life. The effects of bTB testing on farmers is observed alongside establishing how farmers have managed with bTB and what coping strategies they have adopted both personally and as part of their working lives. A key aim of the quantitative methodology was to establish levels of personal well-being and productivity amongst farmers using recognised scales, to explore what significant pressures affect farmers on their farms and acquire their attitudes to bTB.

In qualitative interviews, farmers identified health, happiness, having a sense of worth with respect from others, and having the freedom to farm in their own right as central components to their well-being. Negative influences on well-being were recognised as the weather, red tape and bureaucracy, financial and aspects which causes pressures relative to farm management. In qualitative interviews, farmers linked the impacts of bTB with perceived poor well-being and described various coping strategies to avoid the consequences of bTB. However, survey data found that farmers with bTB were not statistically significantly more likely to have lower well-being than farmers without bTB. Farmers' well-being appears to be connected to their trust in the Welsh Government; farmers' perceived ability to control bTB; and their trust in others (such as vets) to help them avoid bTB. The research therefore presents a new perspective of the extent of the social impacts arising from bTB. Where other studies have indicated a relationship between the well-being of farmers and bTB, the results in this research question the extent to which these impacts exist.

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LIST OF ABBREVIATIONS

AHVLA	Animal Health and Veterinary Laboratories Agency
bTB	Bovine Tuberculosis
CheCHs	Cattle Health Certification Standards
CLA	Country and Land and Business Association
CPH	County Parish Holding
DEFRA	Department for Environment Food and Rural Affairs
FMD	Foot and Mouth Disease
FUW	Farmers Union of Wales
IAA	Intensive Action Area
NFU	National Farmers Union
OCVO	Office of Chief Veterinary Officer (Wales)
ONS	Office for National Statistics
PTI	Parish Testing Interval
SPS	Stanford Presenteeism Scale
SVS	State Veterinary Service
SWB	Subjective well-being
WEMWBS	Warwick Edinburgh Mental Well-being Scale
WG	Welsh Government
WLQ	Work Limitations Questionnaire
WP	Work productivity

CHAPTER 1: INTRODUCTION

1.1 Bovine Tuberculosis as a Social Problem

In July 2014, Mark Henderson was driving through rural Shropshire when he came across a farm lorry blocking his way. Henderson asked the farmer, David Fletcher, if he was alright. Holding a 12-bore shotgun, Fletcher replied, "No, I need help" before firing his gun at Henderson's car and returning inside his farmhouse shouting, "there isn't going to be any farm". Henderson called the police, but it was too late: once inside his house, Fletcher reloaded his gun and killed himself. The inquest in November 2014 recorded a verdict of suicide, but not before hearing that Fletcher had financial concerns and was worried about the threat of bovine Tuberculosis (bTB) among his cattle herd. After his death, tests of Fletcher's cattle proved they were clear of the disease (Shropshire Star, 2014).

Two months after Fletcher's death, the newly elected president of the National Farmers Union (NFU) wrote that:

> "The emotional and economic impact of this disease is huge – and as a dairy and beef farmer, I know that from personal experience. We've lost 40 cattle to bovine TB on our farm in Pembrokeshire over the past 18 months and have experienced the human misery the disease causes. Yes, we are farmers. But we're also human beings who feel great responsibility for our animals. Their health and welfare is of paramount importance and the helplessness and distress you and your family feel when you discover they have tested positive for bovine TB is devastating. Travelling round the country, I've met countless farmers who have suffered similar experiences. I've sat round farm kitchen tables with families who have been driven to despair after investing time and money building up their herds, only to see them devastated by bovine TB. I've spoken to grown men who have been reduced to tears as they load cow after cow, calf after calf, onto lorries to be taken away for slaughter" (Raymond, 2014).

Accounts of the social impacts of bovine Tuberculosis such as that of David Fletcher are increasingly common. This may be due to rising levels of the disease. Bovine tuberculosis (bTB) is an infectious disease of cattle caused by a bacterium *Mycobacterium bovis (M. bovis).* It is a chronic disease in cattle and also causes bTB in

other mammals such as badgers, deer, camelids and goats. The disease is contagious and spread by contact with infected domestic and wild animals (Krebs et al., 1997).

In 15 years, levels of bTB have risen substantially. The most recent statistics in Great Britain suggest that during 2013, 9,094 herds were infected with bTB resulting in the slaughter of 32,620 cattle. In 1999, just 6,754 cattle were slaughtered from 2,374 separate incidents. Overall, the infection rate of cattle herds is 4.5%. Whilst this may seem low, the disease is regionally clustered, affecting the west and south-west of England (Defra, 2014). A similar picture is found in Wales, where there are three areas of higher disease rates in the regions of the South West, South East and Eastern central areas with lower levels in Northern areas of the country (Welsh Government, 2014).

Since 2010, all cattle herds in Wales have been placed on an annual bTB testing regime (AHVLA, 2010) following the 'Health Check Wales' initiative introduced by the Welsh Government to monitor disease incidence and slow down its spread into lower incidence areas. Disease eradication measures in Wales contains annual herd testing, movement restrictions including pre-movement testing, biosecurity measures and a badger vaccination programme within a controlled area of south-west Wales known as the Intensive Action Area (IAA).

At the same time, however, the rising levels of disease have been accompanied by greater and greater demands by farmers and their Unions for the government to do something about the transmission of bTB between badgers and cattle. Since the 1970s, badgers have been implicated in the spread of bTB to cattle yet there has always been public opposition to Government culling badgers to prevent the spread of the disease (Grant, 2009). In 1997, a scientific study was commissioned by the Government to assess the difference badger culling made in the control of bTB. It concluded in 2007 stating that badger culling could make 'no meaningful contribution' to the control of cattle bTB in the UK (DEFRA, 2007 p 5). Nevertheless, arguments have continued to rage about the role of badger culling and have increasingly become connected to the social impacts of bTB and the fate of farmers. Thus, in defending two pilot badger culls conducted in 2014, the president of the NFU connects badger culling with the future of family farming:

> "The badger culls that have just started again in Gloucestershire and Somerset are just one part of a much wider strategy to stop this terrible disease, which is devastating farming businesses across large parts of the country. At the end of last year, more than 6,500 cattle herds across Great Britain were under movement restrictions because of it. These aren't simply figures on a page. They represent the businesses of real people who have devoted their working lives to raising and caring for their animals – and producing the wonderful, high-quality British beef and milk that so many of you enjoy. They are ordinary working people doing the best they can for themselves and their families while looking after some of the most beautiful parts of the countryside" (Raymond, 2014).

1.2 Aims and Objectives

The relationship between animal disease and human well-being has only recently been identified. The outbreak of Foot and Mouth Disease (FMD) in 2001 exposed not just how easy disease can spread around the countryside because of the structure of the farming industry, but how disease and disease control regulations can have an impact upon farmers and their families (Mort et al., 2005, Convery et al., 2008, Peck et al., 2002, Nerlich et al., 2005). Convery et al., (2008 p 51-3), for example, describe the emotional and mental effects of witnessing 'death in the wrong place' as healthy cattle were slaughtered in front of farmers. There have been fewer studies of the social impacts of bTB. Some research has highlighted how farmers have 'given up' on bTB following years of ineffective government policy such that they no longer trust them and rely on their own solutions to managing bTB (Enticott et al., 2012c, Enticott, 2012, Naylor et al., 2014). Other work by farming charities has examined the social impacts of bTB upon farmers and families (Farm Crisis Network, 2009). Other research has also examined the economic impacts to farm businesses (DEFRA, 2010a).

Whilst these studies are useful, to date there has been no comprehensive study of the social impacts of bTB upon farmers. Qualitative impact studies, such as (Farm Crisis Network, 2009) are unable to control for a range of other factors that may mediate the impact of bTB upon farmers. Moreover, whilst there have been some quantitative studies attempting to gauge the impact of bTB upon farmers' mental health (DEFRA, 2010a), less is known about farmers' well-being and its connections to bTB. Much of the research on farmer well-being has focussed on objective measures such as suicide,

yet recent research has suggested that more meaningful indicators should revolve around notions of happiness and well-being. To date, these measures have not been applied to farmers with or without bTB. Similarly, there is little known about the impact of bTB upon farmers' productivity; whilst it might be expected to decline with the pressure of farm business restrictions, there has been no assessment between farms with and without bTB. Finally, little effort has been placed upon unpacking how farmers cope with bTB and how their coping mechanisms can help reduce the social impacts of bTB.

The aim of this study is to therefore provide a holistic account of the social impacts of bTB amongst farmers. The key aims for this research project are to ***investigate*** the social impacts that animal diseases, specifically bovine Tuberculosis is having on farmers' working lives; to ***understand*** how farmers cope with the restrictions and regulations which encompass a bTB breakdown on their farm and the consequences of this to their attitude and beliefs towards disease control; and to ***explore*** what other significant pressures that farmers face which could be an underlying threat or even add to the pressures that bTB already presents. Specific research questions are therefore:

- What does the concept of well-being mean to farmers and what do they believe affects it?
- What factors influence levels of well-being amongst farmers?
- How does bTB impact upon farmers lives?
- To what extent does bTB affect farmers' well-being?
- How do farmers adapt and cope with bTB?

If the relationship between the social impacts of bTB and farmer well-being is as strong as suggested, answers to these questions will be useful for policy makers, farmers' charities and medical organisations responsible for managing the impacts of bTB.

1.3 Study Design

In order to answer the questions outlined above, a mixed methods approach is adopted. Qualitative methods are used to unpack the meanings of well-being, identify the potential range of influencing factors, and the impacts and coping mechanisms for bTB. Quantitative methods are used to analyse levels of farmer well-being and examine the relationship between well-being, bTB and other factors. To do this, the study is based in Wales. As noted above, farms in Wales currently suffer from bTB to greater or lesser extents depending on location. Since devolution in 1999, the Welsh Government has been responsible for bTB policy and through various measures, sought to limit its spread (Enticott and Franklin, 2009). As in England, the policy arena is highly contested. Since 2012, the Welsh Government have been vaccinating badgers in an area known as the Intensive Action Area (IAA) in West Wales. The area had initially been earmarked as a badger cull zone but following a change of Government, these plans were replaced much to the anger of local farmers. Moreover, unlike England, every herd in Wales is subject to an annual bTB test meaning that at least some of the impacts of bTB are felt throughout the agricultural community. The variation in levels of bTB means that Wales offers an ideal case to examine the relationship between bTB and farmer well-being, and contribute to the development of bTB policy in ways that might limit any impacts.

1.4 Thesis Structure

The second chapter contains the literature reviewed on how researchers have conceptualised stress and which models have been developed in the attempt to measure stress levels. Previous work which addresses stress within farming is reviewed and highlights common themes which arise from this aspect, with evidence of the objective implications of stress in the work place. The concept of well-being is introduced together with how progression in the development of measuring subjective well-being has widened with specific reference to measuring farmer well-being. To establish an understanding of how farmers deal with a bTB outbreak and how they cope with living with the risk of their herd contracting the disease and how these risks impact on personal identities, the third chapter explores how people cope with

traumatic events in the context of environmental and human health risks. A comprehensive review of research undertaken with farmers following the foot and mouth disease outbreak in 2001 is discussed with focus on the effects of the disease on farmers and the coping strategies which they developed. Finally, the chapter outlines a conceptual framework constructed from themes identified within the literature which were deemed important in researching the effects of bTB on farmers and to inform the development of the methodology

The fourth chapter outlines a mixed methodology approach with details of a longitudinal study of farmers within high disease risk areas of Wales and a postal survey to a sample of farmers across Wales which included established subjective well-being scales to establish levels of farmer well-being.

The thesis contains three empirical chapters; with the fifth chapter outlining results from the analysis of the qualitative work in relation to farmer well-being from interviews and compares and outlines the analysed survey results of farmer well-being with published population data using the same scales. The sixth chapter incorporates analysed results of the survey data which establishes which top pressures and animal disease threats present farmers with significant problems. The final empirical chapter focuses on the ways that farmers cope with these pressures, how they have developed these coping strategies and their attitudes and beliefs towards disease control and advice on disease control measures. The concluding chapter summarises the research findings and evaluates the extent to which the research questions have been addressed and the limitations within the data. The potential for subsequent research is outlined together with recommendations for future policy from the findings and the impact on the existing policy.

Chapter 2: Literature review – The Social Impacts of Farming Stress

2.1 Introduction

It has been suggested that bovine tuberculosis (bTB) is the most serious animal disease threatening agriculture in the United Kingdom (DEFRA, 2010a p 1). But just like any other environmental risk, those people that live in its shadow – primarily farmers, but also vets and other rural occupations – may be affected not just financially, but may also experience social and emotional effects from living with disease. Whilst these kinds of effects were recognised during the outbreak of foot and mouth disease (FMD) in 2001 (Convery et al., 2008, Mort et al., 2005), there has been little rigorous academic research on the social effects of bTB. This study aims to address this research gap by examining the social impacts and costs of bTB, and identify ways in which farmers cope with bTB.

To do this, this chapter provides a review of key concepts used in the study in two distinct sections. The first section provides an introductory review of the literature on stress and mental health, and explores how stress affects those in rural and agricultural communities. A common perception of the countryside is of a rural idyll, somewhere for people to escape modern living and move to the countryside to "get back to nature" (Halfacree, 1994). However the reality is slightly different: rural living can bring its own problems and issues which may not necessarily be encountered on a daily basis by others not living in the countryside. This chapter investigates in more depth the current research which discusses rural stress and specifically what leads to or induces farmer stress and how it affects them, their businesses and the people around them. In particular, the chapter aims to examine causes of stress (stressors) linked to farming and the effects they have on farmers and how these stressors might relate to the control and eradication of bTB in cattle herds.

The second section examines attempts to conceptualise and measure the impact of stress. Two approaches are commonly used: firstly methods which seek to identify the objective measures of poor mental health, such as suicide rates or time spent away

from work, or secondly they link stress to perceived personal well-being. In analysing the concept of well-being, the chapter also turns to the idea of "presenteeism" - lost productivity arising from mental stress in the workplace – are assessed. This section explores the extent to which this is a useful measure for accounting for the impact of the emotional effects of stress arising from an incident of bovine TB on a farm. Lastly the developments in the measurement of subjective well-being are reviewed together with a small number of literature where attempts have previously been made to measure farmer well-being.

2.2 Conceptualising Stress: From the General to the Agricultural

One morning, in July 2010, John Round a dairy farmer from Gloucestershire, was found dead in the silage pit of his farm, crushed against the side wall by his tele-handler. He was found by his tractor driver when he arrived for work. He noticed that a large bag of feed had been deliberately placed on the driver's seat to bypass the safety device designed to prevent it from working unless someone was sitting in it. At the inquest, the coroner heard that it was Mr Round who had placed the bag in the tele-handler in order to commit suicide after his wife had refused to give him the keys to their gun cabinet. The coroner also heard how in the days leading up to his suicide, Mr Round had been told that his biggest customer, Dairy Crest, would no longer buy the farm's milk and he was being investigated for fraudulently changing the ear tags of animals that had tested positive for bovine TB on his farm (Stroud News and Journal, 2011).

Stress associated with agriculture and animal disease may result in extreme reactions such as these. In other cases however, stress may take different forms and affect people in different ways. Understanding the nature of stress, how it relates to agriculture and the various way of accounting for it is crucial if we are to understand how farmers are affected by bovine tuberculosis. The following sections begin to unpack what stress is, how it affects people, and identify the kinds of stress and their causes experienced by farmers.

2.2.1 Stress: What, How and Why

This section attempts to explain what is the meaning of stress? Furthermore, it will report on accounts of how researchers have conceptualised stress by looking at models developed to indicate levels of stress. Even though stress is a common term which is used in circumstances which present feelings of pressure, tension and anxiety for a person, it is difficult to obtain a medical definition of the condition of stress itself. 'It is a term used in conjunction with others (e.g. Acute Stress Disorder, Post-traumatic Stress Disorder) under the general umbrella of Anxiety Disorders'(Lobley, 2005 p4).

2.2.2 Defining Stress

Stress is a normal physical response to events that make people feel threatened or upset their balance in some way and is the body's normal response to a perceived threat. The nervous system responds by releasing a flood of stress hormones, including adrenaline and cortisol which triggers a response reaction to meet a challenge. However, beyond a certain point, stress stops being helpful and starts causing major damage to a person's health, their mood, productivity, relationships, and their quality of life.

Stress is a word that has been used or exchanged to explain many concepts such as anxiety, conflict, frustration, emotional disturbance, trauma, alienation, strain and anomie. The word stress appeared first within indexes of research abstracts in 1944 (Lazarus and Folkman, 1984 p 4-5). Prior to this point, the concept of anxiety featured predominantly within psychological research and thought through the first half of the twentieth century. The measurement of anxiety using a scale was first developed through empirical research in the early 1950's.

Formal psychological models of stress such as the **Transactional model** or as is sometimes referred to as the **Lazarus model** describe the theory that it is the person that determines whether they will experience stress as a result of a stressor. Therefore it is a person's attitude towards a potential stress inducing event that decides how they will react to it and determine how they can cope. The model illustrates a primary appraisal where a person assesses the stressor to determine

whether it will affect them, and this is where an emotional response arises. A then secondary appraisal stage comes about where a person determines whether they can cope with the stressor which then establishes the strategy for a coping response.

The **General Adaptation Syndrome model** was developed by Selye (1936) which is a physiological response-based approach to the study of stress and maintains that the body reacts the same to all stressors. The model has three distinct phases: firstly the 'alarm' phase where a stressor activates the body to respond. The second phase is when the body fights with its resources against the stressor and will become weakened as resources are depleted. The final phase is the point where the body's resources are depleted which results in exhaustion and the inability to cope and experiences of stress (Selye, 1951).

At its most basic, the **Stress iceberg model** is based on a psychoanalytic theory developed by Sigmund Freud and points to an accumulation of pressures which lie in the unconscious mind, and may not be visible or immediately aware to a person suffering from a psychological disorder.

The **ABC-X model** developed by Hill (1949) is a model of family stress. It has been used as a tool by researchers (Wilmoth and Smyser, 2009, Lee and Iverson-Gilbert, 2003) and (Darling et al., 2004) for identifying the different components that affect how successfully families cope with stress. A study undertaken by Melberg, (2003) discusses stress in the context of the family farm and between individuals within the family that have a role in the farm business. This study was carried out in Norway with farmers and their spouses as participants. Melberg reviews the ABC-X model where a 'stressor event or situation (A) is an occurrence that is of significant magnitude to provoke change in the family system'. 'Resources (B) are the family's resources or strengths' at the time of demand as a result from the stressor, and this could be interpreted as the capability of the farmer to find solutions to a particular problem. The farmer's social activity around the time of the event is considered as a potential resource in this model. 'Perception (C) is the meaning of the event, and the degree of stress (X) is outcome of crisis or managing' which could present itself in different ways depending on the stressor. Resources here are within the family farm, or those that

could be pulled in from elsewhere, and the result of how the stressor is perceived. The social relationships within the family and from outside are considered within this paper, and the matter of whether social relationships have a 'buffering effect' on the stressors that farming families are faced with for example, economic stress, work overload, working conditions and conflicting off-farm interest by both male and female on the farm are all considered by Melberg (2003).

Various models that have been present in measuring the levels of farmer mental health and the identification of possible causes of poor mental health has been discussed by Lobley et al.,(2004 p 6-9). The **Lazarus model** or the **interactive or transactional model** as mentioned previously is considered to be a 'modern approach' to stress studies as it takes into consideration the origin or source of the stress and how it is perceived by the individual. An example of how the Lazarus's theory of coping as a self-motivated social process was identified in a study to establish coping strategies of Polish migrant workers (Weishaar, 2010). The variety of coping factors that were identified within this population group were: the ability to solve problems on their own, the ability to tolerate hardship for a period of time to cope with stages of adjustment and other complexities, the ability to evaluate a situation and having a positive, optimistic view were helpful. These coping factors were found to be connected and influenced each other, hence the difficulty in ranking them in order of superiority.

Research undertaken by McLaren and Challis (2009) discusses three models in measuring resilience and how they could be applied in the prediction of suicidal thoughts from a state of depression within male farmers by taking into consideration social support and sense of belonging. Firstly, the **compensatory model**, which takes into account that people are not responsible for their problems but are responsible for creating their own solutions. This model showed that depression contributed 'negatively' and 'social support' and 'sense of belonging' contributed 'positively' to suicidal thoughts. Secondly, the **risk-protective model** considered resulted in social support and sense of belonging having reduced the effect of depression on suicidal thoughts. Thirdly, the **protective-protective model** showed that the 'depression-suicidal ideation relation' decreases as the quantity of protective factors increased.

The definition of stress has been discussed alongside models which have been developed to determine levels of stress and resilience and touches on their use within rural and farming populations. The following section firstly discusses differences in the meaning of the terms 'farming stress' and 'rural stress' before going on to identify common themes which have been deemed to avert the impact of stressful situations on farmers.

2.2.3 Farming and Rural Stress

How do these definitions and models relate to people living and working in the countryside? To begin with, the term 'rural stress' has become an increasingly used term, even more so since the outbreak of FMD in 2001 and its effects upon farmers and others who live and work in the countryside (Mort et al., 2008, Convery et al., 2008, Nerlich et al., 2005, Bailey et al., 2006). Support networks and farming charities such as the Farming Community Network (FCN), Royal Agricultural Benevolent Fund (RABI) and The Samaritans have campaigned for additional resources in providing support in various ways to those adversely affected. But what is meant by rural stress? And what are the causes of stress amongst farmers?

Lobley, (2004 p10) states that there is a lack of 'clear definition' for the term 'rural' which is not helpful when combined with the fact that there are different definitions for stress. There have been numerous attempts made to analyse rural stress, although Lobley (2005) states that some of this work should have been labelled as 'farming stress'. Previous studies discussed by Lobley (2005), have covered 'occupational stress in the farming community' rather than the rural community and states that there has been an imbalance in rural stress research by focussing on farmers. In addition it also maintains that the evidence base to farming stress also suffers from limitations and may actually underestimate the prevalence of stress and related issues in British agriculture.

Price and Evans, (2009) state that the terms 'farming stress' and 'rural stress' have been overused and they argue that 'insufficient attention has been paid to the conceptualization of the terms. They have become both over-used and ill-defined in their application to British family farm individuals and their life situations'. Their paper

tries to identify how factors leading to distress come about before their 'coagulation as farming stress', by investigating cultural and familial aspects of farming life.

A number of important themes have been identified that 'collectively' or 'individually' contribute to farmer stress. Lobley (2005) describes these themes as 'stressors'[1]. Key examples include: the role of Government and regulation, regarded by farmers as 'significant stressors' and this is also connected to paperwork which is seen as a 'key stressor'. Feelings such as a lack of control over certain factors which are unpredictable such as poor weather conditions (Agricultural Research Group on Sustainability ARGOS, 2006b) or a disease breakdown such as bTB or FMD. This demonstrates a requirement to identify if these 'key stressors' are present within findings in relation to a bTB breakdown which addresses the research questions as to what factors influence the levels of well-being among farmers, and how does bTB impact on farmers' lives. A considerable cost on the personal well-being of many farm households is highlighted by Butler, (2010) whose study of eight farms highlighted some of the social impacts of bTB which included feelings of helplessness, and stresses arising as a result of additional workloads due to cattle movement restriction. These effects of stress being felt by the farmer is also felt by other members of the family and reactions from the wider farming and rural community is also highlighted as a personal issue in relation to bTB.

More broadly, societal changes have also brought additional pressures to farmers. These include agricultural restructuring in the form of the shift from 'productivist' (farming in the post war era up to the mid 1980's) to 'post-productivist' agriculture (Marsden et al., 1993 p104) and changes to the relative position of farmers in society. As more and more people have moved to the countryside, so has the traditional influence farmers had in rural locations been eroded. This particular concern points to the importance of social support networks as a coping mechanism for farmers. Lobley (2005), has shown that 'experience of stress has much to do with perceptions and

[1] **Stressors** can be external (adverse physical conditions or stressful psychological environments) or internal (physical or psychological) and may be defined as short-term (acute) or long term (chronic).

attitudes towards work, and what the job of farming is all about may influence stress levels'.

These broad changes have been revealed to be a burden to farmers or have not made life any easier for them. Results from research on livestock farmers surveyed in Devon (Selfa et al., 2010 p603) concluded that farmers'...are farming more for the quality of life than to maximize profitability although many feel that their quality of life is threatened by increasing regulations, economic challenges and also by perceptions that the state and the public are not supportive of the realities of farming on the land'.

The need for further investigation into the format and characteristics of a family farm and how these help to develop resilience and coping strategies against stress events has been highlighted by Fraser et al., (2005). The key to understanding various ways of coping with stress by farmers is regarded by Fraser et al., (2005) as something of value in developing mental health interventions not solely for farmers but could be adapted to other communities. The study into mental health issues within farming families highlights common themes that contribute towards and are important for health regardless of various farming systems.

- Most farms continue to be family owned and operated businesses
- Exposed to volatility of markets
- Variability of weather patterns
- Influence of government regulations

Research by McLaren and Challis, (2009) was in response to this neglected area in need for further research within farming communities emphasised by Fraser et al., (2005) in that not all farmers that were depressed committed suicide, and that certain 'protective factors' that prevented this. Two of these 'protective factors' are looked at in more detail in McLaren and Challis (2009), namely social support and sense of belonging This study of Australian male farmers draws on three resiliency models to predict the effect that sense of belonging and social support (referred to as protective factors) has on suicidal thoughts from depression (risk factor). The feeling of being a valued member of a community goes in hand with being accepted by others who live within the area or place of belonging and act as a buffer to high levels of stress and

depression. Although this paper mentions the lack of specific research investigating sense of belonging amongst farmers, and the 'protective role' it has on a farmer's mental health, the authors do refer to evidence from research into the sense of belonging within rural communities in Australia which 'facilitated resilience', (Hegney et al., 2007). Having an attachment to a particular place or the land has also been identified in a study into farmers well-being in New Zealand (Agricultural Research Group on Sustainability ARGOS, 2006a)

Melberg (2003) undertook research of farming couples in Norway and acknowledges that stress is continuously present in farming and proclaims that farmers are able to adjust to, handle and resist work-related stress. The study aimed to assess the well-being of farming couples and to determine what stressors they experienced and found that the same stress factors influenced psychological wellbeing for both farmers and their spouses. The findings conclude the importance of relationships; in particular those of close family are one of the most vital sources of social support for alleviating the effects of stress factors. Interestingly, the study deems that secondary social support in rural areas was of insignificant importance to farmers and suggests a closer look at this area in future research.

The changes to rural demographics have also had an impact on many farming families and their businesses, in both the social mix within rural communities and also personal relationships within farming families. Research carried out by Price and Evans, (2009 p7) in exploring the 'patriarchal ways of life' within family farms in mid-Wales highlights the fact that due to 'demographic and economic changes, ''others occupying rural space are increasing in number and are less likely to hold fundamentalist views of agriculture...this leads farm family members more frequently to experience feelings of isolation, detachment and marginalization". In addition, other work by Price and Evans (2006) refers to the role of women on the family farm and their perception by others of being 'gold diggers'. This view of women in a family farm context was uncovered by Price and Evans (2006) where those women entering a farming family business through marriage or were seeking a divorce were perceived as a possible financial business threat. This discourse was also found to be evident in discussions about women from farming backgrounds in this study and there is evidence in the research

showing that farmers are postponing their retirement and succession plans due to fear of the family farm not being kept intact.

Retirement from farming is also seen as another stressor for farmers. This is because farmers' sense of personal identity is linked to the places and spaces of farming (Price and Evans, 2009). Research by Riley (2011) focuses on the lives of retired dairy farmers. The attachment that farmers have with particular places, social networks and work patterns through their livestock is changed following retirement and this paper investigates further into human-livestock relations and what effects the termination of these relations have had. This involved 'serial interviewing' with respondents over fourteen months in order to be able to re-visit themes if necessary, with the main focus of the questions being on their experience in working with their animals and the practices they carried out, even on a day to day basis, working on the farm. In particular, it highlights periods of distress for the farmers when having to sell up their entire herd, and during the sale when the opportunity to provide the auctioneer with 'marketing narrative' for every cow going through the sale ring due to the scale and timescale of the event.

Although this study has uncovered some very important aspects in terms of the changes that transpire following a detachment of a life's work with animals, the research by Wilkie, (2005) discusses in depth animal-human relations. This paper raises the point on productivist agriculture within the UK, and the fact that higher stocking rates on farms resulted in less time and attention being available to animals and hence less attachment between a farmer and their livestock. It also goes further to say that those with breeding animals have a stronger attachment to their animals than those with animals being kept as stores[2] or for slaughter, primarily because breeding animals are on the farm for longer, with this timespan being referred to as their 'career path'. This raises a question of whether breeders asking for a higher compensation for animals during a bTB breakdown are actually asking for compensation for their emotional feelings?

[2] **Store** animals are those that are kept on a farm but are sold before reaching slaughter weight.

Wilkie's paper explores how people make sense of their interactions with animals in *practice*, for example how they make sense of the various husbandry techniques they apply to keeping and rearing animals, e.g. feeding, vet and med issues. The author includes 'slaughter' as one of these issues and discusses how it applies to human attachment. There is evidence from research following the Foot and Mouth Disease (FMD) outbreak in 2001 where (Convery et al., 2008 p56-9) refer to the emotional geographies of livestock-farming relations, and that the 2001 FMD epidemic overstepped the mark of the emotional geographies of the farm as a place of livestock management by referring to the term 'death in the wrong place'. This meant that the process of killing animals on the farm was seen as stepping away from the daily system of livestock management and the role of farmers being seen as livestock keepers. The role of livestock slaughter is not one which farmers usually participate in physically or observe; they are only usually involved in the production of an animal for slaughter up to the end of the farm drive, or the abattoir gate.

2.2.4 Counting the Cost: Objective Accounts of Stress

So far this literature review has shown what stress is and how it relates to farming and farmers. But what are the ways by which it can be accounted for? How can it be measured? In this section, different ways of representing the extent of farming stress are explored. It begins by discussing the objective consequences of farmer stress, in other words, the outcomes of stress. These may be physical or financial. The first part examines farmer suicide which has been identified as an outcome of farmer mental health and has been the subject of many studies. Secondly, occupational health is discussed and the potential dangers farmers and their families can face on a daily basis and how stress can be a potential precursor to an accident or injury on farms. Thirdly the notion of absenteeism and presenteeism is introduced and consideration is given on the practicalities of measuring the cost of presenteeism within farming and its relativity to the farming industry, in particular to those farmers affected by bTB.

(a) Suicide: According to Hawton et al.,(1999) farmers account for the largest numbers of suicides amongst any single occupational group in the UK. Between 1991 and 1996, there were 190 suicides amongst farmers in the UK. Suicide is the second

highest cause of death in young farmers after accidents, and is an important cause of mortality in older and retired farmers and amongst farmers' wives. A study by Meltzer et al., (2008) concluded that health professionals and agricultural workers had amongst the highest proportional incidence of suicide by occupation in England and Wales between 2001-2005, and these rates remained excessive within these occupations compared with previous decades. Regional studies carried out by Malmberg et al.,(1997) using psychological autopsy concludes that the reasons for the high rates of suicide among farmers are likely to be complex and not solely related to any single problem such as social isolation or financial pressures. The study also adds that there is anecdotal evidence to show that the changes in farming affected older farmers and those with a more 'rigid outlook'. These could be highlighted as a concern as there is continuous change within the farming industry, for example the threat of regulatory uptake of new technologies such as electronic tagging. Although there does not seem to be evidence to show that any one particular sector of farming is more susceptible, the study highlights the presence of some 'key explanatory variables – the presence of mental illness, low rates of treatment, lack of a close confiding relationship, work and financial problems and the availability of firearms' of which are evident themes in research on farmer stress. Concern amid the suicidal rate of farmers was the driver to a study undertaken by Macgregor et al., (1995) and Deary et al., (1997) to determine what were the pressures identified by farmers. A total of six stressors were recognised, namely bureaucracy, financial issues, uncontrollable natural forces such as the weather, time pressures, personal hazard and isolation. Some stressors were affiliated more with a farm type, for example those with mixed enterprises were affected more by bureaucracy, and time pressures with dairy farmers. The age of farmer was found to be affiliated with stress levels with older farmers showing lower levels of stress apart from when it was tested with government policy issues where higher stress levels were evident amongst older farmers. Although isolation was ultimately recognised as one of the six major stressors, it contributed a low score to overall stress levels.

(b) Occupational health: Farming is a dangerous occupation, and there have been various initiatives to address the number of accidents and deaths occurring on farms. There are few existing campaigns aimed at the farming industry in the UK, mainly driven by the Health and Safety Executive (HSE) with industry backup, but all having the same objective to reduce the number of deaths and injuries through accidents at work on farms in the UK.

The HSE campaign **"***Make the promise, come home safe*" *(HSE, 2011b)* in 2011 was run in conjunction with industry backup from the National Farmers Union in order to raise the profile of farm safety and Farmers Weekly magazine also featured campaigns in conjunction with HSE. Other industry bodies such as the Country Land and Business Association (CLA) have launched their own 'Farm Safety Charter'. The Welsh Government believed the effectiveness of a joined-up approach when it launched an *'On Farm Health and Safety Charter*' (Welsh Government, 2012) in conjunction with fourteen farming industry organisations who collaborated in promoting good health and safety practice to farmer.

Part of a HSE Farm Safe campaign (HSE, 2011a) has been targeted towards keeping children safe on farms and an advertising campaign was featured in the farming press during 2011. Other resources such as leaflets have been utilised in highlighting the potential dangers on farms and to reduce the risks of an accident to farmers, their families and staff. Specific Issues for family members are highlighted by Fraser et al.,(2005 p343) and state that 'the nature of farms as both home and workplace present specific risks for children that need to be managed to prevent injury or death. Children often participate in farm work or accompany their parents who combine child minding with farm work'. In conclusion, Fraser et al., (2005) points out that those within farming families can be exposed from an early age to a range of risks to their physical and mental health, which can continue in adulthood and later life. A lack of 'epidemiological studies of farming families' is highlighted by the authors; which could provide data to show whether these risks translate to higher rates of psychiatric morbidity.

Stress can lead to accidents, for example when someone's mind is not entirely focussed on the task in hand, because of sleep loss as a result of worry about something that stresses them. Occupational stress can also be a precursor to mental health Gregoire (2002), with stress sometimes showing through physical symptoms such as back pain. Also when a lack of concentration during a task rated as high risk of an accident leads to an event, which in turn renders that person unable to work; this then leads to sickness absence and this is referred to widely in literature as absenteeism (Gosselin et al., 2013). Although there is currently no evidence to show if farmers are working at times of illness, there has been research in other occupations to show the effects of turning up at work ill on both the employees and the cost to the employers.

By looking at reports of occupational ill health, Stocks et al., (2010) outlines the results of self-reported work related ill health data (2004-07) derived from the Health and Safety executive (HSE), 'showed that workers in skilled agricultural trades had significantly higher prevalence but not incidence of occupational illness compared to all industries...with the majority being related to back problems'. Within the same data it shows low numbers of agricultural workers reporting stress, anxiety and depression'. This seems to have a contradictory result compared to the work of others (Gregoire, 2002, Malmberg et al., 1997, Malmberg et al., 1999, Hawton et al., 1999).

As discussed in the previous section, there have been several studies into the factors that contribute towards farming stress and mental health even to the extent of suicide rates per region in the UK (Hawton et al., 1999, Malmberg et al., 1997, Stark et al., 2006). There have also been attempts to measure the levels of farmer health issues in relation to stress using models and questionnaires by researchers including (Alpass et al., 2004) and (Sanne et al., 2004, McLaren and Challis, 2009, Kolstrup and Hultgren, 2011, Thomas et al., 2003) and these have been reviewed by Lobley et al., (2004). The following section will endeavour to expand on the effects of occupational work problems related to health, referred to as absenteeism and presenteeism (Bierla et al., 2013), and relates to previous work undertaken in its evaluation where attempts have been made to measure the effects of work related stress.

Absenteeism is defined as an absence from work due to an illness. The financial cost of absenteeism is something that can be calculated fairly straightforwardly using management data from sickness absence of employees against staff employment costs. (Ferrie et al., 2005, Mattke et al., 2007) A calculation of the cost of sickness absenteeism by The Sainsbury Centre for Mental Health, (2007 p3) estimates an average daily figure of £120 per employee. Absenteeism levels per employee are estimated in this report at 7 days per annum which equates to a cost of £840 for the employer. Approximately 40% of this is apportioned to mental health problems (2.8 days), which therefore equates to a cost of £335.

It has been argued, however, that turning up to work whilst ill or suffering from poor mental health – known as presenteeism – is equally, if not more damaging to productivity. Presenteeism is defined as the loss in productivity that occurs when employees come to work but function at less than full capacity because of ill health (Sainsbury Centre for Mental Health, 2007 p3). Employers are becoming more aware of the effects of presenteeism in the workplace and the associated costs that comes with employee underperformance. There is evidence to show that there is a linear association between going to work ill – presenteeism, and long-term sickness absence -absenteeism, with participants in a study by Hansen & Andersen (2009) showing a 53% increased chance of sickness absence if they had at least six or more presenteeism events.

Research by Aronsson et al., (2000) shows that there is evidence of a high presenteeism rate found for occupations which provide first hand care such as teachers and nurses with high proportions showing upper back and neck pain and fatigue/slight depression. The primary reasons for this was down to low replacement levels as a result of staff cutbacks. The research shows that there is a link between sickness presenteeism and difficulty in finding a stand-in or replacement for staff.

However, as is common to other attempts to measure events which appear to be intangible such as the effect of relationships between employees, measuring presenteeism is a much greater challenge (Schultz et al., 2009, Mattke et al., 2007, Sanderson et al., 2007, 2001)

Presenteeism therefore could offer a way of objectifying some of the impacts arising from long term problems for farmers such as bTB. Potentially, it offers a way of establishing the tangible losses in productivity by placing a cost on them. In this way, presenteeism is like other recent attempts to monetarise impacts that sociologists have identified as real, but which economists have suggested are intangible and/or too hard to measure. For bTB, presenteeism may have real benefits. The financial cost of the social impacts of bovine TB is under appreciated within current cost benefit analyses of policy options. Measuring them may provide additional justification for different policy options when the full economic costs are calculated.

Various ways of measuring presenteeism have been attempted. However, all of them make some sort of attempt to connect perceived levels of mental health with subjective or objective data of productivity. For example, workers perceived productivity, efficiency or effectiveness, or actual data of their productivity where such data exists. Typically, researchers have used surveys such as the Work Limitations Questionnaire or the Patient Health Survey to assess these levels of mental health (Lerner et al., 2001). Other approaches include Koopman et al., (2002) who developed a scale known as the Stanford Presenteeism Scale (SPS) to measure the health impacts of workers on their productivity and their ability to concentrate at work. However, compared to measurements of absenteeism, presenteeism measures are harder to convert directly into monetary values (Lofland et al., 2004). Other problems include reporting bias. Hansen & Andersen (2008) find that some occupational groups may have artificially low levels of recorded sickness absenteeism, namely self-employed people who possibly have more control in adjusting their work tasks during times of ill health. Also, those who worked more than 45 hours a week and had inconsistent working hours were found to have reduced sickness absenteeism levels but higher sickness presenteeism.

These problems may be particularly acute for assessments of presenteeism in farming. Farmers are likely to fall into this group or employment category for a number of possible reasons. These include:

- poor record keeping of the incidence of illnesses in order to calculate the rate of sickness presenteeism or absenteeism, which could be a reflection on the lack of time for paperwork
- the fact that work is at home and there is not a dividing line separating the two
- unavailable support such as casual labour due to economic stress.
- work overload and poor working conditions

It is also evident in studies that farmers have a stoical attitude (Lobley et al., 2004) and feel compelled to turn up to work whilst ill especially if the business is run single handed. In these circumstances, it becomes difficult to divide the place of work and the home which adds additional stress to those that are ill, and also to the spouse or family member to which the workload may fall on to ease the burden. There is evidence to show that employees who have confidence in their abilities and have a high self-esteem are prone to higher levels of presenteeism (Löve et al., 2010) particularly when workers are exposed to high physical and psychological work demands. Hard work is one of the three religious-philosophical doctrines adopted by Silvasti (2003) to evaluate narrative accounts from life stories of farmers' association with nature through their work. Respondents were asked to describe a 'good farmer' and responses portrayed a farmer who is able to show the visible results of hard work, such as the appearance of the farm were typical. The ethos of a good farmer is researched by Burton, (2004) where hard work is seen as part of the culture of intensive agricultural production.

It may therefore prove to be a difficult task to try and establish actual absenteeism and sickness presenteeism levels within the farming industry and subsequently place an estimation of cost on this if data is reliant on a farmer's own records of illness. This possibly explains the cause for a current lack of evidence for occupational presenteeism within the agricultural industry.

2.3 Subjective Accounts of Stress and the concept of well-being

This section introduces the concept of personal well-being, how its measurement was developed and what is being evaluated. Developments in identifying various factors involved in the build up of stress in farmers through using models and questionnaires

is a step forward from a purely medical approach in studying the effects of stress, however, there are other methods in understanding the relationship between cause and effect of poor mental health. The measurement of farmer well-being is a concept which has potential for further investigation in this region and an appropriate understanding of what constitutes farmer well-being is called for here. The reasons behind understanding measures of well-being are important if the research questions set out aim to investigate the links between bTB and its potential social impacts.

Well-being is a broad concept with many varying definitions, and having come across a plethora of definitions and descriptions on what constitutes the term well-being within the literature, the aim is to discuss what is meant by subjective well-being (SWB) and to try and pinpoint a definition which is deemed concise enough to comprehend. Before this, there is also a need to outline the differences between the terms mental well-being and mental illness. Mental well-being relates to a person's psychological functioning, life-satisfaction and ability to develop and maintain mutually benefitting relationships. Other attributes include personal growth, purpose in life and self-esteem, aspects of which can be attributed to eudaimonic well-being. Conversely, mental illness is a term to encompass mental disorders, which are illnesses that can affect mood, affect and the ability to function effectively and appropriately.(Stewart-Brown and Janmohamed, 2008 p2).

According to Deci and Ryan (2008), SWB is interpreted to mean experiencing a high level of positive affect or emotion, a low level of negative affect, and a high degree of satisfaction with one's life. It is understood to be a positive physical, social and mental state; it is not just the absence of pain, discomfort and incapacity. It requires that basic needs are met, that individuals have a sense of purpose, and that they feel able to achieve important personal goals and participate in society. It is enhanced by conditions that include supportive personal relationships, strong and inclusive communities, good health, financial and personal security, rewarding employment, and a healthy and attractive environment (DEFRA, 2010b p106).

The notion of SWB has been regularly substituted with the term happiness and this wording could help when interpreting SWB to those with no prior knowledge of the

concept. SWB allows people to judge their own lives as it is self-reporting, instead of focusing on quality of life assessments made by "experts" Diener, (1985). Well-being generally seems to be acknowledged as covering two approaches: firstly the **Hedonic** angle which includes the subjective experience of happiness or affect and life satisfaction. The hedonic attributes of well-being are ones in which the concept of happiness is associated primarily alongside seeking pleasure and pursuit and is related to positive affect and having no worries (Huta and Ryan, 2010)

Secondly, the **Eudaimonic** approach covers positive psychological functioning, good relationships with others and self realisation. The latter includes the capacity for self development, positive relations with others, autonomy, self acceptance and competence (Stewart-Brown and Janmohamed, 2008 p7). This second perspective of well-being motives sometimes referred to as eudaimonia, corresponds to the cognitive side of SWB. It is sometimes referred to as the degree of contentment an individual perceives their aspirations have been met (Strack et al., 1991 p10).

Despite the differences between these two perspectives, they both play a complimentary and vital role in the measurement of subjective wellbeing. The reason why this is labelled as subjective is the fact that respondents in surveys have to rate their own feelings and how they feel such as 'how happy are you today?' rather than give a tangible answer to a question, for example, 'are you employed'? (Tinkler and Hicks, 2011).

The findings from above find that eudaimonia and hedonia are associated with different aspects of well-being that somehow seems to compliment each other within life. Hedonia relates more to purely affective outcomes, while eudaimonia relates more to cognitive-affective feelings of significance and appreciation; hedonia relates to becoming disengaged from concerns, while eudaimonia relates to becoming more engaged and feeling connected with a broader whole; and hedonia relates more to immediate outcomes, while eudaimonia relates somewhat more to longer-term and person level outcomes, suggesting that these pursuits may fulfil well-being at different time scales. (Huta and Ryan, 2010)

There are various accounts of well-being summarised by Dolan et al., (2006) who were commissioned by Defra in 2006 to review the evidence relating to the causative factors associated with various concepts and components of well-being, specifically personal well-being, following on from UK Government's Sustainable Development Strategy, 'Securing the Future' (HM Government, 2005). This required Government to obtain an improved appreciation and focus on well-being and the report outlines four accounts of wellbeing as summarised below which are collectively referred to as SWB due to the similarities between certain aspects of these accounts: *Preference satisfaction, Flourishing accounts, Hedonic accounts* and *Evaluative accounts.* A report by NEF (2009), defines well-being as 'the dynamic process that gives people a sense of how their lives are going through the interaction between their circumstances, activities and psychological resources or 'mental capital''. This paper aims to highlight the deficiencies in the measurement of subjective dimensions within well-being by governments. A review of social surveys that measure subjective well-being carried out by ONS (Waldron, 2010 p10) have categorised questions relating to SWB as 'Global', Domain, Affect and Psychological.

2.3.1 Historical background in the development of Subjective Well-being measurement

Going back in history, it is recognised that the creator of the concept of Eudaimonia was the Greek philosopher, Aristotle (384-322 BCE), who argued that all 'good' acts performed by someone would lead to their greater well-being (eudaimonia). In recent times, studies of the well-being of individuals and nations relied heavily on economic definitions and measurement using economic indicators, such as income and GDP. Easterlin, (2003) critically investigates both psychological and economic theories of well-being and attempts to develop a better theory which explains people's feelings within responses to social surveys. This is mentioned by Waldron, (2010 p7) as the 'Easterlin Paradox' who points out that something more was needed to increase well-being as UK levels of life satisfaction and happiness had not risen since the 1950's despite strong improvements in their economic circumstances. This also is the basis of the proposal from NEF (2009) to establish a measure, and to collect and publish the SWB of the population on a regular basis as 'National Accounts of Well-being'.

Developments in well-being indicators in the UK since 2007 has largely been cross-governmental and has been driven by Defra and the Office for National Statistics (ONS) in its remit to measure national well-being (Newton, 2011). In addition, other work on wellbeing has been carried out by the New Economics Foundation (NEF) and the Young Foundation's 'Local Wellbeing' project.

Table 2.1: Key milestones in the development of well-being measurement since 2000

2000	UK Local Government Act giving power to Local Authorities to encourage social wellbeing.
2002	Publication of the UK Prime Minister's Strategy Unit paper 'Life Satisfaction: The state of knowledge and implications for Government'
2002	UK Sustainable Development Strategy committing Government to explore the policy implications of wellbeing research.
2004	First international conference on the development of a Gross National Happiness Measure hosted in Bhutan.
2006	UK Local Government White Paper 'Strong and Prosperous Communities' is published.
2008	OECD hosts an international conference in Istanbul on 'Measuring the progress of Societies'
2008	UK Government Foresight Review on mental capital and wellbeing.
2008	HM treasury working paper 'Developments in the Economics of Well-being'.
2009	OECD Stiglitz Commission recommendation that national statistical surveys incorporate subjective (as well as objective) measures of wellbeing (Stiglitz et al., 2009)

2.3.2 Measures of Wellbeing: what has been developed?

A review of scales which have been developed to quantify SWB of the population, where these measures have been utilised and what aspects of SWB they attempt to measure is located within appendix one of this thesis. Some of these SWB scales have been utilised within research undertaken to measure SWB of farmers, and this is explored in more detail in the following section.

When considering the relevance of these models to this study and their appropriateness in capturing farmer well-being and health whilst living with and without the consequences of bTB, several factors need to be kept in mind. Firstly the

potential impact of the time of year and seasonal or temporal effects needs to be considered for when to undertake the survey as busier times of year for farmers such as lambing or harvest may affect response rate.

Secondly, the time frame over when the questions are dealing would ideally have a practical timespan for respondent recall of events. Thirdly, careful thought needs to be given to the issue of policy relevance to the selection of a SWB measure to be used as the research questions in this study are attempting to establish the consequences of government bTB eradication policy on farmer well-being. Therefore the results of a survey to measure farmer well-being needs to be transferrable into quantifiable evidence and recommendations for policy makers.

Data collected to measure life satisfaction may be more valuable if compared to another variable such as occupation (Waldron, 2010), and this is an area that could be investigated further to establish farmer well-being against other occupations within the population. The same report also compares the GHQ-12 and WEMWBS *(see appendix 1)* and concludes that the nature of the questions in these surveys can help establish which geographical areas and groups of people have the most and least of positive affect and psychological well-being. This approach is worth considering further when investigating the social impacts of bovine TB on a geographical basis when used alongside datasets showing the density of farmers under bTB restrictions for instance. Other considerations as to the preference of SWB measure could be related to its availability for translation into Welsh when used within the farming population in Wales. The SF-36 has already been translated and used through the medium of Welsh which is an important consideration if a questionnaire of farmers in Wales is to be undertaken, as a proportion may prefer to complete it in the Welsh language. These will be discussed more specifically in chapter four.

2.3.3 Farmer wellbeing

Research carried out by Melberg, (2003) is one of very few examples of attempts to measure farmer well-being as it has been more common to find work on the objective measures of farmer stress as mentioned earlier in this chapter. However, data utilising

psychological well-being was derived by combining a group score of variables from questions asking farmers and spouses their views on levels of anxiety and nervousness over a period of six months and was not based from scores using an established psychological measure of SWB. However, there is a small, but important sample of research available which has attempted to measure farmers' mental health and well-being using established measures of SWB which are outlined below.

The GHQ-12 was used in a study by Hounsome et al. (2011) to determine farmer mental health compared to a group of non farming population. Results highlighted that male farmers aged between 45 and 64 who were self-employed or not in paid employment and living in a rural area were at higher risk of psychiatric disorder compared to a matching subgroup within the non-farming population. The fact that the questionnaires were carried out at agricultural shows is made with suggestion that the results could be accentuated further if data was gathered in different circumstances. The use of two health questionnaire (SF-36 and Visual Analogue Scale (VAS)) were used in a study to investigate the voluntary uptake of new technologies or policies of farmers by Hounsome et al., (2006 p229). Following a survey of farmers across Wales to understand the decision making processes in relation to agri-environment schemes, the importance of farmer health was highlighted as one of the important variables. The study goes as far in saying that poor mental health of farmers may be 'one cause of non-adoption of agri-environment schemes'. The limitations to this study have been highlighted by others due to the fact that the survey was conducted at agricultural shows; an event where someone suffering from depression may not have the desire to attend.

Another study utilised the GHQ-12 in a postal survey among a sample of farmers with the aim to determine the psychosocial effects of disease outbreak in Cumbria during the FMD outbreak in 2001 (Peck et al., 2002). A second control group of farmers who were not directly affected by FMD showed that those farmers in Cumbria had higher scores using this method. Reasons given in using this method were down to its established application in detecting psychosocial effects in the general population and the ease of use and relatively short time taken to complete the questions. The burden of paperwork on farmers either due to lack of understanding of official forms or the

fact that those farmers with low mood felt daunted by more paperwork was given in part as justification for a below average response rate. The study established that farmers sought support from family, close friends within their community and from trusted professionals primarily their own vet.

A fundamental report aimed at understanding the longer term effects of bTB on farmers was undertaken jointly by the University of Exeter and ADAS and commissioned by DEFRA, (DEFRA, 2010a). Contained within the project remit was research into the effects of a bTB breakdown on the health and well-being of farmers and their families. A questionnaire to measure indications of mental health problems (GHQ-12) was incorporated into a postal survey to a sample of farms. Conclusions from this study denote that farmers under long term bTB restrictions were generally affected more by the stresses of livestock movement restrictions. Results of dairy farmers and their spouses show higher stress levels for those under long-term restrictions and from those which had lost a large number of animals to bTB. Findings among beef farmers correspond with those of dairy farmers but were not significant. The classification of long term restrictions was defined as any length of time over 12 months, which is similair to the mean duration of a bTB herd breakdown in Wales currently lasting 367 days (Welsh Government, 2013b).

To add to this field of research, a more recent study commissioned by the organisation known as the Farming Community Network (formerly Farm Crisis Network) (Farm Crisis Network, 2009) studied the social effects of bTB on farmers within areas of England and Wales with prevalent bTB. Both the economic costs of bTB and the social costs such as effects of additional workload were estimated within this study. It established additional evidence that it was not exclusively the economic aspect of the farm business that was being affected by the disease but the farmers themselves who were bearing with the consequences of losing their cattle and the stresses of formalities and paperwork involved with bTB regulations and additional workload as a result of movement restrictions and overstocking. Clear messages coming out from this were that bTB restrictions on farms were having an underpinning effect on other pressures such as financial hardship, deteriorating relationships within the family, physical illness as a result of psychological stress and frustrations because of bTB restrictions. What

was interesting about the methodology was that the survey was undertaken primarily over the telephone with some face to face interviews, and farmers were asked to report on a five point scale what their feelings were on aspects of bTB controls such as their perception on communication with authorities and the effects of bTB on their families and their own personal well-being and levels of stress. Self completion is routinely the method of administering established well-being measures (*WEMWBS, GHQ-12, SF-36, Cantril Ladder of Life, Satisfaction with Life Scale and PANAS Scale*) otherwise there could be a risk of farmers not being completely truthful with their scores in an interview situation. Interviewees were also asked to note down their own assessment of the farmer's state of mind during the interview.

2.3.4 Defining stress, well-being and happiness for methodological thinking

The following provides a brief evaluation on the differences outlined between stress, well-being and happiness and offers a brief justification on the decisions made towards establishing the research methodology. Previously, section 2.2 has discussed the background to the problem of defining stress and that the phrase 'stress' is frequently interchangeable with expressions such as anxiety and frustration. Within the context of farmer stress, a review of rural or farming stress literature (Lobley et al., 2004) has highlighted the complexities involved in determining levels of stress and translating outcomes into evidence. Lobley (2005) refers to farming stress as an occupational related stress and others (Hawton et al., 1999, Malmberg et al., 1997, Fraser et al., 2005, Judd et al., 2006, Gregoire, 2002) have identified farmers as being at risk of suffering from the consequences of stress. The development of models to measure stress which determine levels of psychological disorders or mental health were outlined earlier in this chapter, however when considering methodological approaches for establishing how bTB affects levels of stress within the farming population for this study, the lack of a clear definition for stress provides limited vision. It is therefore recognised that there is need for a clearer understanding of farming stress in relation to bTB and the relationship this has on the personal well-being of farmers, and an area worthy of further enquiry through fieldwork. Lobley et al.,(2004 p ii) argue that stress is a subjective experience and that one single definition is irrelevant in the context of

any stress and where definitions regularly refer to the interaction between the demands placed upon a person and their ability to cope with it.

In section 2.3 the literature review moved on to discuss subjective accounts of stress rather than previously mentioned objective accounts that could be referred to as occupational stress in order to understand which would be an appropriate research methodology in establishing the effects of bTB on farmers. It also meant that in order to communicate any effects which bTB had on farmers it needed to be in a relevant format to government policymaker, farming unions and others who would be of assistance to farmers. 'The traditional focus on happiness and life satisfaction measures in well-being research has often led to an identification of well-being with experiencing good feelings and making positive judgements about how life is going' (NEF, 2009 p 19) however, NEF suggests that the measurement of how well people feel they are doing is considered as a means towards measuring their functioning and resilience. Whilst Kirana et al., (2009) indicates that 'subjective well-being is the preferred psychological term for 'happiness'…however, in the current health psychology literature, these terms are frequently used interchangeably'. On the other hand, it is suggested (NEF, 2009 p 9) that the aspect of happiness is only one element of subjective well-being and that people require not only personal, internally focused elements of their lives to possess good levels of SWB but also social and community experiences are also vital.

Therefore, it was felt important that in order to capture any potential negative emotions within personal well-being brought on by stressors linked to farming or bTB was combined with the measurement of additional aspects of well-being related to social well-being through an established subjective well-being scale. Consideration as to the methods employed in taking this forward are discussed in chapter four.

2.4. Implications for methodological development

At this point, the implications for methodological development are briefly discussed following the literature reviewed within this chapter. The studies which have investigated the influencing factors which contribute to farmer stress have provided a basis for the methodological thinking for this study in that capturing information on

farmers' family and social networks, their relationships with their livestock and influences of rural demographics and their social standing in the community for example is as fundamental as the establishment of pressures directly associated with bTB. Reviewing objective accounts of stress has revealed that this may not be a practical approach to adopt within the methodology. Initial thoughts are that a more subjective investigation on the impact of bTB on farmers will be required. The methodologies of the relatively small number of studies which have acknowledged farmer well-being and which have adopted scales to measure SWB levels will require appraisal and careful consideration during methodological development. Some studies have established SWB levels to understand farmers' decision making processes and whether farmer health has an impact on this. Others have compared SWB levels of farmers between groups to determine the effects of FMD and bTB, which could provide comparative data to the findings of this study. There seems to be a need to be able to separate out other pressures which are claimed to be the underpinning effect of bTB restrictions on farms. Some additional thoughts as to how factors associated with capturing well-being levels such as timing and temporal effects together with the method of delivery will need to be weighed up.

2.5. Conclusion

This literature review has explored the causes of stress within farming and rural communities and how these have been determined. It has investigated theoretical models to measure mental health and has looked at how these have been used in a farming context. Research identifying some influencing factors on stress in farming and how this has been labelled as rural stress in some studies has been pointed out. It goes on to look at how stress can be objectively measured and provides evidence from a large amount of research on the effects of farmer stress in relation to occupational health and cases of suicide along with attempts at initiatives within the industry to raise awareness of the dangers in farming. Literature is reviewed on occupational work problems related to health and explores the concepts of absenteeism and presenteeism and explores the feasibility of these measures in placing a cost on the intangible effects of a disease outbreak such as bTB on a farming business.

A background to the advance of the relatively new concept of subjective well-being has been reviewed and some of the various developments in the way this is currently being measured. Simultaneously, research into attempts to measure farmers' SWB has been reviewed and how mental health has an effect on practices such as the uptake of new technologies.

The next chapter goes on to review literature on research in relation to risks in a different context to farming to attempt to comprehend what strategies individuals deal with when faced with a risk situation. For long term risks and threats – such as bovine TB – people often find ways of coping, developing their own strategies for living with risks and the mental pressures that it brings. The chapter then goes to identify the coping strategies and response behaviours of farmers to risks recognised within literature in relation to farming and animal diseases specifically, foot and mouth disease and bTB.

Chapter 3: Living with Risk – a Literature Review

3.1. Introduction: Living with Risk

This chapter begins with a review of the literature in relation to circumstances where people develop coping strategies as a result of living with a type of risk. In the preceding chapter, the literature review has covered how farmers experience stress. The literature reviewed in this chapter now turns to how people cope with traumatic events and live with environmental risks. Ultimately this is to establish an understanding of how farmers deal with a bTB outbreak and how they cope with living with the risk of their herd contracting the disease. To do this, this chapter focuses on how people have adapted to living in the context of the following risks: health; flooding; nuclear power; and foot and mouth disease. The chapter explores how these risks impact upon personal identity, and how these threats shape responses to risks. These coping strategies are discussed alongside potential behaviours and attitudes of farmer towards a threat of bTB to their herd.

The latter section of the chapter reviews the literature which has emerged out of the Foot and Mouth Disease in 2001 which highlights specific examples of how farmers coped with an animal disease.

Finally, a conceptual framework has been produced which identifies themes arising from the review of literature within this chapter and the previous one in order to inform the research methodology.

3.2 Living with Health Risks

As one of the aims of the thesis is to investigate how farmers might cope with bTB, then it is appropriate to examine literature from other related areas of environmental risk. This section discusses instances of coping with health risks. To do this, two different health risks are chosen. The first are the risks associated with bringing up children. The second is the impact of living with cancer.

Lee (2008) discusses the concept of good motherhood in relation to a mother's experience and feelings of feeding formula milk to babies and how they deal with the notion of risk by doing so. The paper discusses the mothers' feelings when their identity as a good mother is compromised by feeding formula milk despite statistics (ONS) displaying that 90% of women feed their babies wholly or partly with formula milk at 6 months old (Lee, 2008). Various strategies adopted by these women showed that those who had more experience of child rearing and had older children or had worked with babies and young children felt more confident about their decision to feed formula milk to their babies. Some new mothers felt less confident about their decision to feed formula as a result of having initially attempted to breastfeed but failed. Too much advice in pregnancy as to how and what not to feed their baby made some mothers ignore the advice completely or they felt that there were too many health publicity messages in the media which made them draw up their own conclusions and to develop their own approach to baby feeding.

Women felt guilt and failure by turning to formula milk and for not being able to carry out the 'ideology of intensive mothering', most of these being first time mothers who have adopted the beliefs and attitudes of others on the principles of intensive motherhood. Conclusions emerge that women who feed their babies formula milk and who are faced with a potential risk by doing so where the child's physical health and mother/child relationship may be affected, develop and adopt various attitudes of 'living with this risk' such as feelings of confidence, defiance and defensiveness and 'going it alone' due to information overload.

Simultaneously, the findings in a study into the attitudes of parents to the MMR vaccine (Casiday et al., 2006) found that of those parents surveyed, those with large families or have had previous experience with no problems of the MMR vaccine had more confidence in the vaccine. The results also established a lack of trust in governmental advice on MMR and ways that they were perceived in controlling future risk, especially from those that had refused the MMR vaccine and who preferred to obtain reliable advice from their own GP.

Social risk is highlighted by parents in addition to the possible health risks of a child suffering autism, bowel disease or contracting measles following an MMR vaccine and this is reported (Casiday, 2007), (Gellatly et al., 2005) and (Poltorak et al., 2005) with parents showing anxiety that others may perceive them as being a bad parent and a risk to others if they do not have their child immunised. Gellatly et al's, (2005) study established that parents' decisions on the MMR vaccine were influenced by current research results, the information leaflets provided by health professionals, the eradication of rubella and the risk of a harmful reaction. For some parents, Brownlie and Howson (2005) recognise that talking about the risk of MMR contributed to their anxiety, but other parents found that obtaining information leaflets about these risks helped with reducing uncertainty.

Similarly with the influence of 'health messages' to parents from the mass media (Lee, 2008), the fluctuation of attitudes towards the MMR vaccine in regular attitudinal surveys has been observed to coincide with those times of media coverage (Poltorak et al., 2005).

3.2.1 Cancer

Other forms of risk perception are researched by Kenen et al., (2003a) who study how women with a family history of breast/ovarian cancer cope in living with the risk of developing the disease themselves. The authors established that women developed various coping strategies in order to put the issue of disease risk at the back of their mind and 'to get on with their lives'. Kenen et al., (2003a p 316) introduce the 'concept of chronic risk which helps explain the lived experience of the *risk* of illness as opposed to illness itself'. The study goes on to show that the healthy women at a greater risk of genetic cancer show similar changes in behaviour to people who are suffering from a chronic illness.

The impact of the risk becomes more apparent at certain times of the women's lives such as at the time of annual screening. The three main themes emerging from Kenen et al., (2003a) on risk perception in relation to an increased threat to hereditary breast/ovarian cancer include family, life stage and perception and biographical interruptions. The authors found that women with close family who had died or were

suffering from cancer were more aware of the risks to their own health compared to those who had experienced losses with fewer, more distant relatives or with less recent cases. Some women, but not all, felt that adapting various lifestyle routines such as diet, exercise, positive attitude and stress reduction together with regular screening gave them an element of control over that risk, however a common factor of coping was found to be 'getting on with life' and not allowing the risk take over their daily existence. The 'gene test' was seen as knowledge which they could use to ensure treatment and care. Trust in medicine/science was discussed with interviewees by Lee, (2008), and in Kenen et al., (2003a p325) a proportion had 'great trust in science and medicine, both with regard to current care at a top institution, and in future cancer cures that scientists will eventually provide'. Kenen et al., (2003a p328) suggests the use of a 'chronic risk trajectory on future longitudinal research of this kind which would refer to phases that an individual may go through and the biographical disruptions involved. Table 3.1 illustrates how some non-controllable factors in a chronic risk trajectory can be described in three ***phases*** – stable, downward and comeback'.

Table 3.1: Phases of chronic risk trajectory

Stable	Between annual cancer screenings
Downward	If there is a false positive found, time between receiving original result and follow up procedures.
Comeback	Notification that the screening result was not a true positive

The way individuals perceive risk and how various circumstances can influence their assessment of the risk they face is discussed by Kenen et al., (2003b) and the role of prospect theory and use of heuristics (cognitive shortcuts) which affect women's decision making on choices about possible future outcomes of an inherited disease.

Heuristics are used to simplify complicated messages or to make understanding easier as some people may not have the time to thoroughly explore the information and

options provided to them; therefore they draw their own conclusions from various sources of evidence and experience which will vary between individuals. Women from families with a history of breast/ovarian cancer face a great deal of uncertainty as to whether, or when, they will develop one, or both, of these cancers and the uncertainty of the risk associated with options and treatment available to them (Kenen et al., 2003b). This is when individuals turn to the use of heuristics as a preventative measure from being besieged by circumstances. The use of three main heuristics by women interviewed by Kenen et al, (2003b) were found to be *availability, representativeness* and *illusion of control.* These are referred to as biases in Bornstein and Emler, (2001) when looking at how evidence is gathered in medical decision making in order to make a diagnosis of a patient's symptoms.

Availability refers to the ease of recall of information on recently occurring events, such as a recent death of a family member to cancer.

Representativeness refers to the similarity in characteristics to a situation or another person, a stereotype, explained by Kenen et al., (2003b) to be similar to another person in behaviour or resemblance.

In Kenen et al's; (2003b p842) study, some respondents made attempts to control the outcome by believing that changes in their lifestyle would 'greatly reduce' or 'eliminate their risk of developing cancer regardless of the lack of evidence in relation to these changes. This is referred to by Kenen et al (2003b) as the concept of the *'illusion of control*'.

Fear and anxiety are other conditions that can affect people's perceptions and is focused upon in analysis by Horlick-Jones, (2011) in his personal account of experience into the fear of the recurrence of male breast cancer. Horlick-Jones, (2011 p2,11) refers to this fear as a 'hypochondria – like condition' with an inclination to be more aware of body symptoms and proposes that this 'fear of recurrence' comes from a person's 'loss of certain aspects of social competence' which he terms 'everyday health competence' where patients have learnt to be aware and 'how to read their bodily sensations in socially-responsible ways'. Horlick-Jones, (2011) found that his methodology of writing in a notebook helped him to 'effectively manage the

considerable degree of anxiety he was experiencing' and this could be considered as some form of a diary.

Following discussions with his fellow patients, Horlick-Jones, (2011) discovered that some were 'slightly resistant' to admitting they had experienced fear and were only prepared to discuss it due to their 'shared experience'.

3.3. Living with Nuclear Risks

The Chernobyl nuclear power station accident in 1986 and more recently in the aftermath of the earthquake and subsequent tsunami in Japan in March 2011, the Fukushima nuclear plant explosion increased the publicity and awareness of the risk and the possible consequences for those living close to a nuclear power station. A study into people's accounts of living close to a nuclear power station by Parkill et al., (2010) looks at two sites in the UK, and at the time of the research were being decommissioned. However, people's attitudes may have changed towards living with the risk of a fully operating nuclear power station nearby in light of an UK Government announcement in 2011 (DECC, 2011) that nuclear power stations would be built on eight sites across the country by 2025.

For those living in close proximity to a nuclear power station it is evident that people will disregard or suppress the negative aspects of the situation and seem to be defensive of the community and its proximity to danger from the pessimistic comments of 'outsiders'. Parkhill et al;, (2010 p53) highlights that respondents used 'linguistic techniques' such as metaphors, humour and discussion within the community to express concerns and issues. The use of humour is also recognised in Parkhill et al., (2011) who identified a significant amount of humour emerging from analysis of interview transcripts and suggests that it is 'a means for vocalizing what is difficult to say in a manageable and permissible way' and allows those that live close to a nuclear power station to voice their concerns and anxieties which can be deemed as a form of coping with the situation. This study has provided recognition in the use of humour as a 'neglected aspect of risk perception'.

Respondents within Parkhill et al, (2010 p50) were found to become anxious and concerned when there was an unpredicted spontaneous event at the power station with no prior information being provided to local people, or when there is a disruption to daily lives when a road is closed for example, as at these points the power station 'is temporarily viewed as a risk'. This would not be the case during some regular practices such as letting off steam from the power station. This is something that is highlighted by Wynne, (1992) in his paper discussing when some local farmer's theory as to why there were high levels of radiation in the vegetation surrounding the Sellafield nuclear plant, and that scientists were wrong in blaming the Chernobyl disaster for this, in fact saying that 'you didn't need to be a scientist or be very articulate to figure it out'.

3.4. Coping with Flooding

In recent years research has been carried out to investigate how an event such as flooding affects people's health, both physically and mentally. This approach is presented by Tunstall et al., (2006) and uncovers many factors which contribute to the health effects of flooding and how susceptible the victims of flooding are to stress depending on various measures that take place in dealing with the aftermath. Examples of this would be how the handling of insurance claims took place, and the timing and amount of advice given on evacuation and water contamination.

The reliance on factors such as family or community support, the number of times that they had previously been flooded and whether they were homeowners or in rented accommodation were contributing factors as to how people coped with the stress and anxiety brought on by flooding and within the recovery period. The latter reveals evidence that the clean up process would be out of control of the tenant which brought uncertainty and anxiety and the fact that a lesser proportion of tenants (59%) had contents insurance compared to home owners (92%).

The study also highlighted the impact on gender as a contributing socio-demographic factor to health following flooding. Women were found 'to be able to admit to feelings of stress, anxiety and depression and seek medical help' following a flooding event. Tunstall et al., (2006 p377) suggests qualitative research has found that women have a

'greater emotional investment in the home than men'. Could this be the case in relation to a farm with an outbreak of bTB, where the farmer (he/she) who has put the greatest emotional investment into the farm would suffer or even admit to suffering distinctly greater symptoms of stress and anxiety?

The role of women in trying to establish some sort of normality within the home following flooding is recognised by Sims et al., (2009) in particular at case studies of women who kept diaries over a period of 18 months combined with group discussions and in-depth interviews. The study highlights various forms of caring for others and what complications arose due to a flooding event and demonstrates how people cope in situations following a disastrous event, and how they cope with the aftermath of flooding. The case studies of three women highlights how some people can carry on regardless of a traumatic event whereas for others the effect had been a long term distressing experience with no prospect of returning to any sort of 'normality'.

The level of trauma people suffer tends to differ depending on whether the event is a natural force or a human induced event and this theory is evident in Harries' (2008 p486) study into the flood risk areas of England. Those living in these areas see or comment that 'floods that are attributed to people are more detrimental to the feeling of security than floods that are attributed to nature' or 'an act of God'. Even with an awareness of the risk of flooding to their home, some people do not take mitigating steps towards decreasing the event and its consequences, and this study questions why this occurs and seems to suggest that doing something to prevent flooding 'endangers other needs that are immediate and pressing'.

'Ontological security' is mentioned by Harries (2008) and others (Giddens, 1991) as the way people will protect their feelings and disregard the fact that there is a need to carry out actions that would help prevent further physical or mental distress when they are at risk. It is suggested by Harries (2008) that discourse on how to address flood-risk mitigation takes into consideration the driving factors behind people's ontological security in order for it to have some effect without being seen to give up on the social representations. Wynne (1992) argues that if you want people to change their behaviour, the last thing you do is to tell them to do something – you need to

involve them in the change process and that people's understanding of risk is dependent on the situation they find themselves in. Their knowledge is structured differently to others and is related and dependant on their setting and identities.

These risks people encounter in relation to aspects of their health, and living close to a nuclear plant or in a location at risk of flooding have provided a means of understanding how individuals react differently alongside attempting to cope with these risks. The next section outlines risks in the context of farming and farm animal diseases together with references to research into ways of coping with these situations.

3.5. Farming: the importance of identity in coping strategies

The previous cases have highlighted how identity is a central concept which helps define risks but is also central to the way people cope with risks. A similar effect can be detected in agriculture too and the ways by which farmers cope with threats to agriculture. In his paper, Burton,(2004 p198) researches the attitude of farmers towards the changes in what is referred to as 'post-productivist policy measures' which had been implemented by Government whereas 'productivist' methods are referred to as intensive agricultural production and highlights the changes that have occurred since the Second World War when farmers were able to 'claim a high social position' as caretakers of the nation's food supply. Examples of these measures would be the introduction of agri-environment schemes or the encouragement of diversification through rural development Government funds which were introduced due to an emerging situation of over-production and the need to reverse this trend, examples of over production would sometimes be referred to as 'milk lakes' and 'butter mountains'. Farmers felt that these measures were taking away their primary role of producing food and to become 'public custodians' or 'keepers of the countryside'.

It is reported by Malmberg et al., (1997 p108) that 'the fabric of farming life...has changed dramatically over the last few decades' helped along with increased bureaucracy and legislation with evidence of increased anxiety for making changes, sometimes being financially forced to diversify which itself led to difficulties in obtaining planning consent and learning new skills.

Although these measures have been an attempt to change the style and role of farming and the enterprise mix and intensity on a farm, Burton, (2004 p196) regards this as a general failure to 'change the role of the farmer'. It has been recognised in research that some farmers felt strongly about the way that their role and purpose was being altered and that their 'identity' as a 'good farmer' was being sabotaged and that they became 'resistant to any type of change'. Burton refers to the term 'hedgerow farming' which his respondents believe is a practice that is carried out by many farmers in order to monitor and assess the way the land is being farmed and how the livestock appeared; deemed to be a form of social information gathering. Although hedgerow farming was recognised by the participants as common practice, according to the farmers interviewed it wasn't something that was practiced by them.

Hedgerow farming also enables farmers to make an impression on others by using the land they have near the road as their shop window. There is slightly more effort and thought put into which animals or crop planted on the land most nearest and visible from the roadside which would allow their peers to make their inspections whilst passing by. Various social symbolic values of crops and livestock were discussed including physical appearance and yield of the crop, although personal feeling is that an accurate measure of yield is not something that could be established by the system of hedgerow farming. It also gave farmers satisfaction to see a failed crop or an example of poor husbandry in a neighbour's field.

Burton, (2004) also discusses the farmer and family being referred to with the farm name. This is a common practice in some areas of rural Wales where farmers and their families are called by their farm name after their first name. There is a personal lack of knowledge for the reasons behind this practice, possibly it is because there are so many Jones, Thomas' and Evans' or whether it relates to the theory of a sense of place. Burton discusses Goffman's theory (1959) of the family farm and the way it is farmed is a result of the family's work from several generations which 'represents the identity of their families past, present and future'.

A study carried out in New Zealand has looked at both the positive and negative aspects of well-being between farming couples and the ways that they manage stress,

(Agricultural Reserach Group on Sustainability ARGOS, 2007). Through cognitive mapping of ideas, it was found that the main aspects showing high importance in influencing farmer well-being were identified as: the farmer being the decision maker, the quality and quantity of what they produce and satisfaction. The latter being a recognised aspect of well-being.

Roy et al., (2014) studied male farmers in Canada through qualitative interviews to identify coping strategies of farmers as a result of stress and mental health problems. Both informal and formal support was identified. Informal support included turning to close family, children and trusted close friends and at times in association with social activities such as sports. Formal stress related coping strategies were identified as help seeking from a GP, social worker or psychologist. Discussion revealed the challenges of farm location to these services, the expectations of farmers as to what they would gain from help seeking together with financial and time constraints surrounding farm work. The research conveyed a media example of a farmer deemed as a role model who had admitted help seeking following depression and probed into participants' views on this. Most considered that the disclosure of depression was not considered common practice amongst male farmers; however the majority sanctioned help seeking and were hopeful of a normalisation of this.

3.6. Farming: the role of social capital and animal disease

'Research shows that a crucial factor in affecting the quality of people's experience of life is the strength of their relationships with others' (NEF, 2009 p 3). Deemed to be a relatively new term, (Pretty, 2003) social capital refers to the value of connectedness and trust between people and facilitates co-operation (Pretty, 2003, Fisher, 2013, Palmer et al., 2009) and 'the presence of supportive personal relationships is thought to result in higher levels of individual well-being, whereas lower levels of support increase an individual's susceptibility to psychological distress and physical illness' (Kirana et al., 2009 p 1442).

Alongside a sense of belonging, social support amongst farmers has been reported as a protective role against suicidal thoughts for farmers suffering with a mental illness

(McLaren and Challis, 2009) and where social support is recommended as an intervention against suicide in farmers (Malmberg et al., 1999). To expand on the area under discussion within the literature on the role of others within society in alleviating stress for farmers in the context of animal disease, a small amount of literature reviewed on the role of social capital in farming is discussed. The role of social capital was seen as a 'therapeutic' means of recovery for farmers and others involved in the disaster situation of the FMD crisis in 2001 (Convery et al., 2007, Convery et al., 2008); and social capital was recognised in its contribution in alleviating the effects of disease induced stress situations where 'informal' social capital took place in the form of peer support. The foremost example provided was for those workers on the frontline who went through a process of debriefing following the traumatic events of a day on the front line. This 'informal' debriefing format with their peers was deemed more effective when conveyed between those within that social group rather than being introduced by professionals. Furthermore, Lobley (2004) concludes that farmers have a tendency to confide with family and friends rather than seek professional advice for psychological problems. Another study concluded that farmers turning to others within their own community was recognised as a means of support which farmers sought during the outbreak of FMD in Cumbria and was considered a supporting factor in resilience in farmers (Peck et al., 2002)

By drawing on later work undertaken (Fisher, 2013, Naylor and Courtney, 2014) where the importance of social capital is focused upon within the context of how farmers deal with a bTB breakdown, it was recognised that farmers who had a wider social network, particularly outside their immediate farming community, had a positive attitude to bTB risk and were able to cope better with the impacts of bTB compared to less socially connected farmers. However, this did not result in a subsequent change in behaviour towards disease control. The role of trust between farmers has been discussed (Fisher, 2013 p 21) which acts as a channel to social capital and the role of distrust in government and recommends that 'building positive, trusting relationships through regular and consistent contact should be the focus of farm-level bTB intervention'.

Research on the attitudes of farmers to bTB disease risk Enticott, (2008a) has recognised that lay knowledge between social groups of farmers has an impact on the uptake of advice on biosecurity and where farmers possess a fatalistic towards bTB, in particular for those who have previously experienced a herd breakdown or live in a high disease risk area. This point is discussed further alongside farmer coping strategies in section 3.7. On the basis of these studies; it is evident that the value of social networks for farmers has been recognised as a factor which can shield individuals from stressful situations.

The section covering the first part of this chapter has looked into how people cope by way of living with risk and also how they carry on and deal with traumatic events. Ultimately this is to establish an understanding of how farmers deal with a bTB outbreak and how they cope with living with the risk of their herd contracting the disease.

3.7. Farming: connecting bTB risk to coping strategies

By linking these coping methods outlined above into the context of farmers living with the risk of bTB, there is scope to explore how farmers would feel if their status as a 'good farmer' is compromised when they experience a bTB breakdown. How farmers react to information overload on biosecurity, and whether they have adopted their own control measures by drawing their own conclusions using common sense measures, needs to be explored further. Inquiry around this matter needs to be included within an interview schedule to establish farmers' beliefs towards being a respectful farmer and their attitudes to advice on disease control in order to address research questions on how they adapt and cope with bTB.

Research undertaken (Enticott, 2008a, Enticott et al., 2012b) employs a theory derived from medical sociology known as 'the candidate' to explain how farmers will make up their own conclusions about the risk of bTB to either an area, another farmer or even within their own herd by basing it on previous knowledge. However, this knowledge is sometimes proven to be 'wrong' and farmers cannot understand why others who buy in cattle, deemed as a high risk strategy, never have bTB, whereas another farm which

has a closed herd and is deemed a low risk to bTB will become infected. Enticott (2008a) concludes that farmers have become 'fatalistic' about bTB and they believe that it is only a matter of luck if their herd goes down with it. The reasons explained for this are due to the disparity between biosecurity advice based on scientific evidence given to farmers alongside the lay knowledge of the disease which existed on spatial foundations. Leaflets produced by Defra in order to communicate biosecurity to farmers were referred to by Enticott (2008a) as a 'population approach' to biosecurity, or a blanket approach. These were deemed to have little value in biosecurity uptake if farmers were not implementing the advice because of their impracticality towards their own individual situation.

The impracticality of biosecurity advice deemed by farmers and the lack of trust in Defra has led to Welsh Government initiatives on disease control in employing private vets to discuss individual biosecurity measures with farmers (referred to by Enticott (2008a) as the 'high-risk strategy' approach where a more personal and effective plan of control is undertaken). Questions arise as to whether this is because there is evidence that farmers have trust in private vets or whether these vets would have more local knowledge in order to offer practical measures for bTB control or a combination of the two. The constantly changing guidelines and advice to farmers in relation to bTB from Government can also be overwhelming and it is possible that farmers would rather not spend the time or have the ability to assimilate and understand scientific information. Even though this information is translated into a user friendly format for farmers by Government in circumstances, it can sometimes be disregarded or ignored as a result of an individual's coping mechanism or their feeling of trust in Government.

A blanket approach to biosecurity advice for bTB control was of little importance if farmers were not applying them and Enticott et al., (2012a) focus on the results of this and give evidence that new approaches to biosecurity advice given to farmers through channels of local knowledge with private vets had an impact on farmers' attitudes towards adopting some of these control measures. The reasons for this are identified in three ways, firstly an 'alignment' of expertise' of vets with farmers, with vets having an understanding of farming methods. Secondly, farmers felt that it was good to talk

about the approaches to disease control as they could mull things over with other farmers. Farmers also felt what is referred to in this paper as 'emotional care' with one to one discussions from known vets with local knowledge, rather than over the telephone advice or from official vets. Their previous acquaintance with these vets also meant that a connection and form of trust was developed further and hence farmers could be more open with their concerns on disease control. Seeking information on bTB control measures from their own vets and why farmers are more liable to act upon this gained knowledge is studied by Fisher,(2013) in the context of key intervening factors of trust and consistency of sources of information to farmers. This is compared with the uptake of information provided by government sources where a lack of understanding of local and cultural knowledge is deemed a limiting factor in the uptake of information by farmers together with a history of brittle relationships involving government and farmers in relation to bTB.

Farmers whose herds have been bTB free combined with a high level of confidence that this would be the case in the future if they carry on doing the same things can be looked at in a related context to the mothers who have had experience of using formula milk who have observed babies grow up healthy encountering no problems. The lead up to an annual bTB test may cause anxiety and worry to farmers with factors such as an awareness that neighbouring farms were under bTB restrictions contributing to and exacerbate their feelings. For farmers with a disease free herd there would not normally be a significant amount of effect on the farm business at other times of the year unless animals were pre- movement tested.

In the case of heuristics where three main types were highlighted by Kenen et al.,(Kenen et al., 2003b) *availability, representativeness and illusion of control* in the context of women living with the risk of heritable cancer; these heuristics are applied to scenarios where farmers may use them as a coping mechanism.

Availability – when farmers can recall that a neighbour has recently gone down with bTB; however, how much knowledge of that incident they have and whether they would have been able to recall any historical bTB stories on their neighbours is difficult to predict. There is a different perspective to look at here for the theme of

'knowledge' with farmers making their own conclusions from the information they have acquired and assimilated. This is looked at by Wynne, (1992) who's reference to famers as laypeople in his study of the Chernobyl disaster on farms in the UK's Lake District surrounding the area around Sellafield Nuclear Plant. The study showed that laypeople presented themselves to be more ready than the scientific experts to reflect upon the status of their own knowledge, and to relate it to that of others and to their own social identities. 'The case shows the unacknowledged reflexive capability of laypeople in articulating responses to scientific expertise'.

Representativeness – is where farmers may compare their farm or business 'circumstances' to others who have a similar farm enterprise mix and herd size. In performing this heuristic, a farmer would attempt to assess the risk of his herd contracting bTB if a neighbour had recently had a herd breakdown by comparing differences in management practices for instance. When the risk of bTB is apparent for example when neighbouring herds are affected or they believed they had infected badgers on their land, a farmer may view this as a threat to his cattle. This may induce a relief/worry cycle (Lee, 2008) if a contiguous herd test is proposed by Government vets.

Illusion of control - In some cases farmers may believe that they are already keeping things under control using various measures that have no scientific evidence but it works for them. It could also be argued that in many cases that these 'rituals' are a personal coping strategy for farmers. Research carried out into the justification of badger culling by farmers, Enticott, (2011) investigates this further and identifies farmers' needs to control the risk of contracting bTB in their livestock.

This section has identified some coping strategies that farmers may adopt in the face of a threat to bTB, by reworking the approaches identified within research into health and environmental risks. Ways of identifying these strategies through fieldwork will be considered further on within a conceptual framework.

The next section provides a summary of the findings from a literature research carried out in relation to the Foot and Mouth Disease (FMD) epidemic in the UK in 2001. In particular the literature review has studied closely the impact of the disease on

farmers and others who live in the countryside from non academic accounts alongside an academic perspective. Many elements highlighted in literature on this subject area are closely related to the topic of this PhD which investigates the social impact/human cost of animal disease outbreaks, specifically bovine Tuberculosis.

3.7. Farming: living with disease risks

Many of the aforementioned coping strategies are evident in existing research on the impact of animal disease upon farmers. As stated earlier, there is little research on the effects of animal disease upon farmers, but the FMD outbreak is one exception. In this section of the chapter, the coping strategies of farmers are explored as they were forced to live with the consequences of FMD during 2001.

(i) Background

FMD is a notifiable disease, primarily as a result of its potential economic impact on the farming industry. Since 18 November 1985, Directive 85/511/EEC, it is compulsory to notify the State Veterinary Service (SVS) and the European Commission if the disease is identified in an animal, this will immediately trigger surveillance, testing and eradication procedures which the UK Government already have in place.

The 'official' account of what happened during the FMD outbreak in 2001 has been provided in a Government report and is widely known as the Anderson Inquiry (Anderson et al., 2002) which was published on 22 July 2002. However, in order to understand the extent of the damage from this disease outbreak, this was just one of the many other public inquiries into the 2001 FMD outbreak in the UK. Examples of these were the Royal Society and the European Parliament Inquiries of 2002 and other regional reviews carried out in the disease aftermath in the counties of Cumbria, Northumberland and Devon.

The duration of the FMD outbreak in 2001 went on for several months with the first case identified in pigs at an abattoir in Essex on 19th February with the last confirmed case in September 2001. The confirmed cases were traced back to a farm in Northumberland. The course of events that followed has become amongst one of the

most memorable disasters in twentieth century agriculture due to the destruction and chaos it caused to the farming industry in the UK. The last outbreak of FMD in the UK had been in 1967 (apart from an isolated outbreak on the Isle of Wight in 1981), and the Anderson Inquiry produced a comparison of the 2001 and 1967 FMD outbreaks showing the scale and duration of the disease together with changes in the state of the farming economy and the SVS.

The scale of the disease or 'epidemic' as reported in the Anderson Inquiry shows that there were 2,026 cases, or infected premises, in mainland Great Britain. The total for the UK as a whole, including the four cases in Northern Ireland, was 2,030. Pre-emptive culling was carried out on a further 8,131 premises. The cost to DEFRA was over £3 billion, including £1.2 billion paid to farmers in compensation.

(ii) The effects on farmers

There have been many accounts of the 2001 FMD outbreak published which are not official government reports or of an academic nature but they are of an intrinsic value to the history of the 2001 outbreak and it was felt that they were worthy of a mention. Many authors report about research respondents' stories of an 'eerie' silence on the farm and the surrounding countryside following a culling on a holding and this is also illustrated by Chapman and Crowden, (2005) in the form of photographs, poems and narrative portraying the sequence of events of an FMD breakdown on farms in Devon and the subsequent culling of their animals. There is one particularly poignant photograph of a vet allowing a bucket reared calf to suck his fingers only moments before the calf would have had to be sedated and taken out of its pen, across the farmyard to be shot and laid alongside the remainder of the herd.

Chapman and Crowden (2005) discusses the effects the disease had on a handful of farms in the West Country, and the anxieties and fears it brought about from the waiting to see if the disease would arrive on their doorstep, to the extent of how farmers had to deal with overcrowding situations as a result of the livestock movement ban. There is detail about farmer's 'frustrations' with DEFRA and its inability at the best of times to provide answers. In some cases this indecisiveness from DEFRA led to

'desperation' with some farms uncertain whether their apparently healthy animals were to be culled. Many farmers tried to obtain evidence and support through the form of publicity perhaps to obtain a sympathy vote and get a reprieve from a cull.

'Frustrations' are also discussed in Cook, (2001) who also gives an account of events during the course of the epidemic in the West County. The author goes into greater depth and detail of individual farm cases and their encounters with DEFRA/MAFF[3] on whether their livestock would be killed immediately or monitored for the disease in cases of outbreaks in the surrounding area. There are examples of 'winners' and 'losers' and how they 'took on MAFF' by legal and physical stance. The political context is highlighted formidably by Cook (2001) and something of this investigative nature would probably be found in an inquiry report.

Cook, (2001) discusses the human cost of the disease which has featured in the academic literature review on this subject; the understanding of what went on and the feeling of isolation even within communities and cites narrative from a priest of 21 parishes in Cumbria "Our community has been in isolation. It has been a massive bereavement where people have been on their own...with foot and mouth you're locked in, isolated...the people round about you can't get to you". The impact and effects on children is also mentioned by Nerlich et al., (2005) and this is discussed further in the next section.

The relationship between farming and the remainder of the countryside is interlinked, farming has not just the one role of producing food but is 'integral to the character of the landscape' (Convery et al., 2008 p44), and this is the countryside in which the British population have an appreciation of and enjoy spending their leisure time. This romantic view of the countryside changed in 2001 when it was shut down completely and that the clean air was filled with black smoke from burning pyres of animal carcases.

A study by Nerlich et al., (2005) shows the interaction between children from rural and urban areas during the FMD outbreak. The research data was obtained from a children's website message board where there were discussions about FMD and the

[3] MAFF – changed its name to DEFRA in 2001

children's attitudes towards farmers and those who lived in the countryside. Participants were from rural and urban backgrounds, and stereotypes on town and country inhabitants were discussed, and it appears that a lack of knowledge or experience about some of the issues discussed, in particular on FMD and farming, caused disputes.

A study which begun during the FMD outbreak by Poortinga et al., (2004) highlights the fact that respondents who were from two rural communities in England 'were more concerned about a broad range of indirect consequences than about the direct (health) impacts of the disease, especially about the effects on the livelihood and future of rural economies'. There was a marginally higher concern for the effect of FMD on the future of rural communities from the area most affected by the disease.

Whilst addressing a gathering of people in Cumbria who had been involved and affected by the FMD epidemic in 2001, Kai Erikson of Yale University in his preface to Convery et al., (2008) believed that the level of trauma people suffer tends to differ depending on whether the event is a natural force or a human induced event; this difference in levels of trauma was documented previously in the situation of the victims of flooding (Harries, 2008). In fact many people were convinced that the FMD outbreak was government induced in order to reduce the number of farmers in the UK and this has been recognised in the Anderson Inquiry

There are many stress inducing events that farmers face on a daily basis ranging from cashflow problems to working long hours, therefore a disease outbreak such as the FMD outbreak in 2001 brought along additional stress. Examples of this would of been the feelings of invasion when 'officials' would be turning up on the farmyard – their place of work, in order to verify paperwork and to arrange for the culling and disposal of their animals, all of which was out of the control of farmers. Nerlich and Wright, (2006) show an example of how advice on biosecurity from DEFRA kept changing during the outbreak; for example, the initial closure of footpaths was later revoked, and the number of hours between visiting an infected premise and another farm for vets was cut from 5 days to 24 hours which would also make farmers suspicious of any advice forthcoming from government. Constantly changing policies brought about

stress to farmers and for those working on the frontline who were having to keep up with new advice.

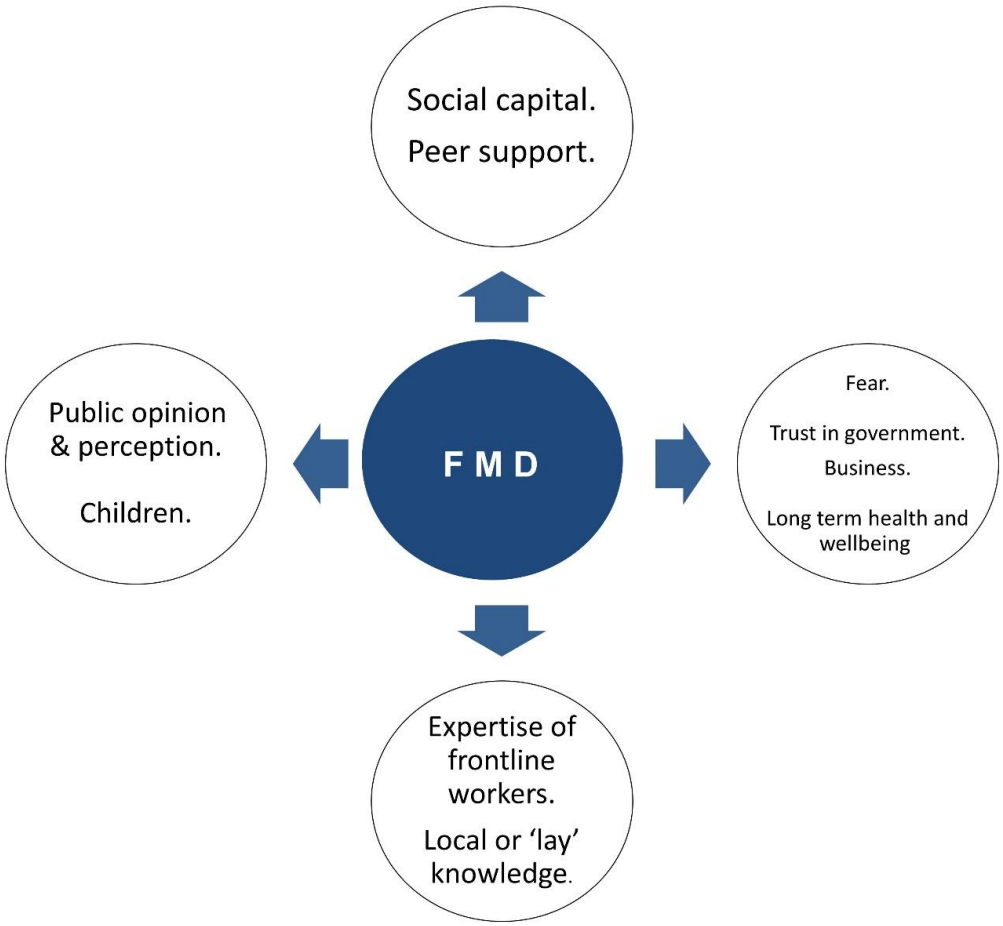
The two communities studied by Poortinga et al.,(2004) had focus groups on which discussion goes into depth on the reasons of distrust in government such as food scares in the past from *Bovine Spongiform Encephalopothy*, more commonly known as BSE or mad cow disease. People expressed the need for more openness to be able to regain trust.

Convery et al.,(2008 p51) refer to the emotional geographies of livestock-farming relations, and that the 2001 FMD epidemic overstepped the mark of the emotional geographies of the farm as a place of livestock management by referring to the term 'death in the wrong place'. This meant that the process of killing animals on the farm was seen as stepping away from the daily system of livestock management and the role of farmers being seen as livestock keepers. Farmers weren't familiar with seeing animals slaughtered on such a large scale, and also at the wrong time in the animals' life, sometimes when they were perfectly healthy or just about to give birth to new life, and for them this seemed wrong. The whole farm routine changed overnight after a cull.

In the longer term, Bailey et al.,(2006) suggest that diaries written for their study, some two years after the peak of the outbreak, give evidence that the trauma from the events of the 2001 FMD epidemic to be long lasting.

The themes emerging from the literature review on FMD have been captured in Figure 3.1 below. Some of these themes summarises how people coped during and following the epidemic for example, peer support.

Figure 3.1: Themes emerging from literature review on FMD



The unique aspect of Poortinga et al's., (2004 p89) study is that it has captured perceptions during the FMD crisis, using a mixed methodology of focus groups and survey and has 'provided a vivid picture of perceptions at the height of the crisis' This is an approach that could be considered with bTB in order to capture the social impact of the disease, however, due to the nature of the virus in comparison to FMD, the methodological approach to be undertaken needs to be considered thoroughly in order to capture social impact data for an extended period of time.

(iii) Farmers' coping strategies: Social capital and Peer support.

Even though the risk of transmission of FMD to humans is very rare, there was a genuine worry in 2001 that the animal form of this disease would provide a direct risk

to human health. This became a very real issue, particularly around the beginning of the outbreak where a few people working on the frontline that had been in the presence of diseased animals reported blisters and flu-like symptoms to their GP's. A human viral disease called hand foot and mouth, which can be more commonly found in young children, is not to be confused with the animal form of FMD. Other problems arose for frontline workers during the 2001 FMD outbreak and Convery et al., (2007) have shown that alleviating stress using 'peer support' and 'therapeutic spaces' plays an important role in maintaining a state of good mental balance. It is suggested that was used as a form of social capital and this is highlighted by Convery et al., (2008) whose work acknowledges the 'social capital' of disaster work teams and shows how workers within teams working on the FMD frontline received spontaneous support and counselling from trusted members or colleagues and that coping strategies such as humour and talking with colleagues worked well. The Cumbria Inquiry (2002) recognised the 'huge expertise' amassed by frontline workers during FMD wasn't being 'captured' to inform future contingency planning. Convery (2008 p130) affirms it is essential in a disaster situation for organisations to encourage staff to support each other and to encourage and facilitate 'low-key' yet vital, 'therapeutic spaces'.

Whilst concerns about the longer term effects of FMD on mental health and well-being were raised, it wasn't an issue picked up by the medical profession at the time of the epidemic. However, the longitudinal diary based system used in Bailey et al., (2006) found that diary respondents sought other means of 'support' such as community, 'informal support', practical and financial assistance from each other, from voluntary agencies and anonymous, emotional support from telephone rural stress help lines. In fact the authors argue that 'longitudinal diaries present a hitherto untapped potential for health geography research'(Bailey et al., 2006 p160). Mort et al., (2005) highlight that there is evidence to show that voluntary helplines and rural support groups were 'besieged with appeals for help' with 'health' meaning not just in relation to the need for medical intervention but 'about survival and practical support'.

For farmers, the supportive environment and the working relationship between themselves and the rural community was changed as farmers had a fear of spreading or catching the disease if they went to help out a neighbour. Farmers and

slaughtermen had been labelled as 'dirty' but this feeling didn't immediately go away after all the disinfection and cleaning, it took longer to do away with that 'label'. For rural communities, the disruption to local events such as agricultural shows, which were deemed as social events for farmers, also had an impact on individuals who didn't have any social contact for months until the recovery period. Some found that the return of community events such as sports to be therapeutic.

(iv) Farmers' coping strategies: challenging expert knowledge

Local knowledge or 'lay' knowledge is referred to in Bailey et al., (2006 p159), where 'problems found in the implementation of disease control, communication and other measures that led to an upsurge in public objection and expressions of public concern, frustration and anger as to how the epidemic was being handled'. Frustrations came about as to the lack of communication by the Government to consult locally with aspects of the whole eradication process, for example, obtaining the correct materials for burning on the pyres and it was felt that there was no coherence between MAFF's central and local operations. Convery et al., (2008) point out it was recognised by local people that materials such as coal (referred to as 'things') were being used to build pyres but were the wrong type and that it became a big issue as it wasn't burning and pyres had to be relit and in some cases rebuilt.

The pyres became 'symbolic of policy blindness' and refers to those in 'central' Government not checking with local knowledge. The authors point out that 'the power of the local, and the web of detailed associations in the local, are integral to the implementation of any strategy of (flood or disease) containment, disaster management or recovery' and although policymakers have contingency plans in place for such disasters, it is the association with the local knowledge and people that makes the carrying out of these plans possible, it empowers any form of plan.

For those 'trapped' at home, not able or wanting to leave the farm for fear of transmitting the disease it wasn't possible to go the GP, therefore for some the telephone was the only means of communication. New communities were also being developed online, with many farmers and their families using the computer for

information on where to go for support or even for spatial information to track the disease spread. Nerlich and Wright, (2006) discuss 'spatial modelling' of the disease was done in the form of watching the Defra website to see which farms and where had recently "gone down". This 'lay' spatial modelling (which was different from the scientists mathematical modelling, but in some ways similar) and the 'expert' spatial modelling of the disease were means of taking 'control' of the disease.

One of the coping 'rituals' recognised by Nerlich and Wright, (2006) was for farmers to take control of their own biosecurity procedures and that these actions seemed to help as it was something to do to help them cope with the situation. Narrative from Chapman and Crowden (2005) on how the farmers portrayed coped by keeping themselves 'very busy most of the time...cleaning the farm and re-thinking' and 'become incredibly bored and bad tempered' at quiet periods. One respondent said he had three daughters and 'didn't feel the need to go back into serious farming...but I couldn't walk away from farming completely. It's in my blood'.

There are various coping strategies that have emerged from this literature review some of which demonstrate individualistic characteristics such as using their own style of biosecurity. Community support has also featured as a powerful means of coping and linked to this are other types of 'conversation' such as internet forums and peer support. The ability to obtain accurate knowledge and to be able to engage in and discuss and share this information was also seen as an important feature and which should have implications for any future disease contingency plan to take account of and include a robust communication strategy.

3.8. Conclusion

This chapter stepped outside the farming 'box' and explored literature on how people cope in situations when living with a risk such as the threat of flooding or other disasters in order to relate these ideas or theories with how farmers cope with a bTB breakdown.

There are common themes in relation to coping with disaster situations emerging from this review of literature, specifically the support of others whether it is from

professionals or community and peers. The way that people facing a risk obtain and decipher information in order to make their own conclusions has featured strongly as a coping mechanism with the use of heuristics and drawing their own conclusion from 'information overload'. Also trust in the sources of information and how this is conveyed also features strongly. The theme of fear, which also featured in the FMD literature, has been recognised in those at risk from cancer and for those parents weighing up the risk of autism with respect to giving their child the MMR vaccine.

Recommendations from research has been to encourage those at risk who are reluctant to change, and to help mitigate an occurrence of disease or disaster event, is by involving them and making them believe it is their idea or decision. This will also be dependent on trust from those providing the advice and facilitating any changes. Certain people adopt routines that give them an element of control; it makes them feel better that they're doing something, regardless of any scientific evidence to support that it will work, and this was identified behaviour in relation to biosecurity within the FMD literature.

Analysis on a range of points has raised questions within this chapter of what significance risk situations have in general and also in relation to farmers and bTB. The intention of this is to address specific questions on which to base the subsequent methodological phase by considering the extent to which emotional consequences of bTB are experienced and how they are dealt with; whether these impacts change over time as a result of adopted coping mechanisms; and how these changing emotional responses impact upon the attitude of farmers towards biosecurity practices and disease prevention measures. Establishing levels of farmer SWB will play a key function towards this and will provide tangible evidence on whether bTB has an impact on farmers from this perspective. Finally, an approach to discover how the consequences of social networks within farming is a help or a hindrance to farmers perceptions of living with bTB; how these social networks are used to make sense of bTB and provide emotional support to farmers will be undertaken in the following chapter.

3.9: Foundations derived within literature for a conceptual framework

Within the conceptual development of the research there have been important aspects of the literature reviewed which have been relevant to the establishment of a framework to capture the social impacts of bTB on farmers. The basis for the development of this conceptual framework can be traced back to the literature reviewed in relation to risk, FMD, bTB, personal well-being and happiness. Key themes within these literatures have been highlighted as areas of interest where research could potentially uncover the contributing stress factors associated with bTB and understanding of how farmers may or may not be dealing with a bTB problem on their farm. These sources have been summarized into a flow diagram in figure 3.2, showing underpinning themes and their role within the proposed conceptual framework. These have been loosely categorised at this point into two groups, firstly internal factors which are primarily those which farmers have direct control of, and secondly, external, where factors which can intervene with farmer well-being would largely be out of a farmer's control.

Firstly risk related themes where literature describes scenarios where people are exposed to or encounter risk and how they obtain and make sense of the facts gathered on that risk is reported to be related to their own personal situation and surroundings. Understanding how others live with continuous exposure to a risk can aid in identifying how farmers can do the same with bTB and to identify ways of coping. Research undertaken with flood victims investigates how such an event affects people both physically and mentally and how a stressful situation is dealt with by individuals. The concept of identity reveals how people deal with risks in individualistic ways and by capturing this within a framework may well aid in bringing to light distinctive differences in the characteristics of farmers dealing with bTB. Examples of these will be explored in relation to farmers facing a risk of or dealing with bTB in their herds such as how community factors and other social support contributes towards how people manage stress during the event and the aftermath of recovery.

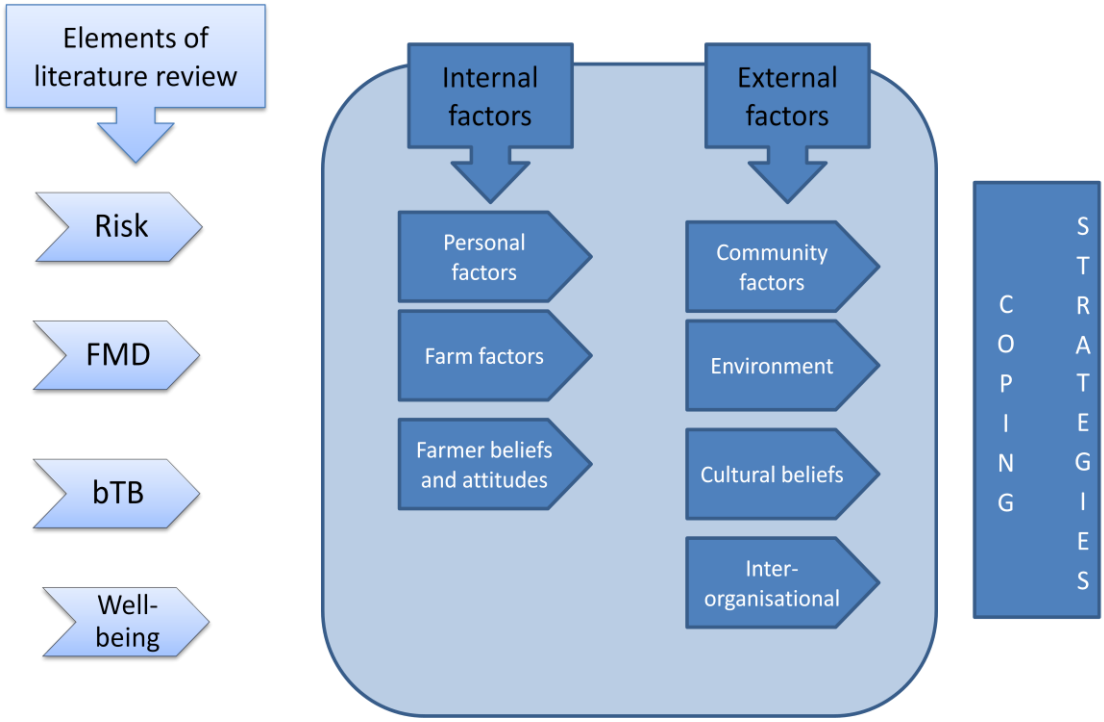
Secondly, the themes emerging from literature reviewed on FMD for example, the importance of sharing local knowledge, and which provided robust evidence of the

social effects experienced by farmers from a significant animal disease. Different farmers' attitudes towards disease risk within FMD literature highlights how some farmers felt that there was nothing they could do to prevent the disease spreading, whereas others endeavoured with biosecurity practices, partly as a form of coping with the risk. Figure 3.1 captures the numerous themes emerging from the FMD literature in a diagrammatic format which provides a plethora of areas to consider in the context of bTB.

Thirdly the research on bTB where not only the economic but the personal costs to farmers have been highlighted (DEFRA, 2010a) and provides a thorough checklist of factors to consider taking further. Both personal circumstances and wider social and community factors play a role in both adding to and alleviating stresses surrounding bTB. There is evidence to show that farmers' attitudes to the risk of bTB is related to their social networks (Naylor and Courtney, 2014) whilst those with a wider social circle appear to have better resilience to the risk.

Finally, the personal well-being of farmers and their quality of life can be affected by an array of factors. Aspects such as age of farmer and gender featured as problematic social issues within literature reviewed (Riley, 2011, Price and Evans, 2006). The research will aim to identify what farmers understand by the term well-being and secondly, what aspects of their lives they consider has some bearing on their well-being and what may influence this. Personal relationships may bring a negative or a positive bearing on personal well-being and quality of life where both perspectives have been reviewed and considered worthy of inclusion within a conceptual framework (Melberg, 2003, Price and Evans, 2009). Social relationships within rural communities also feature as significant and relevant to situations where farmers can endure stress. Occupational health also features as a precursor to mental health in literature (Gregoire, 2002) where stressful situations as a result of working conditions needs to be established in the context of bTB and its consequences on farms, and how it relates to quality of life and personal well-being. There is evidence within literature saying that farmers were farming for the quality of life (Selfa et al., 2010) rather than for profitability, but threats to their quality of life can cause stressful situations.

Figure 3.2 Concepts captured within literature associated with social impacts of bTB



The following section goes on the explain how the development of the conceptual framework captures how these factors may act together in a bTB disease situation resulting in varying outcomes on farmers' well-being and coping abilities.

3.10: Conceptual Framework on the Social Impacts of bTB Eradication

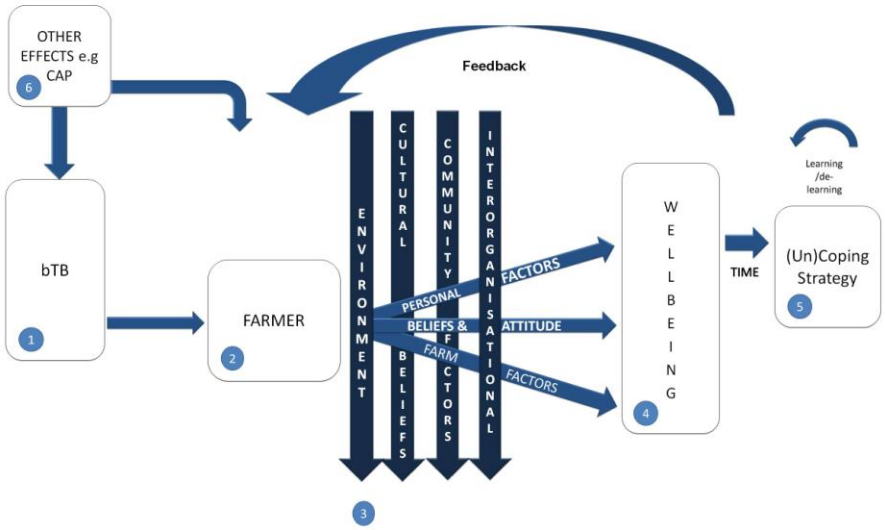
With the aim of the research questions in examining the impact of different factors upon farmers, then there is a need to develop a holistic conceptual framework to identify what influences well-being levels amongst farmers. A conceptual framework was drawn up to assemble aspects arising from the literature review related to the research questions in a diagrammatical format to aid the next stage towards methodological thinking. Specific attention is given to the questions presented with establishing the impact of bTB on farmers' lives and levels of well-being together with understanding approaches towards how farmers adapt and cope with bTB.

This framework is demonstrated diagrammatically (*figure 3.2*) in order to outline the key elements that need to be taken into consideration in measuring the social impacts of bTB eradication on farmers. The figure below draws on the main features in the research which address the key research questions and will steer the development of a

methodology for data gathering. The main variables have been incorporated within a conceptual framework and can be numerically identified (1, 2, 4, 5, and 6 with well-being (4) being recognised as a dependant variable.

In order to establish the relative extent of the social impacts of bTB the main causal linkages, key stressors, or intervening variables, have been incorporated into the framework. These are both intrinsic and extrinsic to the farmer and may perhaps contribute to personal well-being in relation to bTB and are recognised as horizontal (intrinsic) and vertical (extrinsic) arrows at the centre of the framework (3). By taking these variables into account, it will facilitate the understanding of the relationship between variables. It will also help to estimate the degree or proportion of influence of intrinsic as opposed to extrinsic factors on farmer well-being and if possible on the attitude towards disease risk and take up of control measures and the adoption of coping strategies.

Figure 3.3 Conceptual Framework on Social Impacts of bTB



3.10.1: Key Intrinsic factors

The key intrinsic intervening variables, which are essentially within the control of the farmer, have been identified from literature reviewed in chapters two and three as follows:-

Personal factors

i. Personal factors such as the ***age*** of a farmer is something to investigate further during analysis of data when searching for significant effects between levels of well-being. Retirement from farming is also seen as another stressor for farmers and according to Price and Evans (2009), this is because farmers' sense of personal identity is linked to the places and spaces of farming. The attachment that farmers have with particular places, social networks and work patterns through their livestock is changed following retirement and Riley (2011) investigates further into human-livestock relations and what effects the termination of these relations after retirement have had on farmers. There is some evidence to show that younger farmers (Ellis-Iversen et al., 2010) have more intent to adopt animal disease control programmes.

ii. ***Gender*** – this is a personal factor which was highlighted in the literature review to consider whether well-being levels could be different between women and men who are involved in the daily farm activities. The personal relationships within farming families and the patriarchal ways of farming families are referred to by Price and Evans, (2009). The role of women in trying to establish some sort of normality within the home following flooding is recognised by Sims et al., (2009) who's study focuses on the role of caring in a flood recovery situation.

iii. ***Social and family contacts*** –Research carried out during the FMD outbreak of 2001 has documented the social and emotional effects of living with an animal disease (Convery et al., 2008, Mort et al., 2005). These factors are considered as key variables in an effort to determine the social impacts of bTB and examples of these intervening variables have been highlighted in

the literature review. Stress within the family farm is studied by Melberg (2003) and considers family capabilities in adapting to and overcoming problems brought on by stressors. Results highlight the importance of personal relationships, particularly close family members, in alleviating the effects of stress factors within farming. In addition, social capital was identified as a fundamental form of coping for farmers and frontline workers under the stresses of FMD (Convery et al., 2008). Findings from work undertaken in New Zealand viewed both the positive and negative aspects of well-being between farming couples and the ways that they manage stress, (Agricultural Reserach Group on Sustainability ARGOS, 2007). In the case of bTB, there is a need to determine the effects of these relationships on a farmer's well-being and whether the consequences are experienced by both the farmer and spouse or that their relationship provides a buffering effect from stress. The changes to rural demographics have also had an impact on many farming families and their businesses, in both the social mix within rural communities and between personal relationships within farming families (Price and Evans, 2006, Price and Evans, 2009).

iv. ***Sense of belonging*** – a sense of belonging was one factor that was taken into consideration by McLaren and Challis (2009) when studying resilience in farmers. Along with social support, sense of belonging was found to have a protective effect against suicidal thoughts in depressive farmers. Retirement has already been stated alongside age factors in conjunction with the change in attachment that farmers have with particular places following retirement Riley (2011). Having an attachment to a particular place or land could also be viewed as a 'protective factor' against the emotional effects of bTB on farmers and has been identified in a study into farmers well-being in New Zealand (Agricultural Research Group on Sustainability ARGOS, 2006a).

v. ***Occupational health***- health issues directly related to the farmer as a result of occupation or poor working conditions and the potential dangers farmers and their families can face on a daily basis shows that stress can be a

potential precursor to an accident or injury on farms. It has been highlighted that occupational health can lead to mental health issues (Gregoire, 2002), therefore discussing this point with farmers could be useful towards establishing their risk attitude and the impact on their well-being.

Farmer beliefs and attitudes

i. ***Beliefs in disease transmission*** **-** Wynne (1992) discusses how farmers, referred to as laypeople, become to provide their own viewpoint in response to scientific expertise using their own knowledge and beliefs of the land and animal management practices. Opinions on disease transmission by farmers is discussed within the FMD literature, and an example on lay spatial modelling of disease spread showed different results to the scientific model presented by Defra (Nerlich and Wright, 2006).

ii. ***Attitudes to risk and self-efficacy*** - A study of coping strategies of migrant workers by Weishaar (2010), reported that having the ability to evaluate a situation and having a positive, optimistic view were helpful and that having multiple associated coping factors was beneficial. Other forms of risk perception are researched by Kenen et al., (2003a) who studies how women with a family history of breast/ovarian cancer cope in living with the risk of developing the disease. The impact of the risk becomes more apparent at certain times which could also be the case with a farm's annual herd bTB test. The lead up to the test may cause anxiety and worry to farmers with factors such as an awareness that neighbouring farms are under bTB restrictions could contribute to and exacerbate these feelings. The use of heuristics in relation to disease risk and trust in government where farmers will draw their own conclusions following assimilation of facts would be uncovered during farmer interviews in relation to coping strategies. Research carried out into the justification of badger culling by farmers, (Enticott, 2011) investigates the question of what farmers do to control the risk of their herds going down with bTB and identifies farmers' needs to control the risk of contracting bTB in their livestock.

iii. ***Attitudes towards cattle*** (*emotional attachment*)- the FMD literature review identifies the emotional attachment that farmers have with their livestock, (Riley, 2011) and human-livestock relations are studied by Wilkie (2005) who suggests less animal-human attachment between those farmers who have higher stocking rates. Wilkie also suggests that farmers with breeding livestock have a stronger attachment to their animals than those with animals being kept as stores[4] or for slaughter, primarily because breeding animals are on the farm for longer. A qualitative methodology may well explore these points further in relation to bTB through interviews.

iv. ***Attitudes towards their work*** farmers attitude and perception towards risk in relation to how one experiences stress through work is discussed by Lobley (2005), together with evidence in studies showing that farmers have a stoical attitude, (Lobley et al., 2004) and feel compelled to turn up to work whilst ill, shows that attitudinal aspects are a key factor in how a person copes when faced with a difficult situation or threat. Recognising coping strategies towards problems on a farm related to bTB will help facilitate and understand why some farmers take action to reduce the risk of bTB on their farm compared to those that sit on the fence and do nothing. The semi-circular arrow labelled as learning/de-learning in figure 3.1 identifies how a farmer is able to become trapped in a situation, made worse by attempts to solve an original problem, resulting in a vicious circle of stress and relief. An example of this could be related to the cycle of feelings experienced by farmers who are coming up to the period of bTB testing or when a herd is under movement restrictions.

v. ***Trust in government*** one example referred to the historical issues between Government and farmers surrounding the area in the Lake District around Sellafield Nuclear Plant (Wynne, 1992) with farmers (laypeople) making their own conclusions from the information they had acquired and assimilated regarding the high levels of radioactivity in the area. Research on livestock farmers surveyed by Selfa et al., (2010) has concluded that

[4] **Store** animals are those that are kept on a farm but are sold before reaching slaughter weight.

farmers were farming more for the quality of life than to maximize profitability but many felt that their quality of life is threatened by increasing regulations, economic challenges and also by perceptions that the state and the public are not supportive of the realities of farming on the land. The role of government and legislation was one of the themes identified by Lobley et al., (2004) that contributed individually or collectively to farming stress.

vi. ***Trusted sources of information*** will influence farmer decision making on the take up of control measures. Farmer attitude towards advice given in relation to bTB could also be contingent upon whom they trust, their beliefs in disease transmission and their self-efficacy. The research by (Enticott, 2008) highlights these points in the literature review.

Farm Factors (Organisational)

i. ***Farm type*** - There are aspects to consider in relation to the farm such as tenure type, the structure of the land layout and the type of enterprises. The farm structure for example, where land is in several parcels, could be an advantage for a bTB breakdown as some areas could be used as isolation units. However, there are also many disadvantages that could be attributed to this scenario due to restrictions placed on animal movements following a bTB breakdown with a lack of cattle handling facilities for bTB testing presenting problems. Some of these problems can be overcome, but this is dependent on the type of farm and the enterprise mix. It is envisaged that the bulk of the issues discussed above can be established through a quantitative methodology.

ii. ***Management practices*** (may act as a proxy for contact with cattle/emotional connection) - bTB can influence cattle enterprises in different ways in relation to the reorganisation of management practices and strategies as a result of restrictions. It can also have a variable level of influence on the income from these enterprises. The levels of emotional attachment that farmers have with their livestock is discussed by Wilkie (2005), where there is evidence to show more connection is suggested with

breeding livestock than with store cattle. Nevertheless, this supports the concept that farmers are emotionally affected when they lose their animals unexpectedly as in a situation where bTB reactors are sent to slaughter. Discussions with farmers in an interview situation will help to establish their feelings towards their livestock being taken in this way and the impact it has had on them as a farmer and the way others within the farming community perceive them.

iii. ***Economic factors*** The effect on a farm business cash flow as a result of bTB restrictions is a familiar dialogue within farming communities and has also been evidenced through research (Butler, 2010, DEFRA, 2010a, Farm Crisis Network, 2009). The economic environment as a contributing factor to farmer stress is an issue that needs further investigation through qualitative interviews and/or a quantitative survey.

3.10.2: Key Extrinsic Factors

Cross cutting the above factors are extrinsic variables, which are out of the farmer's control, but are deemed to have an effect on well-being. These external stressors are discussed in more detail below:-

Environment

i. ***Disease status*** – There is a need to establish if there is a relationship between levels of bTB on farms and the length of time they have endured herd restrictions and whether farmer well-being levels fluctuate over this period. Results could suggest that a farmer's subjective well-being may change over time and reduced life satisfaction could be a result of longer term bTB restrictions or hedonic well-being may be affected at the start of a bTB herd breakdown as the farm is rendered to legislative and disease control regulations.

ii. ***Disease history*** - Additional aspects that could contribute to the emotional effect of bTB on a farmer may be the disease history on the farm. The effect of disease history of the farm on farmer well-being can help to prove whether there is a relationship between previous experience of bTB and well-being and

to ascertain whether coping strategies have been established and have helped them in any way?

iii. ***Poor working conditions*** – exposure to difficult weather conditions and time pressures for some tasks which are out of their control could affect physical and mental health and consequently farmer well-being.

Cultural beliefs/normative behaviours

i. ***Concepts of good farming*** – Price and Evans (2009) research the cultural and familial aspects of farming life and other cultural beliefs such as the ethos of a good farmer has been discussed, (Burton, 2004) where hard work is seen as part of the culture of intensive agricultural production. In circumstances where bTB may prevent a farmer in farming the way they want to farm, there is a need to establish how this can influence their well-being. Hard work is one of the three religious-philosophical doctrines adopted by Silvasti (2003) to evaluate narrative accounts from life stories of farmers' association with nature through their work.

ii. ***Emotional geographies of livestock farming***. Studies carried out on the social impacts of the FMD outbreak in 2001 (Convery et al., 2008) refer to the emotional geographies of livestock-farming relations. In the context of bTB, the process of killing animals before their time is up on the farm whilst they are at their productive stage will undoubtedly cause distress to farmers. Evidence to establish farmers' feelings on seeing cows being shot on farm will be explored through interviews.

Community Factors

i. ***Levels of social capital / social networks*** and the stresses of rural living and the demographic factors that can either bring on stress or help alleviate it. Farmers' social activities are considered within a model by Melberg (2003) in a study of Norwegain farming families, and whether this could have a cushioning effect from stressors. Hegney et al., (2007) also highlighted that feeling like a valued member of a community was related to resilience among rural living Australians. Changes to the relative position of farmers in society has also

created stresses as the rural demographic mix has altered to consist of a greater proportion of non-rural population who may bear a lack of understanding of farming practices. Reactions from the rural community which impacts on a farmer's personal identity has been recognised by Butler (2010) as a contributor to feelings of stress.

ii. ***Lack of understanding of farming ways*** within a rural population ensuing less respect for farmers within their communities. The apparent lack of knowledge on issues surrounding animal disease and farming caused disputes between those with rural and urban backgrounds during the FMD outbreak in 2001 (Nerlich et al., 2005). The changes to rural demographics, the social mix of rural areas and the impact of this on many farming families and their businesses is discussed by Price and Evans (2009), and as a personal issue in relation to bTB by Butler (2010). Capturing any effect of the rural population on farmers in relation to bTB will be derived through both qualitative and quantitative methodology.

iii. ***Level of influence from peers*** before any decision making is made on the uptake of disease control measures. Consideration of economic factors, lifestyle, perception from peers and others are discussed and developed into a conceptual model by Ellis-Iversen et al., (2010). Data collection through interviews carried out with farmers by trusted sources (vets) was deemed as an advantage in farmers being able to discuss more sensitive issues.

Inter-organisational factors

i. ***Information overload and interpretation of knowledge*** together with accessibility and consistency of knowledge provided to farmers. Information overload from Government organisations in relation to bTB and biosecurity could be too much to assimilate for some farmers. How farmers react to information overload on biosecurity is explored in the literature (Enticott 2008) alongside farmers who have adopted their own biosecurity measures after deciding that there was too much hype and information and have drawn their own conclusions. It is worth establishing what farmers views are on information they receive on bTB control measures and how farmers interpret this together

with what (*coping*) factors may influence them. The use of heuristics as a coping strategy for bTB breakdown by farmers can result in various trial and error situations to make life simpler in order to reduce stress or merely to simplify complicated messages. A lack of time to assimilate a surplus of information presented to them regarding regulations and scientific information in relation to biosecurity and disease transmission is one example. This could be explored through a qualitative interview methodology. Additionally this could help to establish whether there are any other reasons for farmers not to take on board information on bTB that is presented to them, for example, a lack of trust in Government, and this point of the framework is where more in-depth research methods will be adopted. An alternative perspective to this was in relation to a farmer's own knowledge and the example given by Wynne (1992) discussed how farmers, referred to as laypeople, become to provide their own viewpoint in response to scientific expertise. Use of humour as a coping strategy has been highlighted by Parkhill et al.,(2011) as a 'neglected aspect of risk perception' together with contributing factors such as family or community support (Tunstall et al., 2006).

ii. ***Government policy issues*** affecting disease management and control. The role of Government has also been highlighted from the literature review as a potential stressor for this framework which may affect a farmer's well-being. Fear and anxiety have been highlighted as common feelings between farmers throughout the FMD outbreak of 2001 during the period when the disease was spreading across the country. When the disease did arrive in their area, there were indeed organisational issues which caused added anxiety, such as the indecisiveness of DEFRA as whether to cull healthy animals in a contiguous location.

iii. ***Economic factors*** associated with the farm business which are out of the farmer's control but has an influence on well-being could be pressure from external organisations such as banks which can force drastic change to a farm enterprise mix, or even precipitate retirement in extreme cases.

3.10.3: Considerations for research methods

The research methodology adopted will need to consider procedures to identify coping strategies over different lengths of time as farmers experience stress and a change in their well-being as a result of bTB restrictions but also takes into consideration the effect of intervening variables such as 'stressors' or even supportive influences. It has been recognised by Fraser et al., (2005) that the key to understanding various ways of coping with stress by farmers is regarded as something of value in developing mental health interventions. It could be a valuable opportunity to share knowledge following establishment of what coping strategies farmers are adopting in relation to bTB such as discussing issues with others that have experienced similar situations.

The effect that stressful situations are having on a farmer's productivity within their business can also be investigated with the effects of any loss in productivity at work as a result of the emotional effects of a bTB breakdown; this is referred to in the literature as Presenteeism.

There are undoubtedly other factors which have an impact on a farmer's well-being and these will need identifying alongside other potential stressors such as CAP reforms and food scares. For some farms affected by bTB, these other factors could be an added strain on their businesses and the social impacts of these other factors, and farmers' feelings on the extent these are affecting them can be determined in more detail when measuring SWB. The conceptual framework has identified variables to take forward the study into its next phase towards a methodology. The following chapter goes on to explain the methodology adopted to establish the points outlined above.

Chapter: 4 Methodology

4.1 Introduction

This chapter describes the methodological research strategy employed to assess the social impacts of bovine Tuberculosis (bTB). In seeking to understand these impacts using the conceptual framework outlined in previous discussion, this chapter discusses and identifies different methodological strategies required. A mixed methods approach is outlined drawing on quantitative and qualitative methodologies. The chapter identifies different ways of measuring farmers' subjective well-being and its impact upon their productivity. Drawing on previous qualitative analyses of the social impacts of animal disease (Convery et al., 2008), the chapter also outlines a longitudinal qualitative methodology to both inform the conceptual understanding of farmers' subjective well-being and explore the social impacts over time and farmers' coping methods. The chapter begins, however, with a brief reminder of the research questions.

4.1.1 Summary of research questions

The literature review and subsequent conceptual framework draws attention to the following issues that need to be answered in assessing the social impact of bTB:

- What does the concept of well-being mean to farmers and what do they believe affects it?
- What factors influence levels of well-being amongst farmers?
- How does bTB impact upon farmers lives?
- To what extent does bTB affect farmers' well-being?
- How do farmers adapt and cope with bTB?

4.2: Research Methodology

This section will discuss the first phase of the research which was the qualitative methodology and the procedures undertaken in the process of recruiting farmers and developing the interview schedule. A description of the farmers who agreed to take

part in the study with details of their farm characteristics, bTB status and location is outlined here also.

The second section will focus on phase two, the quantitative methodology element of the research and describes the procedures involved in developing the survey questions, establishing a sample of farms and distribution of the survey. Following initial analysis of the data, the characteristics of those farmers who responded to the survey are outlined subsequently.

4.3 Qualitative methodology

The epidemiological nature of bTB, together with the cattle testing and disease eradication measures entailed around it, meant that any empirical work linked to establishing the social impacts of bTB on farmers needed to involve a long term strategy in order to highlight any challenging human effect over a length of time. For example, farmers who do not have bTB are subject to annual bTB tests in Wales, although this may become more frequent where farms adjoin other holdings with bTB or have bought cattle from farms that have subsequently tested positive for bTB. For farms that have bTB, the process of eliminating it from their herd can be long and drawn. Infected herds must have at least two clear bTB tests (known as short interval tests) at 60 days apart. Delays are not uncommon due to the availability of bTB testing staff and/or attempts to culture bTB in laboratories to check for the disease. Short interval tests would be read on 'severe interpretation' which sets a higher standard for the herd to pass than uninfected herds. For many herds, this means that bTB restrictions can last years rather than months.

A qualitative longitudinal research design was therefore selected in order to understand farmers' conceptions of well-being and identify the key factors and coping mechanisms as they developed over time. This involved visiting farmers at three time points over a period of 18 months. During the course of the first interview farmer well-being was discussed in relation to what personal well-being meant to them and what influenced their well-being. Each participant was also asked to complete well-being scales at every visit by means of the ONS Quality of Life and the WEMWBS questions which would also be incorporated in the postal survey. The second visit involved

participant observation during the bTB tests of the participating farmers. The purpose of the third visit was to discuss changes to the farm during the research period. Table 4.1 shows how this process occurred over time.

Table 4.1: Timetable illustrating time points for qualitative interviews

Contact made with vets in chosen areas with interviews	July and August 2012
Initial visit and interview with farmer participants	October to December 2012
Second visit to participants either observing during a TB test/test reading day or walking and talking interview	February to May 2013
Third visit to participant farms for interview	March/April 2014

4.3.1 Sampling procedures

As it was important to include farmers with bTB in the research, a purposive sampling strategy was adopted. Purposive sampling tailors the sampling of participants who will have the most relevance to the research questions (Bryman, 2008 pp.458-462). Other studies examining the social impacts of animal disease have adopted the same sampling strategy (Mort et al., 2005). Participants were identified by 'snowballing', i.e. developing contacts from gatekeepers in the field of research. Sourcing participants through a gatekeeper or a trusted entity to potential participants is suggested by Lofland (1995 p38), in order to 'try to use and/or build upon *pre-existing relations of trust* to remove barriers to entrance'. As part of the study, farm vets were interviewed both to gather contextual knowledge about the impacts of bTB and to use them to generate farmer contacts. Similar approaches in agricultural research have been used by Wilkie (2005) and (Price and Evans, 2006, Price and Evans, 2009). Whilst it is possible that snowballing can introduce sources of bias (Bryman, 2008 pp.184-185), a range of different vets were interviewed in separate parts of Wales to protect against this form of bias. Other possibilities of data to source participants was weighed up including the use of information from a business telephone directory, the Farm Business Survey and the Annual Agricultural Census data carried out by the Welsh Government. Work undertaken by Peck et al., (2002) using two samples of farms in Cumbria and the Scottish Highlands were derived from the Yellow Pages which

generated a 29% response rate. However, Burton and Wilson (1999) suggest that use of the Yellow Pages as a sampling method can introduce bias for example it may exclude farmers with financial problems as it is a user pays directory, or lifestyle farmers who are not reliant on income from the farm.

In total, four vets were interviewed and acted as gatekeepers. Table 4.2 shows the location and practice details for each vet. The locations for the vets - Carmarthenshire, Pembrokeshire, Swansea and Monmouthshire were selected because they represented areas with high bTB incidence in Wales (AHVLA, 2010, AHVLA, 2011). Although veterinary practices can draw their clients from a wide geographical base, and there can be substantial differences in the level of bTB within high-risk areas, it was anticipated that vets would be able to easily identify farmers with bTB for inclusion in the project.

Table 4.2 Brief description of veterinary practices

Area	***Branches***	***Vet Staff***	***Main work***
1) Swansea	6	22	Small animal with small farm animal specialist team
2) Carmarthenshire	1	9	Large and small animal
3) Pembrokeshire	4	13	Large and small animal
4) Monmouthshire	1	6	Farm animal

4.3.2 Farming participants

Locations of participants

As noted above, although vets acted as the gatekeepers in identifying suitable farmers, there was also a need to identify specific locations for the research participants based on the level of bTB. In order to fit the conceptual framework, it was proposed that potential participants would be located within areas where there had been a history of bTB breakdowns on farms or within those areas of Wales considered to be high risk disease areas. Farms which were bTB restricted would be advantageous as it would

aid in providing an insight into coping strategies but this was not critical, however the main criterion was that participants would have had experience of bTB in their herd at some point in time and be vulnerable to getting it in future.

In considering the above criteria, the process in deriving locations for potential participants was based on areas within Wales using data derived from the TB Health Check Wales Report of herd breakdowns (AHVLA, 2010), and the Annual TB Surveillance Report (AHVLA, 2011) which could provide the degree of incidence of bTB in geographical areas across Wales. A total of four areas were chosen as the study areas for the qualitative phase based on the above sources. The rationale behind the number of farms to be included in the sample was reliant upon obtaining a sample size that could be managed within the time span and costs available and in order to be capable of drawing meaningful conclusions from that data and not purely arbitrary. A small number to allow for any participant dropout was also incorporated into the sample size. The feasibility of carrying out the research inside a proposed longitudinal design within 18 months and with the resources and time available to carry out the fieldwork and subsequent analysis of detail within transcripts was also considered.

The recruitment of farmers who had spouses and/or family working on the farm as participants for the interviews rather than just farmers would provide qualitative evidence to back up findings of a report by WRO (2011), which involved interviewing farming families. It gave an insight into how decision making processes occurred between those farming families on farms and the 'plurality' of decision makers was highlighted as a significant point. This is an important aspect which could be helpful in addressing the research questions on coping strategies and in relation to a farmer's decision making strategy on disease risk relative to bTB control or prevention. It would also provide an insight into whether support from close family members is a factor in coping with everyday pressures on the farm. The sampling criteria provided to the gatekeeper did not signify that it was essential for other family members to participate but that it would be deemed of value. It was recognised however that it may not be entirely feasible to recruit a sample of farming families to participate due to time

difficulties of having both farmer and spouse present at each visit especially if one attended part time work off farm.

Recruitment of participants

Interviewed vets were invited to assist in recruiting approximately four farmers from their area that could be suitable participants for interviewing. For two of the vets a synopsis of the study was provided for them to put into their farmer newsletters as a way of generating farmer volunteers to the study. Over a period of two to three months the vets provided me with a total of 15 farmer names who would be suitable for taking part in the study. Following receipt of farmer contact details from the vets, the potential participants were contacted by telephone for an initial discussion about the study. An initial discussion with the farmer gave them an opportunity to ask any questions prior to making arrangements for an interview. In one area (area 2) one of the farms which were contacted decided not to take part because of personal reasons which left 14 farms. However, another participant volunteered to mention the study at a farmer discussion group in one of the research regions, and as a result two more farms were recruited in this way providing a total of 16 overall.

4.3.3 Research Measures

Exploration as to the concept of well-being was undertaken initially with farmers through interviews in order to inform the approach to be taken with well-being questions to be included in the quantitative survey. In addition to this, the well-being scales included in the survey could be piloted during these first interviews. The farmer interview schedules were piloted with one farmer to ensure the understanding of terms particularly in relation to questions on SWB. During initial visits to the farms, a research information sheet was provided for participants and this was discussed over in detail with the farmers for them to obtain a greater understanding on their involvement in the study, it also contained the contact details of the researcher and supervisor for any future reference (*see appendix 2*). Following their confirmation to partake in the study, the farmers were asked to sign a consent form as a formal

agreement to participate (*appendix 2*). Obtaining formal consent was part of a procedural requirement of Cardiff University CPLAN Research Ethics Committee. Ethical considerations are outlined in a section located in the latter part of this chapter.

Because of the sensitive nature of the subject, the interview schedule was semi-structured and kept informal. Interviews focussed on the meaning of and factors affecting well-being, bTB history of the farm together with farmer's coping strategies and attitudes towards the risks and implications associated with bTB. In addition all those participating in the interview were asked to complete two well-being scales, the ONS Quality of Life scale which was included in the quantitative survey and the WEMWBS 14 point scale (a shorter 7 point version of this was included in the quantitative survey). Towards the end of the first interview, the bTB history of the farm was discussed alongside farmers' feelings in relation to historical disease breakdown and subsequent loss of cattle. The workload involved at herd testing and feelings of those on the farm around this time was talked over and farmers were prompted to relay interesting anecdotes on these subject areas.

The second visit to these farms took place during the Spring of 2013, and for eight farms it coincided with a bTB test in which observation was undertaken during a herd test or test reading day. Of these, one farm was undertaking a pre movement test as their annual herd test occurred in the autumn, this was also the main reason for the remaining eight farms where a walking and talking interview, otherwise referred to as the "go-along" interviews (Carpiano, 2009 p263) was undertaken. Field notes were written up immediately following these visits and observation notes were used for recollection if undertaken. In some circumstances it was not possible to make observational notes during the bTB test, and on three farms the role of noting down the skin test measurements for the vet was assigned to me. These observations were undertaken as part of a triangulation strategy in viewing farmers within the context of a bTB test situation to verify findings from qualitative interview questions around bTB testing and to cross check results of data analysis of the quantitative survey.

Third and final interviews with farmers took place approximately ten to twelve months following these observational visits or walking and talking interviews in March and April 2013, eighteen months subsequent to the first interviews. The questions were led by initial enquiry into how farming life had been for the participants since the second visit to the farm. The dialogue then went on to discuss results of the farmer postal survey and the initial findings coming from this where the opinions of participants were sought on survey results in relation to levels of farmer well-being were explored. Areas of enquiry were opened up to discover farmers' feelings on their rural demographics, their level of engagement within it and whether it was important to be a respected member of the farming community they lived in. Further questioning addressed how farmers dealt with managing animal diseases in general on their farms together with whom they would trust for information and seek advice from in the context of various elements of the farming business. Lastly, participants were asked who they would confide in if they had personal problems before being handed the well-being scale to complete at the end of the interview. For a second time, farmer interviews were recorded apart from one, where field notes were taken during and immediately following.

4.3.4 Data Analysis

Interviews were digitally recorded whenever possible and these were then transcribed and coded into relevant themes using QSR Nvivo 8 software. Written observations were taken down immediately following the interview in a notebook, and these were an advantage as a reminder when writing field notes as soon thereafter in order to ensure as much recollection. Coding of interview material was carried out using an inductive approach by initially keeping a record of codes which started to emerge whilst transcribing the interview recordings alongside those which were anticipated following the questions developed from themes within the conceptual framework. The transcribed interview material was then transferred to QSR NVivo8 software and analysed using codes that were already inputted from those which emerged during transcription and those that developed systematically through the coding process in NVivo.

4.4 Details of farmer participants

The 16 farms that participated in the longitudinal research had an average farm size of 114 hectares (282 acres), of which 40% were owner occupiers, 20% tenanted and 40% farming on a mixed tenure basis. A number of farms (29%) also had summer grazing land; the area of some of which would vary on an annual basis. In comparison, the average size of an agricultural holding in the United Kingdom was 90.4 hectares in 2010 (Eurostat, 2010).

The split of main farm types of those farmers interviewed was 56% dairy and 44% beef. A breakdown of the farm enterprises is shown in table 4.3. Four farm business types were just dairy with no other enterprises apart from rearing dairy youngstock as herd replacements. There were five dairy farms that had a beef enterprise which consisted of beef calves reared and finished from the dairy herd. Of the beef farmers five were suckler beef producers having either a mixture of beef finishing or sheep enterprises. Two of the beef suckler herds were pedigree beef breeders. Only one farm operated solely as a beef finishing unit with no breeding animals with all animals purchased in as calves. All but one of the dairy farms produced milk for the conventional milk market with one farmer producing organic milk but had reverted back to a conventional system at the time of the final interview primarily due to the high cost of purchasing organic feed and forage. Average herd size was 202 cattle with a range of between 16 and 600.

Six of the farms had more than one livestock enterprise and four farms had a mix of more than two enterprises which also included arable enterprises. Age of farmer was considered as a possible contributing variable within the conceptual framework associated with farmer well-being and this was to be established through the quantitative survey rather than the qualitative interview phase with farmers. Farmer age is highlighted within studies, for example how retirement from farming is capable of causing stress for farming families and individuals from a loss of personal identity with the spaces and places of farming (Riley, 2011, Price and Evans, 2009). Furthermore, evidence by Ellis-Iversen et al., (2010) shows that younger farmers have more intent to adopt disease control programmes on their farms.

A total of 30 people contributed to the interviews on 16 farms. Interviews undertaken on six of the farms were with the farmer and spouse only, two with the farmer and son, four with the farmer only, two farms having three of the farming family taking part during the interview and one had four participants. The gender of farmers interviewed is given as 62% male and 38% female. Farmers were interviewed in both English (69%) and Welsh (31%).

Table 4.3: Breakdown of farm characteristics for farmer participants

Farm	***Farm enterprises***	***Herd size***	***Farm size (acres)***	***bTB status Oct 2012***	***bTB status April 2014***
Beef farm, area 1	Beef	19	108	Free	Free
Dairy farm, area 1	Dairy and beef	240	250	Free	Restricted
Beef and sheep farm, area 1	Suckler beef and sheep	16	140	Free	Free
Dairy and sheep farm, area 1	Dairy and sheep	200	350	Free	Restricted
Dairy farm a, area 2	Dairy only	325	140	Restricted	Restricted
Dairy farm b, area 2	Dairy only	100	225	Free	Free
Dairy farm c, area 2	Dairy only	160	350	Restricted	Free
Dairy farm d, area 2	Dairy only	220	200	Restricted	Free
Dairy and beef farm, area 2	Dairy and beef	300	400	Restricted	Free
Beef farm, area 3	Suckler beef	61	138	Restricted	Restricted
Beef and sheep farm, area 3	Suckler beef and sheep	160	tbc	Restricted	Free
Dairy farm, area 3	Dairy and beef	486	400	Restricted	Free
Beef and sheep farm, area 4	Suckler beef and sheep	60	277	Restricted	Free
Dairy and beef farm, area 4	Dairy, beef and sheep	600	500	Restricted	Free
Beef and arable farm, area 4	Beef and arable	160	500	Free	Free
Dairy farm, area 4	Dairy only	120	250	Restricted	Free

All the farms taking part were run as family farms with all but two farms having had one or more generation farming there beforehand. Eight of the farms relied on family labour only with no employed labour. Three of the farms employed part time or casual labour for relief milking for instance, two farms employed one full time staff and three farms employed two or more full time staff.

The main income sources for all farms was generated by the farm business, with two farms having diversified into selling forage to other farmers and haylage to horse owners. Two farmers had had careers off farm alongside farming before retiring early and focusing on farming and one farmer was looking at a career change at the time of the first interviews. Other sources of income saw the spouses or sons and daughters of six farms working part-time away from the farm.

At the point of first interviews with farmers 63% of those were under bTB restrictions and 37% were non bTB restricted. Historically, two of these farms had been under bTB restrictions for as long as twelve years with only one or two six month breaks during that time. Others had recently gone down with bTB, however all but one of the farming contributors in the qualitative phase had experience of their farm being under bTB restriction. At the point of the third visit to these farms approximately 18 months after the first time, 80% *[n=5]* of those herds which had been under TB restrictions between 6 and 12 years had been tested clear of bTB and were farming without bTB restrictions.

The next part of this chapter discusses the quantitative methodological approach undertaken.

4.5 Quantitative methodology

The key aim of the quantitative methodology was to be able to explore the relationship between the social and environmental factors of bTB through a farmer survey containing questions to measure subjective well-being of farmers by employing questions or statements from established well-being scales. The survey also aimed to establish whether the emotional effects of matters associated with bTB was having an impact on a farmer's daily work routine and productivity, which was referred to as

presenteeism in the literature review. This was achieved by incorporating a set of statements to measure presenteeism scores along with self-reporting questions addressing work productivity. In addition to well-being and presenteeism scales the survey consisted of specific statements in relation to bTB disease risk, trust in Government, community factors and human-animal relations. In an attempt to identify whether the specific 'intervening' variables highlighted within the conceptual framework were accurate, farmer respondents were asked to rank the top five pressures and which animal diseases present them with the greatest problems. The following sections go on to describe the sampling strategy for this methodology in more detail together with procedures carried out in developing and distributing the survey and details of respondent characteristics.

4.5.1 Sampling procedure

The sampling of respondents was undertaken using a stratified sampling strategy (Henry, 1990 p99) based on a quota sample of dairy and beef cattle farmers across Wales. Three sub samples were established and these are outlined in table 4.4, these consisted of two separate sub-samples containing dairy and beef farms and one which included a randomly selected group of both dairy and beef farms which were under bTB restrictions at the time.

Table 4.4: Sampling criteria of farms for Farmer Well-being Survey

Sub sample type	***Number of holdings***
Dairy farms	600
Beef farms	600
Cattle herds under restriction due to a TB incident (either confirmed or unconfirmed)	600

The rationale in electing for a stratified sample of beef and dairy farmers was to be able to determine different problematic issues for these farmers which they must deal with either as a result of bTB, or whether any other pressures are affecting their well-being. There is evidence to show that there is a longer bTB incidence duration for dairy herds compared to beef herds and that dairy herds had a significantly higher disease incidence rate than beef herds after adjusting for the effects of herd size (AHVLA, 2011). Initial considerations were to split the beef farms sample up into two further sub-samples consisting of beef breeding and beef store producers as undertaken in other research (DEFRA, 2010a); there may be separate issues for some beef farmers such as store producers where bTB restrictions will restrict the ability for that holding to move and trade cattle in comparison to beef finishers with the same bTB restrictions who can trade if their cattle are transported direct to slaughter.

Historically, bTB testing intervals had been calculated by monitoring the level of bTB in the previous six years within a spatial unit known as the Parish Testing Interval (PTI), however alternative approaches are now being taken by England, Scotland and Wales (AHVLA, 2012). As part of a wider programme of increased measures for disease eradication in Wales, the Welsh Government introduced a change in policy from January 2010 which resulted in a move away from using parish based data to determine herd testing frequency to a 12 month testing interval for all areas in Wales. Since then, the Welsh Government has used regions of Wales as spatial units for reporting disease incidence and determining levels of risk to bTB, however there will be varying degrees of disease incidence within these regions (AHVLA, 2011).

The sample of cattle farmers located across Wales was obtained from the Animal Health and Veterinary Laboratories Agency (AHVLA) administrative database on bTB referred to as 'Sam', which superseded VetNet in 2011. In order to improve management processes for bTB testing, this new database was launched by AHVLA in September 2011 where private practice vets were able to enter clients' bTB test data directly online. The decision to use this source was based purely on the fact that this database is the only source of information available on cattle farmers' bTB status in the UK. It was also deemed the most fit for purpose and practical source to obtain a

sample from due to the comprehensive amount of data held on the bTB status of farms compared to others which were considered such as Defra's British Cattle Movement Service Cattle Tracing System and the Welsh Government Annual Survey of Agriculture. To be able to obtain a sample of farms under bTB restrictions would not have been possible from these similar sources of farmer databases. Other studies which have used the AHVLA database are (DEFRA, 2010a, DEFRA, 2009, Green and Cornell, 2005, Donnelly et al., 2005). In total 1,800 farms were selected for the sample with 600 farms for each sub sample as explained in table 4.4. Data protection issues meant that the names and addresses of farmers together with other farm details such as their County Parish Holding numbers could not be disclosed to third parties, AHVLA therefore facilitated the mailing of the survey to the sample of cattle farmers across Wales.

The section below outlines the considerations and procedures involved prior to the survey distribution to the selected sample. Following this the characteristics of farmers who responded subsequent to descriptive analysis of the data are disclosed.

4.5.2. Procedures in Survey development

The quantitative survey developed can be viewed in appendix 2 together with a covering letter that was mailed with it and a reminder letter. The survey was divided into five sections where the theme of each were: information on the farm, farming pressures, personal well-being, farmers views on bTB and lastly personal details. It was mailed to a sample of farmers on 16th May 2013 with a request for completed surveys to be returned by 7th June 2013 in an accompanying covering letter. A reminder was posted to the sample on 29th May 2013 as a prompt for farmers. The following section goes on to discuss considerations involved in developing the survey in relation to establishing farmer well-being from the sample.

4.5.3 Measuring Farmer wellbeing

Farmer Wellbeing

One of the main aims in the development of the survey was to be able to capture farmer well-being in a format that could be analysed and the methodological approach adopted was reflected upon in this section.

Important factors such as any temporal effect of measuring well-being or happiness which could result in a 'seasonal' effect on survey outcomes were something that had also been acknowledged when deciding the timing of the survey. Equally, busy times during the farming calendar needed also weighing against this consideration. There is concern into the validity of measuring subjective well-being across cultures using varying languages has been discussed by Diener and Suh, (2000 p186), but there is no significant evidence to show this may cause differences within the data gathered from Welsh as opposed to English speakers in the same part of the UK. A health survey of farmers by Hounsome et al., (2006) recognised an increased odds of the adoption of agri-environment schemes arising from completion of a questionnaire in Welsh, indicating a possible cultural dimension. The questionnaire was translated into Welsh for those farmers preferring this option and any bias in relation to well-being results due to response language would be verified in the analysis process.

Another methodological consideration for the survey design was the sequence of the well-being questions in relation to the other survey sections to potentially avoid any priming effects from the context of the preceding questions. The survey section on farmer well-being preceded other questions and statements in relation to bTB so as not to create any systematic bias to the responses, however it does follow on from the section which asks farmers to identify farming pressures and problematic animal diseases on their farm, and therefore it is possible that the order of presentation of questions may have some bias on the responses to the well-being questions. It is suggested by Schwarz and Strack, (1999) that an individual's subjective well-being is not constant and is described as an opinion that is formed based on a wide variety of information that is available to them at a particular point in time. The two well-being

measures employed (*ONS Quality of Life Scale and Short WEMWBS*) were placed into section three of the survey and can be viewed in appendix 2.

Presenteeism

In addition to a well-being scale, the farmer questionnaire also included a scale to measure presenteeism. The term presenteeism has been described as lost productivity arising from mental stress in the workplace (Aronsson et al., 2000). By incorporating a measure for presenteeism into the survey it would assist in establishing to what extent bTB is having on work productivity as a result of the emotional effects of additional stress, these can be viewed within section three of the farmer survey in appendix 2.

Firstly the Stanford Presenteeism Scale (SPS) (Koopman et al., 2002) containing six statements was included (*appendix 1 and 2*), and these were modified slightly so that wording relating to 'health condition' was replaced with 'TB'. The modification of this instrument to include the wording related to animal disease or bTB rather than [*your health condition*] would be feasible to establish any effects on farmer's productivity as a result of specific farming pressures. This six item scale could be comfortably accommodated into a larger survey which includes two additional well-being scales (*ONS Quality of life and short WEMWBS*) and questions connected to the farm and bTB which would identify variables captured in the conceptual framework within a proposed time of 20 minutes. Secondly an additional three statements were incorporated immediately following the presenteeism section relating to work productivity. These questions required participants to write down a percentage figure to rate their levels of productivity over the previous four weeks. To avoid misunderstanding the question, an example of how these questions could be answered was provided. These statements were derived from the Work Limitations Questionnaire (WLQ) (Lerner et al., 2001) to measure the degree to which farmers are experiencing limitations on the job due to pressures on the farm or health-related productivity loss. The questionnaire has been used in respondents with chronic pain, depression, rheumatoid arthritis and other states of health.

4.5.4 Piloting

The quantitative survey was piloted amongst three farmers and any suggested amendments were made. Any modifications were undertaken to ensure wording for ease of understanding of questions and timing in order to limit the length of time to complete to 20 minutes. It was felt that further piloting of the survey following these slight modifications would not be required and that initial piloting had been adequate. Prior to the survey being in operation, a survey approval form was submitted to Welsh Government as a requirement for part funding of the study.

4.5.5. Response Rate and Processing

Following the arrival of surveys back in, each one was dated according to the day they returned. Each survey was manually inputted into IBM SPSS 20 and given an unique identification number, and initial checks were undertaken before commencing analysis. A total of 149 surveys (12%) were returned by 24/05/2013 which is within seven days of being mailed out. Overall response rate was 33% and the specific areas of Wales that generated the highest proportion of responses were: 18% Carmarthenshire, 17% Pembrokeshire, 12% Mid Powys, 10% Gwent. When compared with the distribution of respondents for the WRO Rural Household Survey (WRO, 2010), a higher response rate was derived for the Farmer Well-being survey from Carmarthenshire, Ceredigion, Pembrokeshire and Powys but a lower response rate was derived from other areas primarily in north Wales, namely Anglesey and Gwynedd (see table 4.6). Responses from sub sections of the sample resulted in a 19% response from those under bTB restrictions and 37% from those not under restriction. The response from bTB farms was lower than the overall survey response (33%).

4.6 Respondent characteristics and Response Bias

This section outlines the characteristics of those farmers who responded to the postal survey including their main farm enterprise type, farm tenure status, their position on the farm, age range and gender followed by a summary of the farm labour situation

and the bTB status of these farms. These results were generated through descriptive analysis of the survey data in SPSS.

Main farm type

The breakdown of main farm types within the sample gave equal proportions of returned surveys from dairy and suckler beef farms of 37% each as summarised in table 4.5. A comparison of farm types with Welsh Government Small Area Statistics data for 2012 (Welsh Government, 2013a) presents the % of farms with dairy cows as 48% and 32% for those with beef cows with overall herd sizes average of 98 cattle. The cattle enterprise size averages from the June Agricultural Census for Wales in 2012 (Welsh Government, 2013c) gives dairy herd size at 84 cows, this is a much lower figure than the 299 average from the survey. Farm Business Survey results for 2011/12 (Farm Business Survey in Wales (FBS), 2012) give average dairy herd sizes as 106 for hill and upland dairy farm types and 159 for lowland farm types. Therefore there is a variation found between average dairy herd sizes in this study and the national average. Non dairy cattle herd sizes average at 25 within the June Census whereas the average suckler beef herd in the survey has 85 cattle.

The average number of cattle on holdings from the survey was 166 with a range of between 1 and 1,400 cattle. The highest response rates from dairy farms came from Carmarthenshire (26.7%) and Pembrokeshire (24.8%) with two areas (South Powys and West Glamorgan) having no dairy farms responding. Highest responses from suckler beef farms was Mid Powys (17.4%), beef stores was Carmarthenshire (16.7%) and beef finishing was Clwyd (23.1%). Mid Powys generated the highest response rate (20%) from those with sheep as their main enterprise followed by Gwent (16.4%).

Table 4.5: Proportion of farms by main farm type and geographical area

Main farm type/ Area	***Dairy (%)***	***Suckler Beef (%)***	***Beef Stores (%)***	***Beef finishing (%)***	***Arable (%)***	***Sheep (%)***	***Other (%)***	***All %***
All Wales	37	37	9	5	<1	10	2	-
Anglesey	1.0	3.4	6.2	7.7	-	1.8	15.4	3.1
Gwynedd	6.7	8.7	6.2	3.8	-	3.6	-	6.7
Clwyd	11.0	5.8	12.5	23.1	-	9.1	7.7	10.5
Ceredigion	8.6	10.1	8.3	-	-	9.1	15.4	8.9
Pembrokeshire	24.8	13.0	12.5	15.4	-	7.3	23.1	17.4
Carmarthenshire	26.7	13.0	16.7	11.5	-	12.7	15.4	18.1
North Powys	5.2	2.9	4.2	3.8	-	9.1	-	4.5
Mid Powys	6.7	17.4	8.3	7.7	-	20.0	7.7	11.9
South Powys	-	3.9	-	3.8	-	7.3	-	2.4
South Glamorgan	1.9	1.4	6.2	3.8	-	-	-	2.0
Mid Glamorgan	1.9	1.4	2.1	3.8	-	-	7.7	1.8
West Glamorgan	-	5.8	2.1	3.8	-	-	-	2.5
Gwent	5.7	12.1	12.5	11.5	100	16.4	7.7	10.3

Farm ownership status

Following descriptive analysis of the data, 70% of the farmers stated they were owner occupiers, 14% were tenanted and 15% of mixed tenure with less than 1% denoting they had a contract, share farming or other farm ownership status. The Farm Business Survey Wales data for 2011/2012 (Farm Business Survey in Wales (FBS), 2012) publishes the proportion of farms by tenure category within a sample of three farm types: hill, upland and lowland. Within their sample, 53% of the hill cattle and sheep farms were owned, 50% of hill sheep farms were owned, 55% of upland cattle and sheep farms were owner occupiers, 71% of lowland cattle and sheep farms were

owner occupied, 51% of hill and upland dairy farms were owner occupied and 43% of lowland dairy were owner occupiers. A variation can be found here in the proportion of owner occupied farms from the survey compared with the Farm Business Survey sample. However, despite a lower proportion of owner occupiers within the FBS sample of farms with the 70% owner occupier figure for respondents, the FBS results for their sub sample of lowland cattle and sheep farms is comparative.

Position on farm

The first question in the survey asked respondents to note their position on the farm with options provided of farmer, farm manager or other. A total of 95% selected the 'Farmer' option with less than 2% selecting 'farm manager' and a further 4% choosing 'other'.

Age range and gender

The highest percentage of respondents was in the age range of 55-64 years with 33% followed by 29% for those between 45-54 and 24% for those over 65 and the lowest response came from those under 25 years with 0.5% The age groups within the survey epitomize the age ranges within the June Survey of Agriculture 2010: Estimates of Farm Labour 2010 (Welsh Government, 2010). The percentage of principal farm holders by age over 55 years was 63.3% and the proportion under 35 years was 3.1%. Comparison of age groups within the survey with the proportion of principal farmers within Welsh Government June Census Statistics (Welsh Government, 2013d) provides the following data in table 4.6. Response rates of those farmers within the age ranges under 25, 25 – 34, 35 – 44 are consistent with those within Welsh Government Census data however there are slight variations with higher responses in the age ranges 45 – 54 and 55 – 64 and a 10% lower response from those over 65. In comparison to other surveys such as the Rural Household Survey 2010 carried out by the Wales Rural Observatory (WRO, 2010), the highest response rate was for the age range 45 – 54 with 23%.

A gender balance was worthy of consideration within the sample which was in fitting with, and a reflection of the number of farmers and their spouses who both work on farms. This would add significant value to the research results and would build upon

the discussion in the literature review on the role of females within farming families. Research has been carried out on farming couples in Norway (Melberg, 2003) where the role of social support in the mitigation of stress for the psychological well-being of both the husband and wife is measured. Analysis carried out by gender of respondents shows 89% were male and 12% female. Although it was not possible to establish whether this is representative of the national representation of male and female famers in Wales, a comparison between the respondent gender for the WRO survey shows that 54% were female and 46% male. Another survey carried out on behalf of Defra by Liverpool University in relation to bTB policy on farmer behaviour in 2009 (DEFRA, 2009) generated similar gender responses to the Farmer well-being survey, 87% male and 13% female.

Table 4.6: Comparison of survey responses by age range

Age group	***Welsh Government data on principal farmers (Welsh Government, 2013d)***	***Farmer Survey data***
Under 25	0.5	0.5
25 – 34	2.5	2.9
35 – 44	10.0	10.3
45-54	23.6	29.2
55-64	29.0	33.0
Over 65	34.3	24.1

Response language

All surveys were bi-lingual in Welsh and English with 92% of respondents choosing to complete the survey in English and 8% in Welsh. The majority of responses in Welsh were from Gwynedd (36%) followed by Ceredigion (15%) and Carmarthen (13%). This response figure is slightly lower than data within the 2011 Census results in Wales showing that 19% of the population in Wales are able to speak Welsh (ONS, 2012a).

Farm labour

The second question in the survey intended to establish how many people worked on the farm with options to choose family or employed labour. The findings from these questions have been summarised in table 4.7 to show the mean number of people employed per category. In addition, analysis carried out by the mean number of staff per employment category and main farm type is also shown in this table. The results suggest that there is not a big difference in the category of labour on each farm type, with dairy farms generally employing more paid labour than beef or sheep farms. Respondents were also asked what proportion of their time was spent working on the farm resulting in an average of 83%, with 41% specifying that 100% of their time was spent working on the farm.

Table 4.7: Summary of farm labour

Labour category	Average	Range	Dairy	Suckler Beef	Beef Stores	Beef finishing	Sheep
Family members full-time	1.6	1 - 6	1.8	1.4	1.3	1.5	1.5
Family members part-time	1.4	1 - 4	1.3	1.4	1.3	1.1	1.4
Family members seasonal	1.6	1 - 8	1.7	1.7	1.2	1.0	1.6
Employed full-time	2.4	1 - >7	1.9	1.2	1.3	1.2	1.3
Employed part-time	1.5	1 - 6	1.7	1.2	1.0	1.0	1.0
Employed seasonal	3.4	1 - >7	1.8	1.6	1.7	1.8	1.6

It is not possible to compare the employment figures in table 4.7 with the farm labour data collated in the June Agricultural Census of 2011 (Welsh Government, 2013d) due to the way the data has been collated for each labour category where both employed and family labour per farm have been integrated. European Farm Structure Survey data (Eurostat, 2010) shows that 'farming was predominantly a family activity in the EU-28; about three quarters (77.8 %) of the labour input in agriculture came from the holder or members of his/her family in 2010'.

bTB status of farm

The bTB status of the farms surveyed illustrates that 21% of farms were under bTB restrictions at that particular time with the remaining 79% not under restriction. Of those remaining farms not currently under bTB restrictions 41% stated that their farms had never been under bTB restriction with 59% stating that they had been under bTB restrictions in the past. The survey asked those not currently under bTB restrictions to state when was the last time they were under bTB restrictions and 26% had stated 2013 and 24% for 2012.

Data from the survey establishes that the greatest proportion of farms under bTB restrictions are within Pembrokeshire, Carmarthenshire, Mid Powys and Gwent with the lowest proportion of respondents under bTB restriction coming from Anglesey, Gwynedd, South and mid Glamorgan and South Powys. In comparison, the column on the right in table 4.8 highlights the latest Welsh Government figures on bTB incidence by area in Wales, (Welsh Government, 2013b) where information to those areas where a higher incidence rate of bTB per 100 herd were reported from farms in Pembrokeshire, Carmarthenshire, mid Powys, then Gwent and South Powys. Results from the survey data and the Welsh Government bTB results for incidence of disease on farms in Wales are closely related.

The next section of this chapter gives a reflective view on securing a data sample for the survey. This is then followed by a discussion on the procedures involved in obtaining ethical approval for carrying out the research.

Table 4.8: A breakdown of the TB status of the farms surveyed

Area	***% of TB restricted farms***	***% of farms who have never had TB***	***% of farms that have had TB in past***	***bTB incidence areas***	***2012 bTB incidence rate (per 100 herd years) Wales****
Anglesey	0.9	8.5	0.4	Low	1.82
Gwynedd	0.9	12.7	5.4	Low	1.52
Clwyd	2.7	18.8	7.0	Medium	4.58
Ceredigion	6.2	10.9	9.9	High	7.57
Pembrokeshire	35.4	10.9	13.2	High	18.29
Carmarthenshire	20.4	7.3	24.0	High	13.84
North Powys	6.2	2.4	5.4	High	9.80
Mid Powys	11.5	6.7	15.7	High	12.86
South Powys	0	2.4	3.7	High	12.26
South Glamorgan	0.9	4.2	1.2	Medium	3.99
Mid Glamorgan	0.9	1.8	1.7	Medium	3.99
West Glamorgan	3.5	3.6	1.2	Medium	3.99
Gwent	9.7	7.9	10.7	High	12.83
Total	100%	-	-	-	-

*Source: Welsh Government (2013b). Higher scores indicate higher levels of bTB infection.

4.7 Reflections on approach to data acquirement

A reflection on the experience of establishing a survey sample and the issues that arose in relation to this is briefly discussed. During the initial stages of this study a discussion involving myself, my supervisor and Welsh Government officials from the bTB policy team took place to consider initial thoughts on the approaches to the PhD. This included discussion on the methodological approach and the sources of data

available to acquire a sample for a quantitative survey. An initial verbal agreement was made to source this data from the AHVLA database through Welsh Government officials. This assumption was made by all parties that the agreement would go ahead, however the events which unfolded between this point and when the data was required was unforeseen as a change in staffing at the Welsh Government bTB policy team meant that there was no written evidence within the minutes of that meeting to endorse that this agreement had been discussed. This caused a delay somewhat to survey distribution to farmers. A reflection of access to data here has enabled lessons to be learnt as to the degree of rigour for future approaches to acquiring research data.

4.8 Ethical considerations

An application for approval to undertake fieldwork for the study was submitted to the Ethics Committee at the School of Planning and Geography (CPLAN) of Cardiff University and subsequent agreement was provided to undertake the proposed research. A research information sheet was drawn up for participants undertaking interviews for the qualitative phase of the methodology together with a consent form which has been placed in appendix 2. A knowledge and understanding of the ESRC research ethics framework (ESRC, 2010) was taken into account within this process. In the context of the researcher perspective, and with a personal experience of the research being undertaken in relation to bTB restrictions, it was felt that there were aspects of this knowledge that was valuable when building trust and relationships with interview participants. Any personal experience, knowledge or assumption that could potentially introduce bias into the research needed to be avoided by maintaining an account on how the data was collated, interpreted and analysed with evidencing of any personal reactions.

4.9 Summary

This chapter has explained the mixed methods research design undertaken for the study and has described the plans to undertake both the qualitative and quantitative phases of fieldwork in turn. The qualitative approach explains the strategy to recruit farmers within four areas of high bTB incidence in Wales using vets as gatekeepers. A

total of 16 farms were recruited to undertake the qualitative section which involved three visits to each holding based on a mix of both semi-structured interviews together with observations during bTB testing and walking and talking interviews. The focal component to the quantitative approach was a postal survey which included scales to measure levels of well-being and was distributed to 1,800 of farmers across Wales in May 2013. A 33% response rate was derived with all surveys inputted manually into SPSS prior to the commencement of data analysis. Details of farmer characteristics from initial data analysis have been outlined and compared with similar industry statistics or with equivalent research in order to assess the representativeness of the sample.

A presentation of further findings from the data analysis is provided in the succeeding three empirical chapters. Firstly, in chapter five the findings describe and discuss how farmers perceive their personal well-being and what may contribute and influence their well-being. Combined with results of the quantitative data analysis from the SWB measures in the farmer survey, chapter five provides a detailed discussion on the levels of farmer well-being in Wales and what influences it. The causes of poor well-being for farmers are discussed at interview and these are described alongside survey data analysed for levels of work productivity and presenteeism. Subsequently, chapter six investigates the survey data to examine the extent to which farmer well-being is affected by bTB and the part played by other factors such as farm characteristics in influencing farmer well-being. It goes on to provide further results of survey data following analysis of farming pressures and problematic animal diseases and their impact on well-being.

Lastly, chapter seven combines both interview material and the findings from the farmer survey and discusses narrative on how farmers cope with the daily pressures on the farm with farmer attitudes to statements in the survey. Findings in relation to farmers' levels of engagement with the community, their beliefs in being respected members of the farming community and their thoughts on the rural mix of population within their area. Conclusions coming out of this refer to how farmers cope with

specific pressures on their farms and the role of both intrinsic and extrinsic factors within that coping mechanism.

Chapter 5: Farming and Wellbeing

5.1 Introduction

This chapter explores the concept of well-being amongst farmers in Wales. It investigates what well-being means to farmers, the extent and influence of different pressures upon farmers, and analyses levels of well-being using three established measures. The chapter therefore provides the first qualitative and quantitative assessment of farmers' well-being in Wales and provides a different perspective on farmers' mental health to that found in previous studies in England. The aim is to try and decipher what particular aspects of their lives that farmers associate with well-being and to identify whether any particular dimensions of subjective well-being are recognised more commonly amongst farmers and why. These will link back to the themes identified in the conceptual framework where the main points from the literature review have been flagged up in relation to factors which may influence farmer well-being and discusses whether these influences have been identified through previous research.

To do this, the chapter combines both quantitative and qualitative evidence, using results from the farmers survey and evidence from interviews with farmers and vets. The chapter begins by exploring the meaning of well-being with farmers before analysing in more depth five key factors that appear to impinge on well-being. Using the WEMWBS and ONS measures of well-being, and the Stanford Presenteeism Scale, the chapter shows how farmers' mental health varies between different regions and farm types. The findings from analysis of the survey data in relation to farmer well-being is outlined in the latter part of this chapter whereas the results of the survey sections on aspects of farming pressures and farmer's views on bTB are discussed in the succeeding chapters.

5.2 Understanding Well-being

This section describes the meaning of well-being to the group of farmers who participated in the qualitative interviews and discusses the responses and reasons driving their interpretations.

5.2.1 Farmers' perceptions of personal well-being

During the first round of interviews, farmers were asked to think about the definition of well-being, what it meant to them and what they thought influenced both positive and negative levels of well-being. Some participants found answering this question relatively straightforward. For others, it prompted deep reflection on what made them happy and how those feelings connected to their work as farmers. Analysis revealed a number of distinct themes in farmers' understandings of well-being. They are as follows:

Theme 1 – Well-being as Health

The main association farmers drew with the concept of well-being was with the idea of health. Farmers distinguished between good physical and mental health as being a sign of well-being. In relation to physical health, farmers commented that being fit and able to work hard was a sign of well-being. For example:

> *"I would say wellbeing to me is being fit and healthy and probably able to do what you want to a reasonable extent. That's how I would describe it". (Dairy and beef farmer, area 4).*

'Working hard 'and the idea of 'hard work' have previously been seen to be key ideas in the idea of the 'good farmer' (Silvasti, 2003).

One farming couple believed that their mental well-being was not a problem because of the enjoyment they received from farming and its way of life together with an attitude on how lucky they felt of their family. That farmer compared how farming had kept him physically fit compared to others of his age who he had been at school with who had pursued other careers.

> *"Llês, ie ni'n gryf yn feddyliol felly mae'r llês meddyliol ddim yn broblem achos ni'n cael digon o boddhâd mas o ffermio a ffordd o fyw a hefyd teulu, ni'n ffodus iawn, a lawer i dydd ni'n teimlo wedi blino, os odyn ni wedi bod yn dost, annwyd neu 'flu' neu rhywbeth ni dal yn gorfod cadw fynd nagyw hwnna'n gwneud llês… fi'n edrych rownd a'r bechgyn a oedd yn ysgol, dynion sy'n yr ysgol yr un pryd a fi a ma nhw r'un oedran a fi a dwi'n meddwl nagyw rheina'n gallu rhedeg, nagyw rheina'n gallu codi pwysau, dyw rheina chi'n gwybod ma nhw'n… peth nesa bydd ffon gyda nhw, ar ran ochr llês fy iechyd I, mae'n amlwg mod i mwy ffit na nhw". (Dairy and sheep farmers, area 1).*[5]

Closely related to physical health was mental health. Farmers frequently connected these when thinking about the meaning of well-being. Another believed that good personal well-being; both physical and mental is a result of being happy with your life and not have any stress.

> *"It[well-being] means, to me is to have my health. Health means more to me than anything else that's out there, that's what well-being is. Lack of stress and getting your priorities right I think, because one follows the other, if you're happy with what you do and you enjoy life I think health and well-being and everything follows it, but if you're gonna not do that bit I think you'll lead a pretty stressed life, especially farming if you allow it to." (Dairy farmer b, area 2).*

Similarly, farmers would complain that 'stress' was responsible for negatively affecting their well-being.

Theme 2 – Happiness

A second theme was of happiness. This connects to the much broader concept of

[5] *"Well-being, yes we're mentally strong therefore our mental well-being isn't a problem because we get plenty of enjoyment from farming and its way of life and also from family, we're very lucky, and many a day we feel tired if we've been ill, a cold or flu, or something, but we still have to carry on, that doesn't help well-being…I look around at boys who I was at school with, men who were at school at the same time as me, the same age as me, and I think they can't run, they can't lift heavyweights, you know they're…the next thing they'll have a walking stick, on the aspect of my physical well-being, it's obvious I'm fitter than them". (Dairy and sheep farmers, area 1*).

eudaimonia identified in the well-being literature rather than just the physical and mental aspects of health. Happiness was mentioned in relation to the farmers' overall situation in life and their work. Several farmers commented that this sense of happiness or contentment came directly from their work even though they were probably working harder than they should. For example:

> *"Our wellbeing I suppose you'd mean about sort of being happy with life in a situation and not being tired and fed up and cross and upset and all the rest of it." (Beef and sheep farmer, area 4).*
>
> *"Content and happy I would say. Yes I guess so, I think having your health I guess, yes..." (Dairy farmers d, area 2).*
>
> *"…and yes, I genuinely enjoy what I do day to day, I probably work more hours than I would like to."(Dairy and beef farmer, area 4).*

Farmers' happiness related to their work with animals and the sense of pride and enjoyment they got from that. This was particularly the case in relation to pride in farmers stock and being able to complete the cycle of birth to death, or demonstrate success in front of fellow farmers:

> *"But I suppose the real joy out of it comes when you're selling something for, you know, good money or taking it to a show and winning or seeing that you've done something with it, like getting a bull into AI or something like that." (dairy and beef farmer, area 4).*
>
> *"I was brought up on a farm, there's nothing more nicer and a joy to see than a little calf born healthy and that sort thing…and to bring them up healthy, and I always believe you look after your stock, my father always did. The animals came first. Before he ever fed himself it was the animals". (beef and sheep farmer, area 1).*
>
> *"I enjoy the process of inseminating cows and the results of [vets] fertility visits...or feeding the cows and got this much milk out of it, I quite like to say 'yes I got a result out of something I've done' ". (dairy farmers C, area 2).*

One farmer felt that his time and work priorities were tied to looking after the well-being of his livestock outside on the farm more than the well-being of the family.

"It's quality of work. Your stockmanship. I can't stand seeing an animal limping. I can't stand lame cows. So I really enjoy trimming feet and seeing cows walking well, I don't like to see anything ill or looking poor. It's just the quality of the stock. The general cleanliness…so, yes it's all about well-being of stock outside, more about well-being of stock outside than well-being of people in here really. "(dairy farm, area 3).

Happiness also derived from working outdoors in the natural environment. For example one farmer talked about his enjoyment of fencing:

"As I get a bit older… well I still enjoys me work now I won't say I don't, but one of the things I used to love doing and done a lot of it over the years was fencing, you put up a new wire fence you know, posts and stake and you can stand back and look at that one and you can see him for years, of this fencing I enjoyed doing that". (Beef and sheep farmers, area 4).

Another farmer was able to compare his job now as a farmer to a previous career where he was based in an office between the hours of nine to five daily. He referred to being much happier farming and being outdoors as a healthier lifestyle than working in an office:

" O lawer iachach ar fy rhan i, ni'n meddwl gorfod mynd i'r office a aros fan hynny o 9 i 5 bydden ni'n ... ych a fi. Dim...dwi wedi bod yn gwneud rhywbeth arall heb ffermio cofiwch chi, bues i'n gweithio… a wedyn des i nol fan hyn. Dwi'n gallu cymharu mewn ffordd, bywyd sy nawr a bywyd iach a bywyd chi'n gwybod a mynd…8 hyd nes 4:30, 5 o'r gloch a wedyn roedd rhaid i chi weithio penwythnosau a pethe a bydde rhaid i fod yna, a cymharu nawr le i ni, ma lot fwy o oriau nawr fi'n gwybod ond ...". (Beef farmer, area 3).[6]

These farmers recount stories of what makes them happy in relation to the natural environment and their livestock:

[6] *"Oh, much healthier on my part, thinking about having to go to the office and stay there from 9 till 5…yuck. Not…I have done something different than farming mind you, I worked in…and then I came back here. I can compare both ways, my life now is healthy and life going…from 8 until 4:30, 5 o'clock and you had to work weekends and you had to be there, and compared to now, there are a lot more hours I know but…"(Beef farmer, area 3).*

"I certainly think, well I do feel on a really nice sunny day especially in the spring, how much happier I am. I certainly do enjoy on a morning when the sun is coming up and it's misty and you're rushing the cows through the mist". (dairy farmer c, area 2).

"And like yesterday it was good because we cleared a lot [of cattle] off the field because they were making a mess, and you're glad to do that as well. It's nice to see them come in and they're off the grass and they're happy in the sheds. The rain is pouring and it doesn't really matter. Things like that as well give you a lot of satisfaction". (dairy farm, area 3).

Farmers connected happiness to other aspects of health. Beliefs that being happy with one's life also has an effect on a person's state of health are talked about.

"Health, health and healthy kids, I think that is wellbeing to me...have your health and happiness I think I honestly don't think...you know we lost relatives through cancer, heart disease we lost a neighbour last year through cancer and we had got quite involved with that, so we know that money ain't going to get you better ... so your health and happiness, and normally when you're happy, normally your health keeps better as well, because when you're miserable and horrible then everything seems to go wrong, but if you're mentally quite happy and mentally quite 'yeah OK I can cope with this I can do that' physically your whole body suffers so yeah to me it is health and happiness...I think wellbeing is being content with your life" (Dairy farmers a, area 2).

Theme 3 - Respect

Having a sense of worth in the world also appeared to be valuable to some farmers. Although working with animals gave farmers a sense of contentment, the value of those animals and their work was also important to them. For example:

"The well-being is that we're struggling, struggling, struggling to achieve viability, sustainability but we haven't got a quality of life ourselves: we can't relax, we can't go anywhere, it's all looking after the place, looking after the stock and I think that wellbeing, respect comes into it, respect from Government…and respect from society of what we're trying to do because we are producing the food for the nation, or some of it anyway. Our well-being is dependent on prices that we get…and obviously dictated by supermarkets which aren't interested in the little person or even in the big person, just

themselves, it seems to me." (beef and sheep farmers, area 1).

In this quote, the farmer is suggesting that well-being is derived from a sense of purpose or worth in the world. For many years, farmers have been criticised as polluters rather than as stewards of the countryside. Yet in the context of food scarcities and environmental insecurity, farming may be finding new respect. For this farmer, then, acknowledgement from the government, companies and the public that farming was a 'good' activity was significant in informing his sense of well-being. One farmer talks about a sense of self-satisfaction and pleasure from seeing cows he has reared from birth coming through in the herd and milking well.

> *"When you're out milking and you get some cows that are average, some are very good and some are not so good, and you get these cows that milk really well. To say they're like machines is wrong. But their ability to convert their food into milk, the quantity they will give, some of them are incredible. It gives you great pleasure when you rear one of those and you've seen it coming through from a calf, and it comes into the milking herd and you're getting some cracking yields out of it, you give yourself some sort of self-satisfaction." (dairy farmer, area 1).*

Another farmer felt frustrated with Common Agricultural policies and felt that the Government were being short sighted as to the role that UK farmers had in potential food production for a growing population.

> *"I think the pity is that we're [farmers] not being recognised from the very top, Government, for what we do and what we could achieve, and with the state of the economy and what we're borrowing and all the rest of it I think they're short sighted…farming could be one of their main contributors to get them out of this mess really because we are, if we're having a good return on our products and we were making more money, we'd attract more people into the industry…even farmer sons and daughters shy away from the job because of the money and the unsociable hours …and we're inspected up to the hilt with all these farm assurance schemes and god know what so we are gold plated on everything like that more than European countries so our food must be of a high quality", (dairy farmer e, area 2).*

> *"We're looked at as a minority and we're not thought that much of in the country and so that's where I feel frustrated and you know the CAP budget is up for review now in the next couple of years and of course there's all greening*

issues and whatever and then on the other hand you hear of the population of Great Britain could go to another 10 million by about the mid 2020's or 30's and then World population is ever increasing and food is demanded, it is globally demanded and there are markets out there but we don't seem to get in there and ... in the future this is what we're going to have to do, by 2050 we're going to have to feed so many million more and all the rest of it and here we are now and all they're [Government] talking about is greening issues and cutting subsidies". (dairy farmer e, area 2).

Theme 4 – Freedom / Individuality

Connected to the idea of respect, some farmers also commented that being able to get on to do their job was inherent to well-being. For example:

"I don't complain about my quality of life, because I'm quite happy, I love my cows, I love my calves, so long as everybody leaves me alone I'm quite happy." (Dairy farmers a, area 2).

Similar ideas are expressed in ideas of good farming (Silvasti, 2003) in which bureaucratic farming is seen in a negative light. However, this sense of loneliness contrasts with other theories of wellbeing which suggest that communal and social connectivity are important. It was quite a common finding from those interviewed for members of farming families to engage in a community group such as the Community Council, Young Farmers Club or school governor.

"A good network of support and friendship and that sort of thing as well which contributes to a feeling of wellbeing I would of thought and rather than if you stayed slogging your guts out all day and you don't go through the farm gate you get, you feel probably depressed and down, you get stressed and what have you and you need to have that external factors that help you with feeling good about yourself and life and what you're doing I suppose isn't it I would think" (dairy farmer e, area 2).

"A work life balance, you have to have interest for tomorrow, what gets you of bed, what gets you motivated, and the balance of interaction with others both with your work and social life". A one man band doesn't get the quality of life available and I feel that it's a balance between having staff to fill in the gaps without getting to the point where you're entirely reliant and cannot function

without them, it's a balance. (dairy farmer c, area 2).

One farmer at interview believed that farmers would not be in the business of farming if they were not optimists and expected farmers to have better well-being scores than the general population.

> *"…farming is a way of life, you've got to love it, it's no good doing it thinking you're going to make a million because you're not, but it is a way of life, you're in charge of your own destiny". (Dairy farmer a, area 1).*

Being tenant farmers was raised as a form of volatility to their farming business by one farming couple who were concerned for the future generation.

> *"We're farming more for profit today than previously and don't feel we're getting a return for the investment or time we put in…we need to improve profitability for our son to join the business because we're tenant farmers, I'd prefer if our son wasn't going down the route of agriculture" (dairy farmer C, area 2).*

Theme 5 – the Environment

References are made in the comment above to the quality of life that farmers have in relation to well-being and the fact that farming is a way of life rather than just an occupation. A comparison is made here to a pleasurable working environment with the example provided below of working in a city or those in other occupations. For example:

> *"Quality of life, quality of life, respect for what we're doing…it's a way of life I suppose, you work yourself to the bone, but it's just something you want to do isn't it? – And to have, how can I put it now, different facets in life. We can't go working twenty-four seven and not be able to relax because in farming today, if you're on a small farm, and even big farms have got their problems because they're different problems, but with small farms it's just a treadmill... and of course the environment we live in, it's not a bad environment. We haven't got the stress and strains of cities, we have got other stresses and strains but at least we're working in an environment which is pleasurable". (Beef and sheep farmers, area 1).*

Another farmer shares his feelings on how a farming way of life contributes to his well-being in this example:

> *"You're there milking and if you're standing at the back of the parlour and they [cows] put their heads through the door and you aren't aware of what's going on, and the next thing there's one licking the back of your head. But you know, there's this tremendous sense of communication with them. There's no malice in them. You go into town, you know what it's like driving through town (makes car horn sound), rude gestures, nothing like that with them. You can't buy this. You can't buy this sort of satisfaction and I think this is what contributes to our well-being, to perhaps sometimes to our general coolness. Some people say I'm not a very cool person, quite erratic but you do feel a wonderful way of life, which you can't put a price on." (dairy farmer a, area 1).*

One farmer felt that there were moments in his working day when he would feel that the location of where he worked counteracted the dull routine jobs particularly during the winter months.

> *"It's just been the usual mundane at the moment but there are, I think, now and again a moment or something, it depends where you are on the farm, you look around and you think it's a nice place to be anyway, we've got a few nice spots on the farm where we can view right up to Preselis and so forth and you think it's not a bad spot to be in you know what I mean" (dairy farmer e, area 2).*

5.3 Well-being Influences

In describing their definitions of well-being, farmers also hinted at its causes, for example ideas of respect refer to the influences of bureaucracy and public attitudes towards farmers. This section considers in more depth the factors that farmers' perceive to impact and influence their well-being, drawing on both the survey and interviews.

Table 5.1: Summary of respondents top farming pressures

Top pressures	***Responses N***	***Percent***	***Percent of Cases***
Finance	550	23.0%	99.5%
Weather	390	16.3%	70.5%
TB	273	11.4%	49.4%

Paperwork	256	10.7%	46.3%
Red Tape	301	12.6%	54.4%
Farm Management	440	18.4%	79.6%
Other	177	7.4%	32.0%

Overall Well-being Influences

The second section of the quantitative survey invited farmers to note down in order of importance the top five pressures that made farming stressful for them. Responses were in free-text boxes and subsequently coded into similar themes. Seven broad themes emerged from the coding: finance, the weather, bovine TB, red tape/bureaucracy, paperwork, farm management and other factors. Table 5.1 summarises the results of analysis which identifies pressures in order of importance.

It was clear from the interviews, however, that some of these pressures were inter-connected. For example, the weather was connected with financial pressures which also had impacts on farm management pressures. Moreover, the pressures affected different farmers in different ways. The impact of these pressures is explored in more depth below.

The Weather

It was evident from the analysis of the top five farming pressures that made farming stressful that the weather caused a significant amount of stress for farmers. Over 70% (*n=390)* of respondents entered this in the survey as a stressful factor within their working lives. A likely explanation for this is the timing of the survey which was distributed in May and June 2013. Prior to this point in time, the weather conditions of the preceding summer of 2012 in England and Wales resulted in the wettest since 1912, (Dong, 2013) and this had many implications for farmers. Following on from the wet conditions of summer 2012, and leading into the winter with a wet autumn, some heavy snowfalls in mid, north and east Wales during the start of the lambing season in Spring 2013 resulted in a substantial number of sheep losses to farmers in the hills and additional feed costs to those who could not turn ewes and lambs outside. This

problem would also have had an impact on farm finances with farmers having to purchase additional feed for livestock due to lower or poorer quality forage stocks from summer 2012 or for those having to keep stock indoors for longer in the Spring of 2013.

More broadly, interviews with farmers revealed that well-being had seasonal dimensions. Some farmers felt that they favoured some particular times of the year during the farming calendar compared to the majority disclosing that there were benefits to every seasonal aspect of their working lives on the farm. Those farmers who referred to some particular times of the year which were preferable to others commented on the seasons, the type of events taking place for example seeing cows turned out and not having to carry out mundane winter feeding routine tasks, others preferred the routine of working during the winter time as the summer months could be very busy times and events such as harvesting could take up long hours during the day and this also was dependable on climatic conditions and again lambing time and seeing lambs born as mentioned previously.

> *"Mae'r Gwanwyn yn dangos sign o fywyd...bywyd newydd yntefe, ma hyd yn oed y llwyni, y coed, y dail yn dechrau, chi'n gwybod ma popeth felna dwi'n credu yn help, odi, dwi'n enjoio hwnna, dwi'n enjoio gweld ryw falle llo fenyw, gwneud hi lan i fynd i Sioe neu rhywbeth." (beef and sheep farmers, area 3).*[7]

Factors outside the control of farmers can cause pressure such as poor climatic conditions which can impede the harvest or silaging of grass in turn having an effect on the winter fodder circumstances on the farm resulting in reduced profit from milk production and the added cost in having to purchase in additional feed. At the first interviews, farmers talked about the weather conditions of the preceding summer and how this had affected their business.

> *"We have to work in all weather conditions, which doesn't help and of course*

[7] *"The Spring shows signs of life…new life, even the hedges, the trees, the leaves starting, you know everything like that I think helps, and yes, I enjoy that, I enjoy seeing a heifer calf, then preparing her ready to take to a Show or something". (Beef and sheep farmers, area 3).*

the stresses which affect their wellbeing are getting the harvest in. That's becoming more problematic as time goes on because we only have these short weather windows; that affects your wellbeing. Other than that its a way of life which is, we hope sustainable, don't we?" (Beef and sheep farmer, area 1).

Results from the quantitative survey asking farmers as to the top five pressures affecting them on the farm (table 5.1) discloses that the weather situation came second only to financial pressures as to what gave farmers the greatest amount of stress with bTB coming third. These factors are recognised as ones that are out of the control of the farmers to an extent and could be the reason why they were highlighted as the top three within the survey.

At interview farmers talked about how the change in weather after a long winter coincided with the turnout of cattle which was an event that was mentioned as giving pleasure to farmers, specifically after a long winter carrying out routine feeding and bedding tasks and scraping slurry to see cattle running around a field with their tails in the air.

"Ma gweld y lloi yn mynd mas yn y Gwanwyn a'i cwtiau lan, mae hynny'n rhoi pleser. Mae hi'n mynd yn cwrs mawr a lloi a da ar eu holai nhw, chi'n gwybod mae hynny yn rhoi pleser mawr i chi. Wedi bod yn bwydo nhw drwy'r Gaeaf, scrapo nhw a pethe a gweld nhw'n mynd mas yn y Gwanwyn, ma fe'n gwneud e i gyd yn well, chi'n gweud 'mae'n werth i gwneud fel hyn eto de." (Beef farmer, area 3).[8]

"I look forward to the cows going out and the grass is growing like hell and I know that the winter chores are coming to an end, because it's just the monotony of scraping out and feeding every day; how these people keep their cows in all year round I don't know because I'm quite happy to see them go out, that's why it's been a pain in the backside the last two summers" (Dairy farmer e, area 2).

[8] "*Seeing the calves going outside in the Spring with their tails in the air, that gives me pleasure. It develops into a big chase with calves and the cows behind them, you know that gives you great pleasure. After feeding them all Winter, scraping out and things and seeing them go out in the Spring, it makes everything better, you tell yourself 'it's worth doing this again then'. (Beef farmer, area 3).*

Red Tape and Bureaucracy

Other aspects that were found to affect farmers' well-being were paperwork, form filling and the increased hours farmers have to spend on these tasks rather than physically farming. Comparisons were made at interview to how much more time is having to be spent on paperwork or office time in contrast to farming historically.

> *"I have more paperwork and stress than I would like to sometimes and unfortunately, it's quite a large necessary part of farming these days. But a lot of it's not really needed, it's just imposed by DEFRA, government, you know, whoever. Lots of different places, Tesco's if you like. It's all deemed to be necessary but as far as actually doing a good job of farming goes, it's probably not at all necessary. It doesn't make any difference to how well you look after your animals as such, or what you do…at the end of the day, if you're a good farmer, it doesn't quite work with milk I suppose, but yes, you sell the right amount of milk, you do a good job. You sell the right amount of milk per animal, then you must be doing a good job logically, and if you're selling sheep or cattle, well the price you get for them will dictate how well they've done. But the paperwork comes with it, and in most cases, it doesn't make any difference and it's not really needed, I don't think." (Dairy and beef farmer, area 4).*

Red tape was mentioned by one farmer in his response after being asked what personal well-being meant to him.

> *"Lack of stress. If we could get rid of some of this red tape, this is the stress. We've got to accept that we've got to have a certain amount of red tape, but some of it is right over the top and it really does stress you…there's a financial penalty if we don't dot the I's, cross all the t's we lose an amount of money through it from the single farm payment.". (dairy farmer, area 1).*

Bureaucracy was another factor which farmers mentioned at interview which they detested.

> *"I don't like the pressure that bureaucracy is putting on us, I don't like that. I think it's gone way too extreme, every year seems to be getting worse, there's new rules and they keep changing and it's gone to the point now where it just goes over you because you can't keep up with it. If somebody comes out you just sort of like act stupid and 'please tell me what you want' really, you know, it's gone crazy…and I wish there was no single farm payment and you could do*

what you wanted do, I think we'd be better off. It's pressure really, isn't it? There's no need for it really and I'm hoping there won't be a need for it in the next...you know if food, if farming became a lot more profitable the government would say 'well why are we supporting these people' and 'why do they need single farm payment' and 'leave them to it' and put the money somewhere else maybe. I think that would be nice to be the other way around." (Dairy farmer d, area 2).

-*"…don't like contractors not turning up, that's another one I don't like…don't like farm assurance, don't like ear tag inspections, don't like signing a piece of paper before you value the [TB] cows, that annoys me as well, there's lots of things that annoy me." (Dairy farmer a, area 2).*

Bureaucracy was also connected to farmers concerns about the politics of farming and in particular the Welsh Governments handling of bTB. One farmer felt under threat of this because of concerns with the attitude of Welsh Government with bTB eradication versus how electorate perceive their policies and possibly hindering disease eradication. This is certainly an issue which is affecting farmers as mentioned at interviews and having an impact on their quality of life.

"Yes, the major threat is politics, politicians which some people don't think about but I think about it all the time. Politics, because the present Welsh Government's attitude and because they're worried about PR, they worry what people out there in the urban sprawls think, they're going down a road which is a negative road with regard to dealing with TB in Wales. I think because of that policies are being watered down. I think that the veterinary service within the Welsh Government are too frightened to say too much because they're worried about their jobs…" (beef and sheep farmer, area 1).

One farming couple discuss how much bTB is governing the management of their farm business and how frustrating bTB testing can be in relation to the inconsistency of the interpretation of the skin test:

"Yes, everything is managed around it [bTB]. I shouldn't say it but it's government and TB that's ruling our farm, that's wrong...at the moment" (dairy farmer d, area 2).

"That's another problem when you don't really know why you're on severe [skin test interpretation] or why you're on standard or why are they [AHVLA] doing this and they change the rules quite often, like. It's really frustrating - yes,

I don't really know why we were on severe, really but…". (dairy farmers d, area 2).

Bureaucracy and red tape were identified by farmers where they talk about the association between bureaucracies surrounding the bTB restrictions on the farm.

"…with these cattle going off for TB they have to have a licence go with them in the lorry well they're going straight to the slaughterhouse to be slaughtered, why do you need this piece of paper in the lorry? You know is it absolutely essential, we all know where they're going, the lorry driver is working for the slaughterhouse, he's not going to be taking them somewhere else… his instructions are to come up here and pick three cattle up or whatever and take back to the slaughterhouse, he knows where he's going his bosses know where he's going we know what he's doing so why do we need this licence it's not like he's going to sort of suddenly disappear with them and sell them somewhere else on the quiet or something like that…" (beef and sheep farmer, area 4.

Another farmer showed me the volume of paperwork he had received from AHVLA involving a case for one reactor cow and an IR on his farm. He also referred to the licensing requirement for movement of cattle whilst under bTB restrictions and the fact that this system had somewhat improved.

"*Let me just show you something a minute. That is the total paperwork for one reactor and one doubtful [IR]. Pages and pages [pages rustling]. There is no sense in the amount of paperwork that they [AHVLA] churn out down there. At least you don't have to get a licence every time you want to move. They [AHVLA] will give you a general licence that you just photocopy and send with each bunch of cattle with the numbers on the back of it. That is better than what it used to be like, you used to have to get a licence every time you wanted to move.". (Beef farmer, area 4).*

Finance

Interviews revealed that some of these factors were related. For example, the knock on effects of the weather on business profitability due to poor milk prices and the higher costs of inputs such as feeds.

" Yeah I think it is what it is, it's a lifestyle, and if you like it that's pretty good. I think the returns are pretty poor, particularly in dairy farming. This year hasn't helped a great deal because of the weather, which I know is nobody's fault

really, but it's certainly not helping matters. That's probably the main influence on the feed price really, is the weather, and it's not just here; it's around the world isn't it. Yes, it's what we do and we're not probably going to do something different but it would be better to have a comparable return with other jobs for the amount of work you do." (dairy and beef farmer, area 4).

This farmer talks about finance as one of the most stressful influences on farmers.

" … as much as farmers whinge, I think we've got a very privileged lifestyle I do, I know it's stressful and everything else but it's as stressful as you make it and I think TB is a stress and it causes a lot of upset. I think the biggest thing that is the amount of money that is involved, that's the biggest stress on farmers I think." (Dairy Farmer b, area 2).

The financial impact of a farm being overstocked with animals as a result of bTB restrictions was a subject matter that was raised many times at interview. More animals on the farm meant more work, additional hours and some farms had been forced to employ additional staff to help with the workload. Feed, fertiliser and fuel bills were elevated with more cattle to feed and the lack of enterprise income from being unable to sell surplus livestock such as heifers for breeding or store beef cattle unless they went directly to slaughter under license. Hidden costs like these to the farmer as a result of bTB restrictions were common issues amongst the farms interviewed.

Farm Management

Farmers were asked at interview whether there were any particular jobs they enjoyed less or disliked doing on the farm. Particular themes developing from this question were bTB testing and paperwork.

"I don't mind working hard but working hard for nothing is not right…I'd say that's not wellbeing." (dairy farmer d, area 2).

"Personal wellbeing, erm rwy'n gwybod bod fi'n abuso'n corff i'r ffaith bod ni'n gweithio shwt oriau hir bod ni'n dechrau am 4:30 y bore a falle gweithio mlan nes 7, 8 o'r gloch y nos, neu 7 bob nos beth bynnag sy'n digwydd… ni'n codi rhan fwya y flwyddyn yn y nos…pob nos wedyn ma rhywbeth yn dod a llo neu

wyna neu rhywbeth i ni'n codi wedyn 2:30, ni wedi blino drwy'r amser a ni ddim yn cael llawer o gwyliau, ni yn cael ambell i un ond dim byd o werth, beth penwythnos fan hyn neu rhywbeth felna." (dairy and sheep farmer, area 1).[9]

"Paperwork I'm not particularly fussed on but it has to be done. TB testing is not the most wonderful job. Most people don't like it. I don't know, any other shitty job that nobody likes I suppose." (dairy and beef farmer, area 4).

Linked to a dislike of paperwork were comments from one farmer on the Governments Cattle Tracing Scheme/BCMS service.

"I'll tell you the best thing that's happened to me, I've had the automated man on the passport thing [BCMS}…have you tried him? Oh he's good, he doesn't answer back, you just tell him the answers…I do like that". dairy farmer b, area 2).

One farmer explains how he enjoys making improvements on the farm and the impact of a long spell of poor weather on his pastures.

"I like to see a tidy farm, I like to see the fields in a nice state and that's really not happening at the moment, I like things to be tidy, the hedges aren't cut, there's ruts in the field…I like improving the farm, I like improving the farm we have done that quite a bit as well, I like putting down concrete and make the road look nice." (dairy farmer a, area 2).

"Well nobody likes TB testing, we dread it, I don't like [milk] recording every month, I've started doing that and I hate doing but I've got to do it…because if I want the figures on the pedigree sheets I've got to do it…I hate it, and every month I think this is going to get better, this isn't going to get easier, because the woman doesn't come, I do it myself because it saves £30 odd a month by doing that...I'm too tight. I hate the paperwork with a vengeance, I hate it, I've just done the accounts for the year, I come home from the accountant and it was sort of 12:30 [pm] and I nearly went down the cellar to get myself a beer

[9] *"Personal wellbeing, erm I'm aware that I abuse by body by the fact that we work such long hours where we start at 4:30 in the morning and maybe work on until 7, 8 o'clock at night, or 7 every night whatever's happening…we get up in the night the majority of the year…every night there is something calving or lambing or something and we get up at 2:30 [a.m.], we're tired all the time and we don't get a holiday, we get the occasional one but nothing of benefit, a weekend or something like that". (Dairy and sheep farmer, area 1).*

because I felt such relief because it's done, but I hate it, I hate it [laughing]" (dairy farmer b, area 2).

"TB testo…y peth gwaetha i wneud, yn enwedig gyda da sugno, ma da godro yn rhwydd…dorres i'n fraich, testo TB a llo yn dod mas o'r crush a cratsh". (beef farmer, area 3).[10]

"Mae'r tywydd yn rhoi fwy o bressure arnoch chi, mae rhaid derbyn [hyn]ny yn ffermio a ni'n gorfod cymeryd y tymhorau a ydy ma tywydd oer, dwi ddim yn dyn tywydd oer ond ar ran pethach sy fwya caled o ni'n egluro ginne abiti bureaucracy, y pobol pwysig hyn sy'n gweud wrtho chi beth chi'n gallu gwneud, bachan yn troi lan i inspecto'r ryw ddydd heb weud dim a chi'n gwybod hwnna gyda'r pwer i wneud hyn, ma ffermio'n mynd trw'r cyfnodau annodd, wnai ddim i'r mart os allai help achos chi'n dod nol ma pob ffermwr yn mynd i hala ei hunan yn mwy depressed achos trafod chi yn dweud bod e'n mynd i fynd yn beth ti'n galw. Ma cyfnodau felna i gael amser ma pris yn isel, a'r costau neu'r tymor yn hir neu colledion yn fwy nag oeddech chi'n feddwl, ond mae fe'n rhan o'r busnes a chi'n cario mlan". (dairy and sheep farmer, area 1).[11]

However, although these aspects of farm management appear to have negative impacts upon well-being, farmers also mentioned how some aspects had positive impacts. Activities such as showing animals, researching pedigree cattle genetic bloodlines and breeding programmes for their herd were associated as hobbies and enjoyment. Lambing and calving time was mentioned with respect to seeing the start of new life and to be able to be a part of that experience was another aspect of

[10] *"TB testing…the worst thing to do, especially with suckler cows, dairy cows are easy…I broke my arm TB testing, a calf came out of the crush and crash". (Beef farmer, area 3).*

[11] *"The weather puts more pressure on you, we need to accept that in farming and we've got to take the seasons and yes, the cold weather, I'm not a cold weather person but on behalf of what I was telling you earlier about bureaucracy and things that were difficult, these important people who tell us what to do, turning up to inspect here one day unannounced, and with the power to do that, farming is going through tough times, I won't go to market if I can help it as you come back, every farmer will make themselves more depressed due to discussions like these. There are times like that when prices are low, and costs, or the season is long or losses are greater than you thought, but it's part of your business and you carry on". (Dairy and sheep farmer, area 1).*

farming which farmers referred to as enjoyable despite long working hours.

> *"I fi, gweld llo bach neu wyn bach yn cael eu geni, gweld bywyd ffres. Dwi o hyd wedi bod…yn edrych mlan i'r amser wyna achos mae'r amser o'r flwyddyn yn neis a'r dydd yn hyrach a …sai'n gwybod beth yw e dwi ddim yn gwybod ond ma gweld wyn bach a helpu nhw a'i tynnu nhw a beth bynnag, mae just yn rhoi ryw…mae'n bleser mawr". (beef and sheep farmers, area 3).*[12]

> *"It's looking after your stock, it's your planning for…especially in your programme of breeding, that's very important and trying to see if your plans over the years for developing the farming breeding and developing different lines of stock and pedigrees, if you've got pedigree flock to see how you're developing there if you cross, whatever. That's the pleasure and of course it uplifts you." (beef and sheep farmer, area 1).*

> *"Breeding the cows, and the calves that you've made an improvement over the mothers, that's probably my favourite bit. I quite enjoy milking. I don't get to do that much of it because I end up doing quite a lot of paperwork and management work. But if you did it every day, it probably wouldn't be quite so much fun! I suppose different people like different things" (dairy and beef farmer, area 4).*

One farmer described how his two young children enjoyed halter training calves and taking them to shows and the impact of bTB restrictions on them.

> *"What they get frustrated about is that they like showing calves, and they have their favourite calves, that they cannot take them because they're not allowed to go from here. So this year we had to buy them two calves to the other farm, but that means that they have to go every day to the other farm to train them which is five miles away. So it's nowhere near as convenient as doing it here. But the danger with bTB is that it could take their favourite calves away, but I suppose that's part of life. They have to get used to it." (dairy and beef farmer, area 4).*

[12] *"To me, seeing a calf or a lamb born, seeing new life. I've always been…looked forward to lambing time because the time of year is nice and the days are longer and…I don't know what it is, I don't know, but seeing lambs born and helping them, pulling them whatever, it just gives some…it's a great pleasure". (beef and sheep farmers, area 3).*

Additional factors

Interviews also raised a number of influences upon well-being not mentioned in the survey to a large extent. In particular, farmers' social relationships were frequently mentioned. It was felt that the relationships between those farming family members who were working in the business could lead to pressures, advancing to illness and even what broader literature on the impacts of rural stress has highlighted as suicide (Hawton et al., 1999, Meltzer et al., 2008, Macgregor et al., 1995, Deary et al., 1997).

> *" It's also relationships between each other and the stresses and we do get stresses in farming. You do get a lot of pressures and a lot of farmers, because of it are made ill and some farmers do commit suicide because of the pressures. Not only financial pressures but it's also family pressures that cause that, because of the strains that come in, because of the worry and there's always a worry". (Beef and sheep farmers, area 1).*

During the end of one interview at a farm, whilst filling in their own well-being scores, the family talked about two examples of suicide cases in their rural community. One of which was a relative who was a farmer and the other had been their postman for many years and whom the farmer had known since school days. They attempted to make sense of the possible reasons behind such actions through compassionate discussion about the inexplicable consequences of poor mental health.

> *" Ni'n siarad am well-being, roedd postman gyda ni wythnos diwethaf,roedd e gyda ni ffordd hyn ers blynydde, 49, roedd e'n hynach na fi tamaid bach, a dwe clywed wedyn roedd e wedi crogi ei hunan dydd Llun, 49, roedd e ma bob dydd ers blynydde, a we'n ni'n hala amser yn siarad, fi'n cofio bod yn yr Ysgol gyda fe…mae'r lein yn denau. Roedd mab fy mrawd wedi gwneud…42 roedd e, wedi crogi yn y silage pit…*" (beef farmer, area 3).[13]

[13] *"We're discussing well-being, our postman last week, he was with us this way for years, 49, he was slightly older than me, and yesterday we heard that he'd hung himself on Monday, 49, he was here every day for years, and we spent time talking, I remember being at school with him…it's a fine line. My nephew did too…he was 42, hung himself in the silage pit…". (Beef farmer, area 3).*

One farmer confided at the point of the first interview that he had been prescribed anti-depressants by his GP for the past eighteen months as he had felt that the situation he was in with his farm was affecting him personally. At that point he was in the process of pursuing a different career whilst hoping to carry on running the arable enterprise on his farm. Unfortunately he had been forced down this route as his original plan to disperse the dairy herd and run a small suckler herd had been scuppered due to an unexpected bTB herd breakdown less than two months before the cattle sale.

The next section will describe the results of the subjective well-being scales within the quantitative survey and compares these with established levels of subjective well-being for the general population (UK and Wales) and for those within similar occupational groups as farmers.

5.4 Levels of Well-being Amongst Farmers

The following section presents results from the personal well-being measures, namely the ONS Quality of Life and the short WEMWBS measures that were incorporated into the quantitative survey. Following descriptive analysis procedures carried out in SPSS the results of well-being amongst farmer respondents are outlined below.

The mean scores of farmers from the Quality of Life scale are summarised in table 5.2 together with a comparison of UK, and Wales regional data from the Annual Population Survey (ONS, 2013b) and results of the ONS occupational group entitled 'Skilled Trades' into which ONS have categorised farmers (ONS, 2012b). Comparing the results provides an illustration of survey respondents' personal well-being compared to the national representation for this scale. The findings demonstrate that farmers are less satisfied with their life nowadays than the population average for the UK, Wales and occupation group equivalent and also rated lower when asked if they feel the things that they do in their lives are worthwhile. The final two statements which are asking about their feelings 'yesterday' also score lower than average, and although this is only a measure at one particular point in time, there could be a range of factors

that contribute to the responses that influence farmers' feelings of happiness and anxiousness.

Table 5.2: ONS Quality of Life Personal Well-being questions farmer survey results

	Farmers	UK average	Wales average	ONS Skilled Trades
Overall how satisfied are you with your life nowadays? *(where nought is 'not at all satisfied' and 10 is 'completely satisfied')*	6.5	7.5	7.4	7.5
Overall to what extent do you feel the things you do in your life are worthwhile? *(where nought is 'not at all worthwhile' and 10 is 'completely worthwhile')*	6.8	7.7	7.7	7.7
Overall how happy did you feel yesterday? *(where nought is 'not at all happy' and 10 is 'completely happy')*	6.9	7.3	7.3	7.4
Overall how anxious did you feel yesterday? *(where nought is 'not at all anxious' and 10 is 'completely anxious')*	4.4	3.0	3.0	2.8

The aspects of well-being that the ONS Quality of Life Scale questions aim to measure in relation to personal well-being are identified as hedonic, eudaimonc and experience effect which play a complimentary role in the measurement of a person's subjective well-being. The statements within the scales focus on the subjective experience of happiness or affect and life satisfaction (hedonic) together with positive psychological functioning, good relationships with others and self realisation (eudaimonic). The first statement relates to the hedonic aspect of personal well-being, the second statement is associated with the eudaimonic aspect and the final two are connected with the experience affect to measure people's positive and negative experience.

A further scale to measure subjective well-being which was incorporated in the survey known as the short Warwick Edinburgh Mental Well-being Scale (SWEMWBS) and was positioned in the survey to follow on from the ONS Quality of Life Scale questions, the

findings are summarised in table 5.3 below. A set of seven statements are asking respondents to rate their feelings over the last two weeks on a five point scale derived from the SWEWMBS. These statements aim to measure a person's subjective well-being and psychological functioning using eudaimonic and hedonic perspectives. Statements relating to a person's eudaimonic perspective are asking respondents to rate if they've been feeling useful, dealing with problems well, thinking clearly and are able to make their own minds up about things. The statements relating to the hedonic perspective are asking if a person has been feeling optimistic about the future, feeling relaxed and feeling close to other people. The overall score for this scale is calculated using the total scores from each statement giving a possible range of between 7 and 35. These seven statements have also been used in the UK Household Longitudinal Study (University of Essex. Institute for Social and Economic Research, 2013) and the latest data from the 2009/10 survey is also included in table 5.3 as a comparison of results with the farmer survey. In Sept 2013 a population mental well-being score was added to the personal well-being domain of the ONS National Well-being Wheel of Measures (ONS, 2013a), and this includes the corresponding 7 point SWEMWBS results from the Understanding Society UK Household Longitudinal study.

The difference in well-being results from the most up to date mean score published from the 2009/10 Understanding Society UK Household Survey is given as 25.2 which compares with 23.8 as the mean personal well-being score of all farmers who responded to the survey using the SWEMWBS measure. This denotes a lower than average personal well-being score for the sample of farmers who responded to the survey, however one consideration which needs to be taken into account is that the national average data was derived during 2009/10, approximately three years earlier than the farmer survey.

Table 5.3: Short Warwick-Edinburgh Mental Well-being Scale (SWEWMBS) farmer survey results

	Mean SWEMWBS score	UK Household Longitudinal Study 2009/10
I've been feeling optimistic about the future	3.0	-
I've been feeling useful	3.5	-
I've been feeling relaxed	2.9	-
I've been dealing with problems well	3.5	-
I've been thinking clearly	3.6	-
I've been feeling close to other people	3.4	-
I've been able to make up my own mind about things	4.0	-
Total SWEMWBS	23.8	25.2

It is not possible to directly compare the well-being scores of farmers from the survey to the statements on each of the ONS and SWEMWBS scales, but by placing the overall score of each statement for both scales into an index, and reversing the scale of the fourth statement on the ONS scale relating to anxiousness, this then gives a result which can be used as a comparative indicator of farmer personal well-being from these two scales. The comparison of indices in this way illustrates that the farmer well-being scores using the ONS scale are higher than those from the SWEMWBS. By examining this further and comparing the first two statements in relation to hedonic and eudaimonic aspects of well-being on the ONS scale (table 5.2), it is evident that farmers score higher in the eudaimonc related statement than the hedonic one. This is also a trend in both the national population and occupational group scores. A breakdown of results from the Understanding Society UK Household Survey Data using

the SWEMWBS was unavailable for individual statements for comparing these two perspectives of personal well-being.

The statements in both the ONS scale and the SWEMWBS are targeted towards measuring well-being in a personal domain, but it is unknown whether a respondent is considering other domains when responding to these statements, for example thinking about work related issues.

5.5 Well-being and Productivity

The consequences of poor well-being for some farmers was described when they talked about being tired the majority of the time as a result of having to get up in the night all year round if there was a cow calving. They coped with this by occasionally taking time off and escaping for a long weekend to try and recover, and this was only possible if one of their family members took time off from their jobs or came home from University.

Illness was also something that was raised in relation to a poor immune system as a result of an accumulation of events related to a particularly bad bTB breakdown and the work involved around preparing those cattle for valuations combined with attempting to harvest silage whilst the weather permitted.

In order to demonstrate and to be able to discuss further what the effects of lower personal well-being on a farmer's daily working life and work efficiency is, a set of statements were incorporated into the farmer survey which followed on from the previous two well-being scales. Table 5.4 gives the summarised findings for respondents to these six statements which were developed from the Stanford Presenteeism Scale (Koopman et al., 2002) and was originally developed to measure the impact of health related problems on work productivity. The statements ask farmers to think about their work on the farm over the previous month with scoring on a 5 point Likert scale with 1 being 'strongly disagree' to 5 being 'strongly agree'. Results give an overall score range between 6 and 30 with higher scores associated

with higher presenteeism and self-perceived capability to focus on and complete works tasks.

Table 5.4: Stanford Presenteeism Scale (SPS) farmer survey results

	Mean SPS Score
The stresses of my job were much harder to handle	3.3
I was able to finish hard tasks in my work	3.6
I've been distracted from taking pleasure in my work	3.3
I felt hopeless about finishing certain work tasks	2.8
At work, I was able to focus on achieving my goals	3.5
I felt energetic enough to complete all my work	3.1
Total SPS score	19.6

The results from the SPS give an overall mean score of 19.6 for respondents to the farmer survey out of a possible range of between 6 and 30. These findings cannot be directly compared with other research which has applied the SPS as the phrasing in the statements has been modified to be suitable to the survey respondents. Additionally they cannot be directly compared with the findings from the ONS and SWEMWBS as the SPS largely addresses a farmer's work domain whereas the former two measures concentrate on particular perspectives of personal well-being principally hedonic and eudaimonic aspects and evaluative approaches.

A set of three statements associated with work productivity in the survey followed on from the SPS statements and asked farmers to rate how well they had been working on the farm over the past four weeks. Respondents were asked to answer with a percentage figure between 0 and 100. Work productivity scores from the survey are shown in table 5.5. During the timeframe of May and June 2013 when farmers would

have referred to when responding to this question, they reported that in the past month they were 75.6% as productive as usual. This denotes a 24.4% loss in productivity compared to their usual level. Farmers were able to accomplish 75.3% of their work compared to their usual level of productivity which signifies that almost 25% of their work was unaccomplished. They also felt that they were likely to make more mistakes than usual in their work time (26.3%).

Table 5.5 Work productivity farmer survey results

	% score
In the last month the % of my work time that I was as productive as usual was:	75.6
Compared to my usual level of productivity, in the last month the % of my work that I was able to accomplish was:	75.3
In the last month, the % of my work time that I was likely to make more mistakes than usual was:	26.3

5.6. Conclusion

The findings from this chapter relative to the assessment of farmer well-being levels in Wales suggests that Welsh farmers have lower levels of well-being in comparison to the well-being levels of the general population of Wales. Farmers views on well-being from the qualitative interviews has revealed their beliefs to the meaning of personal well-being to them and their thoughts on what contributes to their levels of well-being. This has disclosed what others have found within previous studies amongst the farming population (Riley, 2011, Wilkie, 2005, Melberg, 2003, Agricultural Research Group on Sustainability ARGOS, 2006a, Roy et al., 2014, Butler, 2010) which is a close association between personal well-being and their farming life. What farmers are saying about their personal well-being and the factors that contribute to influencing these levels of well-being have been unearthed in this chapter namely; good personal health, close family relationships, social connections, being happy in their working environment with the absence of stress. Factors that influence farmer well-being have

been described as those associated with their work on the farm such as bTB testing and the time of year and the weather conditions associated with that. At the same time, institutional factors such as regulations, bureaucracy and red tape have also been pointed out as affecting farmer well-being.

Measured levels of farmer personal well-being have demonstrated to be lower than the average population well-being, but give similar trends in that the eudaimonic scores for aspects of well-being are higher compared with the hedonic perspective. This means that farmers have felt they have been feeling useful, dealing with problems well, thinking clearly and were able to make their own minds up about things. These elements will be discussed in greater detail in chapter seven where evidence is conveyed as to how farmers deal with problems and cope with the pressures that they are faced with.

Farmers have reported on their levels of presenteeism using modified statements from the SPS which have been summarised here. Due to the modifications to the SPS statements, it is not possible to establish a comparison of this scale within the general population, however the value of adopting this measure in the survey will become evident in the following chapter where statistical analysis is applied to see whether any of the pressures identified by farmers affects their levels of presenteeism. Following on from this the self perceived work productivity of farmers showed that nearly a quarter of their usual rate of production had been lost in the previous four weeks compared to normal levels and farmers also felt that they had been 25% more likely to have made further mistakes than usual within that work time.

The subsequent chapter will seek to confirm these findings and probe further using a more quantitative direction and includes further results from statistical analysis of the farmer postal survey. The analysis will attempt to establish what effects the top pressures and other problems such as significant diseases on the farm are having on levels of farmer well-being and work productivity and whether there are any relationships between these variables.

Chapter 6: Factors Influencing Well-being amongst farmers in Wales

6.1 Introduction

A constant narrative in portrayals of the impact of bTB is that failure to tackle the disease is creating and compounding low levels of farmer welfare. Much of the evidence within these narratives is qualitative, or based on single case-studies. Whilst it is reasonable to expect a link between well-being and bTB, there is little systematic research that confirms these beliefs. The purpose of this chapter is therefore to examine the extent to which farmers' well-being is affected by outbreaks of bTB, and explore the role of other factors in shaping farmers' well-being.

The chapter begins by exploring relationships between farmer well-being and farm-level characteristics. Intrinsic and extrinsic factors identified in the conceptual framework as having an influence on farmer well-being are analysed. Intrinsic factors include farm type, farm size, geographical location, age and gender of farmer. Analysis of extrinsic factors includes, for example environmental factors such as disease history of the farm, inter-organisational aspects including bureaucracy and red tape, economic and community factors. Using data obtained from the survey, the analysis compares these factors with three different measures of well-being. In particular, a key focus for the chapter is the extent to which farmer well-being varies according to the presence of different animal diseases, including bTB.

6.2 Farm level factors and well-being

This section provides the results of descriptive analysis of the survey data and describes the influence of farm level factors on personal well-being in the context of the personal characteristics of survey respondents, specifically age and gender. The scores of the three farmer well-being scales (ONS, short WEMWBS and SPS) and the three work productivity statements which were incorporated in the survey are each reviewed in turn alongside variables collated on farm characteristic.

6.2.1 Farmer characteristics

There is some evidence to suggest that farmer well-being is related to age (Riley, 2011, Macgregor et al., 1995) and gender (Deary et al., 1997, Sanne et al., 2004, Price and Evans, 2006, Price and Evans, 2009, Roy et al., 2014). To explore whether these relationships were present in the survey data, the three measures of wellbeing were compared with farmers' personal characteristics (see table 6.1).

Table 6.1: Analyses of farmer well-being and work productivity mean scores by farmer characteristics

Age range and gender	***ONS***	***WEMWBS***	***Presenteeism***	***WP1***	***WP2***	***WP3***
Under 35	26.74	24.11	18.83	84.41	81.18	24.53
35-44	26.45	24.51	19.16	80.60	82.20	29.11
45-54	24.73	23.28* (4.78)	18.21	75.53	74.51	28.35
55-64	24.90	23.37* (4.48)	18.29	73.49	73.67	23.66
>65	27.44	25.09* (4.92)	19.28	74.88	74.43	25.73
Male	25.65	23.95	18.65	75.62	75.52	26.21
Female	25.71	23.32	18.06	75.37	74.23	26.73
Survey mean	25.65	23.87	18.58	75.6	75.3	26.3

Source: survey data
Notes: mean scores
*Note * = p <.05, ***= p<.001 Standard Deviations appear in parentheses below means*
Abbreviations: WP1 – Work productivity 1 (in the last month, the % of my time I was as productive as usual was:
WP2- Work productivity 2 (compared to my usual level of productivity, in the last month the % of my work that I was able to accomplish was:
WP3-Work productivity 3-(in the last month, the % of my work time that I was likely to make more mistakes than usual was:)

Analysis of ONS scores by age range illustrates that those farmers > 65 in age have the highest ONS mean score (M=*27.44*) with those aged 45-54 displaying the lowest score

(*M=24.73*). A one-way between subjects ANOVA test between age and well-being scores show a statistically significant effect of farmer age on their personal well-being within the SWEMWBS well-being measure. Statistically significant differences (<0.05) were established for those farmers within the age ranges 45-54 (*M=23.28, SD= 4.78*), 55 to 64 (*M=23.37, SD=4.48*) and 65 and over (*M=25.09, SD=4.92*). A similar pattern of scores can be found between these age ranges for the presenteeism scale with three out of the five age ranges (<35, 35-44 and >65) showing better average presenteeism scores than for overall survey respondents. The work productivity scores of those farmers aged, < 35 are consistently higher than the survey mean and other age ranges. However, none of the presenteeism and productivity scores were statistically significantly different.

Descriptive analysis between the well-being scores of male and female respondents revealed consistently higher mean scores for male farmers in all measures except the ONS scale where female farmers were slightly higher. However, none of the differences in well-being between male and female respondents were significantly different ($p<0.05$).

Other farmer characteristics examined included the relationship between well-being and the language respondents used to complete the questionnaire. There were no significant differences in the mean well-being scores of those who answered the survey in Welsh or English. However well-being, presenteeism and work productivity levels of Welsh respondents were lower in all items.

6.2.2 Farmer well-being and farm type

Analyses of farmer well-being scores by main farm type is summarised in table 6.2. For the ONS measures, farmers with either beef finishing and beef stores *(M=27.40)* as their main enterprise have the highest well-being scores compared to the survey mean *(M=25.65*). Dairy farmers have the lowest well-being score for this scale (*M=25.31*) and this finding is in line with previous studies that had found that dairy farmers have lower subjective well-being than beef farmers (DEFRA, 2010a). The same pattern of higher well-being levels can be found for the WEMWBS scale for beef store and

finishing farmers. Lowest scores for this scale are displayed by suckler beef farms (*M=23.76*), however this is only a little lower than the overall survey mean (*M=23.87*). The highest presenteeism scores are displayed by beef finishing and beef stores (*M=19.55*) main farm types which are higher than overall survey presenteeism levels (*M=18.58*). Work productivity scores of dairy farmers are highest followed by those with beef finishing or stores, with lowest scores from farmers that had suckler beef as a main enterprise. A significant difference was established between the mean productivity scores of dairy and suckler beef farmers for the statement '*the % work able to accomplish*'.

Table 6.2: Analyses of farmer well-being and work productivity mean scores by main farm enterprise type

	ONS	***WEMWBS***	***Presenteeism***	***WP1***	***WP2***	***WP3***
Main Farm type						
Dairy	25.31	23.91	18.75	78.47	78.70	23.89
Suckler Beef	25.41	23.76	18.33	73.05	72.12	27.40
Beef Finishing/Stores	27.40	24.97	19.55	76.15	76.36	27.13

Source: survey data
Notes: mean scores
Abbreviations: WP1 – Work productivity 1 (in the last month, the % of my time I was as productive as usual was:
WP2- Work productivity 2 (compared to my usual level of productivity, in the last month the % of my work that I was able to accomplish was:
WP3-Work productivity 3-(in the last month, the % of my work time that I was likely to make more mistakes than usual was:)

6.2.3 Farmer well-being and farm enterprise type and herd size

Although beef store and beef finishing farmers appeared to have the highest well-being, further analysis shows well-being to vary by herd size (see table 6.3). For dairy and suckler beef farmers, analysis suggests that well-being is highest amongst smaller herd sizes. Scores of dairy farmers with herd size groups of 51-150 and 151-250 are higher than other herd size groups within this enterprise type. Suckler herds with herd sizes of 150-250 have the lowest overall well-being scores for this enterprise category. This is also the case for levels of work productivity for suckler farms within this herd

size group. Analysis suggests a positive relationship between work productivity and cattle numbers, dairy farmers with herd sizes 251-500 display better work productivity than for other combination of enterprises and herd sizes. The lowest productivity scores are given by suckler beef farmers with this same herd size group.

Table 6.3: Analysis of farmer well-being and work productivity mean scores by herd size and main farm type

	Farm type	***1-50***	***51-150***	***151-250***	***251-500***	***501+***
ONS	Dairy	26.67	25.72	26.07	24.37	24.87
	Suckler Beef	26.85	24.73	21.74	22.29	33.00
	Beef Finishing/Stores	28.66	25.96	26.60	27.00	24.00
WEMWBS	Dairy	22.44	24.06	23.98	23.94	24.39
	Suckler Beef	24.38	23.37	23.12	23.86	23.00
	Beef Finishing/Stores	26.31	24.12	23.00	22.33	27.00
Presenteeism	Dairy	18.78	19.31	19.05	18.12	18.42
	Suckler Beef	18.38	18.53	17.18	17.00	23.00
	Beef Finishing/Stores	19.94	18.88	19.50	20.00	17.00
WP1	Dairy	72.78	80.07	78.14	79.18	77.24
	Suckler Beef	71.55	74.59	72.47	67.86	100.00
	Beef Finishing/Stores	76.34	77.29	73.50	80.00	50.00
WP2	Dairy	71.11	78.80	77.69	81.04	79.14
	Suckler Beef	72.81	71.08	68.47	77.14	100.00
	Beef Finishing/Stores	74.84	77.42	76.50	83.33	50.00
WP3	Dairy	14.44	22.75	27.98	21.79	24.29
	Suckler Beef	27.80	28.40	15.25	44.29	10.00
	Beef Finishing/Stores	28.03	22.75	29.00	33.33	70.00

Source: survey data
Notes: mean scores
Abbreviations: WP1 – Work productivity 1 (in the last month, the % of my time I was as productive as usual was:
WP2- Work productivity 2 (compared to my usual level of productivity, in the last month the % of my work that I was able to accomplish was:
WP3-Work productivity 3-(in the last month, the % of my work time that I was likely to make more mistakes than usual was:)

6.2.4 Well-being and time spent working on the farm

Farmers were asked to write down the proportion of their time spent working on the farm and results display an average of 83%. To assist analysis this data was recoded

into four quartiles based on the proportion of time working on the farm. Table 6.4 gives results of working time alongside the well-being and productivity levels of farmers.

Table 6.4: Analysis of farmer well-being and the proportion of time spent working on the farm

	Proportion of time spent working on the farm			
	1-25%	***26-50%***	***51-75%***	***76-100%***
ONS	*31.57**	*27.96*	*25.39*	*25.16*
WEMWBS	*26.84**	*25.17*	*23.54*	*23.69*
SPS	*21.57*	*19.82*	*18.73*	*18.39*
WP1	*89.75**	*76.09*	*72.90*	*75.40*
WP2	*88.50*	*77.16*	*73.62*	*74.65*
WP3	*15.53*	*18.37*	*28.90*	*27.27*

Source: survey data
Notes: mean scores
*Note * = p <.05, ***= p<.001*
Abbreviations: WP1 – Work productivity 1 (in the last month, the % of my time I was as productive as usual was:
WP2- Work productivity 2 (compared to my usual level of productivity, in the last month the % of my work that I was able to accomplish was:
WP3-Work productivity 3-(in the last month, the % of my work time that I was likely to make more mistakes than usual was :)

In general, farmers' well-being decreases as the amount of time spent working on the farm increases. This trend is apparent for the ONS, SWEMWBS and Presenteeism measures. Significant differences were displayed *(<0.01*) for both the ONS and WEMWBS scores of those farmers who spent less of their time working on the farm (1-25%) than those who worked > 75% of their time. Productivity results decrease the greater the time spent farming with a slight increase in productivity for those working 76-100% of their time on the farm. Productivity scores for the variable *'% of my time I was as productive as usual was:'* also displayed significant differences *(<0.01)* between farmers who spent 1-25% of their time working on the farm compared to those who spent > 25% of their time working on the farm.

The numbers of people employed on the farm may offer one explanation for these relationships. Table 6.5 provides a breakdown of well-being scores comparing those

with and without any family or employed labour on farm from the survey. No differences were seen in the well-being scores for those farmers with or without labour. Presenteeism and productivity levels are slightly better for those farmers with labour but not significantly. Significant differences were evident between the productivity variable *'% time made more mistakes than usual:'* for those without labour compared to those with labour. In summary, these analyses show that having no labour on the farm can have a negative impact on farmer well-being levels and productivity. The conceptual framework outlined that social support from family could be an intrinsic factor in well-being levels of farmers (Melberg, 2003) however, family pressures were also identified as a factor which would create a negative effect on well-being and the coping abilities of farmers to stressful situations (Agricultural Reserach Group on Sustainability ARGOS, 2007, Price and Evans, 2009, Price and Evans, 2006). The results above support the latter proposal where family labour creates a negative impact on farmer well-being. The reasons for this would be difficult to predict through a quantitative survey.

Table 6.5: Farmer well-being and productivity scores with/without family labour and employed labour

	No Labour	***Labour***
ONS	25.79	25.72
WEMWBS	23.89	23.93
SPS	17.63	18.67
WP1	75.38	75.64
WP2	74.00	75.37
WP3	36.60* (29.04)	25.78

*Note * = p <.05, ***= p<.001 Standard Deviations appear in parentheses*
Abbreviations: WP1 – Work productivity 1 (in the last month, the % of my time I was as productive as usual was:
WP2- Work productivity 2 (compared to my usual level of productivity, in the last month the % of my work that I was able to accomplish was:
WP3-Work productivity 3-(in the last month, the % of my work time that I was likely to make more mistakes than usual was:)

6.3 Animal disease and well-being

Whilst there is existing research on the impact of animal diseases such as FMD and bTB to farmers (Convery et al., 2008, Mort et al., 2005, DEFRA, 2010a, Farm Crisis Network, 2009), there is no existing research that examines the relationship between well-being and other livestock diseases. This omission means it is possible that some of the effects of diseases like bTB are exacerbated by other cattle health problems. The relationship between farmer well-being and all cattle diseases was therefore examined.

6.3.1 Top five most problematic animal diseases

Farmers were asked to note down which animal diseases were the most problematic on their farm in order of significance. Responses were coded into six main categories reflecting different disease types. These included: diseases that affected the fertility of cattle (e.g. IBR, BVD); bovine Tuberculosis; diseases that affect the productivity of cattle (e.g. mastitis); diseases that affected youngstock (e.g. scour, pneumonia); other cattle diseases; diseases that affected other animals on the farm (e.g. orf in sheep); or none. Each respondent had five opportunities to identify and rank a disease and results from the survey show that in total, 1,680 disease threats were cited (*table 6.6*). A total of 170 farmers (32%) wrote down the maximum of five diseases.

Table 6.6: Total survey responses for each main category of problematic animal diseases on farms

	Response		*% of cases*
	N	***Percent (%)***	
Fertility	227	13.5	39.0
bTB	433	25.8	74.4
Production diseases	287	17.1	49.3
Youngstock diseases	146	8.7	25.1
Other cattle diseases	83	4.9	14.3
Other animal disease	411	24.5	70.6
None	93	5.5	16.0
Total	1680	100	288.7

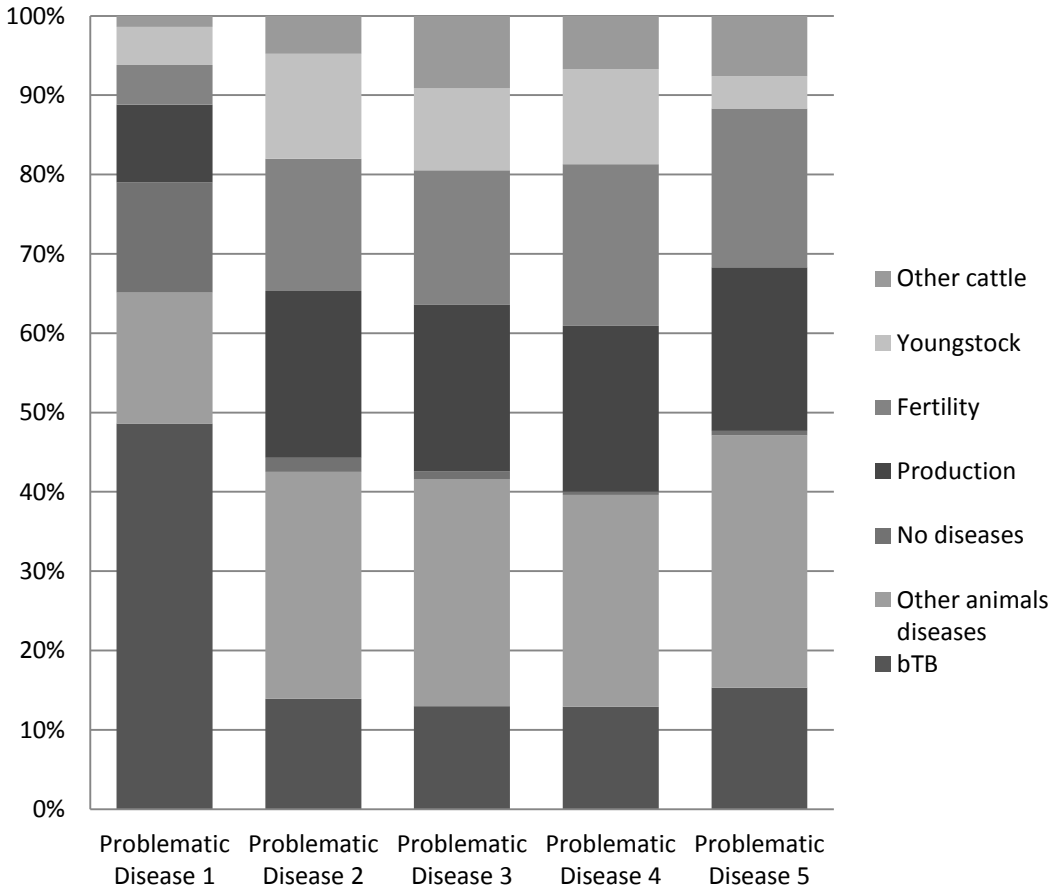
Table 6.6 provides the total survey responses for each of the six main disease categories mentioned above. The most frequently cited disease threat was bTB: three-quarters (74%) of respondents mentioned this disease as a threat, and it accounted for 26% of all disease mentions. As respondents frequently had more than one enterprise on the farm, diseases of other animals such as sheep, pigs or poultry also received a high response rate (*n=411*). Table 6.7 highlights those diseases which farmers placed at the very top of their list of problematic diseases presenting them with the most problems on their farm.

Table: 6.7: List of predominant problematic diseases cited as most significant

Problem disease	***Response N***	***% of cases***
bTB	283	48.6
Other animal diseases	96	16.5
No diseases	81	13.9
Production	57	9.8
Fertility	29	5.0
Youngstock	28	4.8
Other cattle	8	1.4

The highest number of responses within the section in the survey provided for farmers to note down their second most problematic diseases on farms (*figure 6.1*) shows that 'other animal and sheep diseases' were the most prominent with 29% of responses (*n=113*). Production related cattle diseases came second highest with 21% of responses (*n=83*) followed by fertility (17%) and bTB (14%). For the third, fourth and fifth spaces provided in the survey for diseases, those which ranked the highest followed a similar pattern to the second space with other animals diseases coming out top, followed by production related diseases, fertility then bTB. In relation to bTB, farmers from high risk bTB areas were more likely to identify bTB as a threat (*p=000*). Respondents who were under bTB restrictions at the time of the survey were also more likely to note bTB (*p=0.000*) and production (*p=0.048*) related issues.

Figure 6.1: Problematic diseases



Analysis of the problematic disease responses was undertaken alongside farmer well-being to establish any correlation between any of these variables. The work and time involved around animal disease control and prevention in a herd could be a problem for those with specific diseases. Farm level factors such as the number of labour units and the proportion of time spent working on the farm or herd size would need to be considered alongside any explorative analyses into farmer well-being levels against specific diseases.

Analysis reveals no relationship between disease threats and well-being scores. Farmers that rated bTB as a disease threat had lower well-being scores for the ONS and WEMWBS measures, and were less likely to suffer from presenteeism, but these differences were small and statistically insignificant. In terms of farmer productivity, only two significant results were detected. Farmers who did not identify bTB as a

threat were likely to have more time when they were liable to make mistakes in their work compared to those who did (*table 6.8*). Farmers that identified diseases affecting youngstock as the main threats were more likely to have been more productive in the previous month than those that did not. Reasons could be the time of year of the survey release in May 2013 which could suggest that problematic issues alongside winter housed youngstock such as scours and pneumonia would have been overcome, corresponding with turnout to grass at around four weeks beforehand.

Table 6.8: t-test results of disease threats on farmer well-being and productivity levels

	Fertility	bTB	Production	Youngstock	Other cattle	No disease	Other animal	t	df
ONS	-	-	-	-	-	-	26.24* (8.18)	2.12	552
WEMWBS	-	-	-	-	-	-	24.74*** (4.74)	3.70	546
SPS	-	-	-	-	-	-	19.18*** (4.64)	3.78	554
WP1	-	-	-	79.38* (17.71)	-	-	-	-2.43	224
	-	-	-	-	-	-	77.83* (20.94)	-3.26	-541
WP2	-	-	-	-	-	-	77.97*** (21.43)	3.80	538
WP3	-	29.4* (26.44)	-	-	-	-	-	2.15	525

*Note * = p <.05, ***= p<.001. Standard Deviations appear in parentheses below means*
Abbreviations: WP1 – Work productivity 1 (in the last month, the % of my time I was as productive as usual was:
WP2- Work productivity 2 (compared to my usual level of productivity, in the last month the % of my work that I was able to accomplish was:
WP3-Work productivity 3-(in the last month, the % of my work time that I was likely to make more mistakes than usual was:)

Farmers may feel that problematic diseases on their farm are creating more stress, and this could be a driver to take action such as enrolling into a herd health scheme. Data from the survey was analysed to establish whether a relationship exists between the well-being scores of farmers and whether they were in a CheCHs approved health

scheme using an independent sample t-test. The results do not demonstrate any statistically significant difference with mean well-being scores for farmers who were members of a CheCHs accredited scheme compared to other farmers. This denotes that being in a CheCHs accredited scheme does not have an influence on farmer well-being.

6.4. Farming pressures

Although farmers identified a range of pressures to their farm business in chapter 5, analysis suggests that not all have an impact upon farmer well-being. Farmers who identified finance as a key pressure were statistically significantly more likely to have lower wellbeing levels for all three measures. These farmers were also more likely to report reductions in the time that they were productive. Farmers reporting red tape as a key pressure were also statistically significantly likely to have lower well-being scores across all three well-being measures. For bTB, there were no statistically significant differences between those identifying bTB as a key pressure and those that didn't. In fact for all three of the well-being measures, farmers reporting bTB as a pressure were more likely to report higher levels of well-being, although these differences are not statistically significant.

6.5 Bovine Tuberculosis and Well-being

In order to establish the relationship between farmer well-being and bTB, well-being measures were compared with the bTB status of each farm (*see table 6.9*). No clear differences were detected between well-being levels and farm bTB status. For the ONS and SPS scales, well-being was marginally higher for bTB-free farms. Results for the WEMWBS revealed well-being was lower for bTB free farms. Farmers with bTB were marginally less productive than those without bTB. However, none of these differences were statistically significant, and the small differences suggest there is little difference between farmers' well-being and productivity with and without bTB.

Table 6.9: Farmer well-being by farm bTB status

	Farm bTB restriction	
	Yes	***No***
ONS	24.39	25.99
WEMWBS	24.01	23.84
SPS	18.13	18.76
WP1	75.54	75.83
WP2	74.28	75.78
WP3	26.33	26.01

Abbreviations: WP1 – Work productivity 1 (in the last month, the % of my time I was as productive as usual was:
WP2- Work productivity 2 (compared to my usual level of productivity, in the last month the % of my work that I was able to accomplish was:
WP3-Work productivity 3-(in the last month, the % of my work time that I was likely to make more mistakes than usual was:)

Further analysis compared responses to individual questions in each of the well-being scales to see if there were differences between the individual well-being domains and bTB. On the ONS scale, farmers with bTB were less likely to say that their life was worthwhile (*p=0.046*), but none of the WEMWBS measures were significantly different. For the SPS, farmers with bTB were more likely to report that the stresses of their job were hard to handle than those without bTB (*p=0.02*). In short, even when

examining the separate well-being domains, there appears to be little difference between well-being in bTB affected farms and those that are not.

6.5.1 Farmer Well-being and levels of risk to bTB by farm location.

Another way of examining the relationship between bTB and well-being is to consider the epidemiological status of the area in which farmers live. In areas of high bTB, the well-being of farmers may suffer from the prospect of getting bTB. As Skuce et al., (2012) suggests, farmers in high-risk areas become fatalistic towards bTB and possess different attitudes to those in low-risk areas. For well-being, this could mean that there is little difference between farmers' well-being within high-risk areas whether they have bTB or not.

To check for these differences, respondents were allocated to three different risk zones (high, medium and low) derived from the Welsh Government's 2012 epidemiological analysis of bTB in Wales (AHVLA, 2013). Risk of bTB for each area was calculated using the bTB incidence rate per 100 herd years. Farms located within a high risk bTB area were regarded as those areas deemed to have a 'bTB incidence rate (per 100 herd years) of 7.1 or above, those in a medium risk group had levels between 3.0 and 7.0 and the low risk group from areas with bTB incidence rate (per 100 herd years) below 3.0.

The results in table 6.10 do not appear to illustrate any obvious differences in the well-being scores of farmers from different areas of disease risk. The WEMWBS mean score is highest (*M=24.15*) for those in high risk areas but presenteeism scores are also higher in that area compared with lower disease risk areas. Work productivity scores appear to be improved for those farmers within high bTB risk areas compared to both low and medium risk areas. Bivariate analysis with a one-way between subjects ANOVA test was conducted to compare the effect of TB risk area and farmer well-being scores. No significant differences appeared in the well-being, presenteeism or work productivity scores between those farmers in high, medium or low risk TB areas.

Table 6.10: Farmer well-being mean score by area based on bTB disease risk

Area TB risk		***ONS***	***WEMWBS***	***Presenteeism***	***WP 1***	***WP 2***	***WP 3***
	Count	*Mean*	*Mean*	*Mean*	*Mean*	*Mean*	*Mean*
High	414	25.62	24.15	18.70	76.33	75.99	26.02
Medium	88	25.38	22.98	18.47	72.62	72.98	26.50
Low	60	26.55	23.62	18.22	74.35	73.59	27.59

Abbreviations: WP1 – Work productivity 1 (in the last month, the % of my time I was as productive as usual was:
WP2- Work productivity 2 (compared to my usual level of productivity, in the last month the % of my work that I was able to accomplish was:
WP3-Work productivity 3-(in the last month, the % of my work time that I was likely to make more mistakes than usual was:)

To check for confounding factors, firstly, farmers' well-being scores were analysed according to the time since their last bTB breakdown and the time to their next bTB test (see table 6.12). In the first instance, it is possible that proximity to a breakdown may enhance feelings of stress, whilst being closer to a bTB test may enhance feelings of anxiety. The ONS well-being and presenteeism scores of farmers less than a year of having bTB restrictions are lower than for farmers further away from herd restrictions. Work productivity scores are lower for the first two productivity statements for those which have had bTB restrictions lifted in less than one year. Despite the group of farmers analysed here not having herd restrictions, there were small differences in levels of well-being and productivity in some cases but no distinct pattern was discovered in relation to the year their farm was last under bTB restriction and no significant differences in mean well-being scores.

Table 6.11 provides the mean well-being levels of farmers who were interviewed where they completed both the ONS and WEMWBS 14 item scale at three visits over a longitudinal timescale of eighteen months. When compared to the well-being scores of farmers from the survey, the well-being of farmers interviewed were consistently higher for the ONS and SWEMWBS scales for bTB and non bTB restricted participants.

Table 6.11: Changes in well-being scores of farmers interviewed over eighteen months

	Visit 1			***Visit 2***			***Visit 3***		
	TB	***Non TB***	***M***	***TB test***	***No test***	***M***	***TB***	***Non TB***	***M***
ONS	29.63	31.93	30.25	28.85	30.08	29.46	33.33	33.14	33.20
SWEMWBS	24.78	27.57	25.56	27.00	25.50	26.22	27.67	26.86	27.10
WEMWBS	48.83	54.57	50.44	52.23	52.08	52.16	55.33	53.21	53.85

The well-being scores of farmers undertaking interviews at the first visit are lower for the ONS and SWEMWBS for those under bTB restrictions compared to others. Eighteen months later at visit three, there appears to be a different outcome to the well-being scores where those under bTB restriction have higher well-being scores for all three scales. When the mean scores from all three visits over the eighteen months are compared, there are significant differences found ($p<0.05$) between the SWEMWBS and WEMWBS for those farmers under bTB restriction (*M= 25.61, SD=3.36 and M=50.58, SD=6.41*) compared to those without (*M=28.11, SD=3.29 and M=56.22, SD=6.20*) denoting a negative relationship between well-being and being under bTB restriction for this scale.

The scores of visit 2 were analysed according to whether farmers were bTB testing at the time of the visit where results display lower ONS scores for those farmers bTB testing compared to those who were not testing. The ONS scale presents lower well-being scores for those farmers in closest proximity to a bTB test compared to other scales as the SWEMWBS gives a different result where those closest to a test show higher levels of well-being which differs with the survey results discussed below.

Analysis of the proximity to the next test for survey farmers revealed a similar pattern with the ONS scale (*table 6.12*). This included farms with and without bTB restrictions. ONS and SWEMWBS scores of those farmers less than one month to the next bTB test are lower than for those farmers further in proximity to a herd test. Productivity scores were also lower for farmers closer to their bTB test. These results could denote that the run up to a bTB test can effect levels of farmer well-being and hinder work

productivity; however no significant differences were established in mean well-being scores following further analysis. Discussion around the stresses of bTB testing is established in the next chapter where the findings of observations on farms during a herd test or test reading are recollected.

Table 6.12: Farmer well-being score by time since last TB restrictions and to next herd test

	Time since last bTB restrictions (yrs)			***Time to next TB herd test (mths)***		
	< 1 yr	***Up to 2 yrs <5yrs***	***> Five yrs***	***< 1 mth***	***>1 mth but < 6 mths***	***> 6 mths***
ONS	25.35	26.03	25.84	24.84	26.38	25.68
WEMWBS	23.68	23.72	23.44	23.62	24.12	24.0
Presenteeism	18.51	19.19	18.62	18.50	18.97	18.86
WP1	76.02	78.53	76.10	74.49	75.12	75.31
WP2	77.12	78.09	75.40	74.44	77.39	72.82
WP3	22.41	26.77	24.02	27.48	24.59	25.33

Abbreviations: WP1 – Work productivity 1 (in the last month, the % of my time I was as productive as usual was:
WP2- Work productivity 2 (compared to my usual level of productivity, in the last month the % of my work that I was able to accomplish was:
WP3-Work productivity 3-(in the last month, the % of my work time that I was likely to make more mistakes than usual was:)

However, when well-being is considered in high-risk areas alone, a different picture emerges. Farmers with bTB have statistically significantly lower levels of well-being than those without. For the ONS measures, the mean level of well-being is 24.16 for farmers with bTB compared to 26.08 on bTB free farms (*p=0.04*). Similarly, farmers SPS scores on bTB affected farms was 17.94 compared to 19.16 on bTB free farms (*p=0.022*). WEMWBS scores were identical and productivity scores higher for bTB farms, although these differences were not statistically significant. These differences are even more pronounced when farmers who had bTB at the time of the survey are compared with those who have never had bTB. In high risk areas, ONS well-being scores are 24.16 for bTB affected farmers and 27.22 for those with no history of bTB (*p=0.049*). Similarly, for the SPS measures, farms with bTB scored 17.94 compared with 19.76 on farms with no history of bTB (*p=0.036*).

Although differences for the other measures were not significant, these findings are interesting for they suggest that farmer well-being is associated with the wider epidemiological status of an area. These results also challenge notions that the well-being of all farmers in high-risk areas is affected by bTB whether they have it or not. Rather, whilst farmers may become cynical and fatalistic about government attempts to prevent bTB, this does not appear to translate into lower levels of well-being if farmers do not have bTB.

6.6 Farmer Well-being and bTB: multi-variate analysis

The previous sections have suggested that a number of different factors, including bTB, may influence farmer-well-being. To account for all of these factors, this final section presents results from a multivariate analysis. Whilst it is important to include objective measures and perceptual accounts of farm pressures in this analysis, it is also possible that farmer well-being may be affected by farmers' attitudes towards bTB control. For instance, attitudes to the seriousness of bTB restrictions or the validity of preventive measures may mediate the effect of bTB upon farmer well-being. This section therefore begins by considering farmers' attitudes to bTB before incorporating them into a multivariate analysis of the social impacts of bTB.

6.6.1 Farmers' Attitudes Towards Bovine Tuberculosis

Most farmers (88%) surveyed believed that bTB was a big problem for their business. Attitudes did not vary whether farmers were in areas with high, low or medium levels of bTB prevalence. Male farmers were more concerned about the effects of bTB than females (*p=0.047*). Alongside other farm level factors, the conceptual framework suggests that farmers' beliefs about bTB may also be related to their well-being. For example, farmers that do not believe they are able to do anything about bTB may experience lower levels of job satisfaction and frustration over their uncertain future. Previous studies of bTB have found farmers consistently have high levels of fatalism and low levels of self-efficacy (Skuce et al., 2012, Enticott et al., 2012c, Naylor et al., 2014) but these studies do not connect fatalism with farmer well-being.

Results from the survey suggest that nearly half (49%) of farmers believed that it was a matter of luck whether their herd became infected with bTB, whilst 56% believed that there was nothing they could do to prevent their herd from becoming infected. These results are lower than other surveys. In recent work by (Enticott et al., 2015), 79% of farmers in areas with high levels of bTB expressed the belief that bTB was simply a matter of luck. Whilst farmers in areas with medium and high bTB incidence expressed higher levels of fatalism than those in low incidence areas, these differences were not statistically significant. Nevertheless, only 10% of surveyed farmers expressed confidence that their herd would not become infected with bTB. Farmers in low incidence areas were more likely to express this view than those in medium or high risk areas (*p=0.024*).

The survey also revealed that farmers did not believe that other people could offer them much support: just under a third (30%) believed that their vet could help them avoid bTB; 12% thought that doing what other farmers did would lower their chances of getting bTB; and 20% thought that following government advice would benefit their bTB status. Farmers in areas of low bTB incidence were more confident that their vets' advice would be useful than those in medium or high incidence areas (*p=0.006*), but there were no statistically significant differences between these areas when considering the role of other farmers in helping respondents avoid bTB in future. Low incidence respondents were however more likely to believe government advice than those in high incidence areas.

Similarly, farmers that were under bTB restrictions at the time of the survey were less confident that their herd would be bTB free in future (*p=0.000*); and more likely to agree that bTB was a big problem for their business (*p=0.001*) than those farms who were free from bTB. Farmers with bTB were also more likely to hold the view that there is nothing they can do to prevent bTB than those without bTB (*p=0.040*); and less likely to think that their vet (*p=0.004*) or the Government (*p=0.000*) could offer them advice.

These data suggest that farmers' bTB history and the wider level of bTB in their area is related to farmers' attitudes towards bTB. In other words, farmers with bTB have less

optimistic views towards doing anything about it because they think they have a high chance of getting it. These views also reflect on farmers perceptions of the Government's ability to do anything about bTB and the extent to which they trust them to do anything about it. As indicated in the conceptual framework, trust in government and institutions is likely to be a key factor in farmers' acceptance of advice that can help avoid bTB with likely positive consequences for their well-being.

Overall, the survey showed low levels of trust between farmers and the Welsh Government. Just 19% of farmers thought that the Government cared about reducing bTB, whilst 8% thought they were doing a good job. Unsurprisingly, farmers with bTB and those in areas of high bTB had lower levels of trust in the Government. One reason for the low level of trust could be due to the Welsh Government's policy on badger culling. Currently, the Welsh Government is vaccinating badgers against bTB in an area of West Wales known as the Intensive Action Area (IAA). Plans to cull badgers in this area were delayed by a successful legal appeal by the Badger Trust, and then a change in the political make-up of the Welsh Government. Following a review of the scientific evidence, the new Labour Government decided upon a vaccination policy. In interviews, farmers expressed support for a badger cull as the way to deal with bTB. Frequently, support for badger culling was justified in terms of maintaining a balance of nature: that badger protection has meant that there are 'too many' badgers making disease spread more easily. This natural balance discourse has been found in other controversies over the management of nature (Eden and Bear, 2011) and in farmers' views over vaccinating badgers against bTB (Maye et al., 2014). Results from the survey supported this view: 88% of respondents agreed that badgers needed managing to prevent their population growing excessively. There were no statistically significant differences between farmers with and without bTB, or between farmers from areas with different bTB prevalence, which suggests that these beliefs are pervasive throughout the farming community.

Support from the wider agricultural community may also help to provide support to farmers suffering from bTB. However, this may play positive and negative roles. Whilst being a respected member of the farming community may help to attract support

during difficult times, the normative pressures to 'be the best' or be a 'good farmer' (Burton, 2004) may have their own negative consequences for well-being. As interviewees pointed out, the route to well-being may not be found by working long hours or worrying about what the neighbours think. Most farmers (81%) surveyed felt that they were closely linked to the farming community in which they operated and 87% felt that it was important to be respected in their farming community. These views did not vary whatever the level of bTB prevalence in respondent's local areas, or whether farmers had bTB or not. In terms of broader support that farmers might receive from their local area, an equal number of respondents agreed that local residents were not supportive of farmers (36%) as those disagreeing (37%). No differences were found between areas or bTB status.

Interestingly, 83% of respondents also replied that they felt comfortable discussing bTB with their neighbours. This suggests that bTB is not a stigma or a taboo for farmers. These views were held across Wales, whether respondents were in high, low or medium risk areas. Farmers with bTB were, however, more likely to indicate that they felt comfortable speaking about bTB (*p=0.007*).

The final attitudinal questions explored farmers' relationships with their animals. As Convery et al,.(2005) and Wilkie,(2005) explain, the emotional relationship farmers have with animals is important to farmers' well-being. Unexpected disruptions to these relationships may have consequences to farmers' well-being. When farmers were asked about the importance of this emotional connection, almost all farmers (96%) replied that it was important for them to see their animals daily; almost a third (30%) thought that it was important to remain emotionally detached from their cattle (62% thought this connection was important); and 57% agreed that their cattle were just like human beings to them. Perhaps surprisingly, there were no statistically significant differences between beef and dairy farmers: (Wilkie, 2005) suggests that dairy farmers often develop closer bonds with their cattle as they are in regular close contact with them, although these relationships can vary according to animal age and agricultural cycles. Analysis shows that there are also no statistically significant differences between farms with and without bTB.

6.6.2 Principal Components Analysis

In order to examine the effect of these variables on farmer well-being, all attitudinal variables were combined using Principal Components Analysis using a varimax rotation. The KMO score was 0.701 indicating that the variables had sufficient variance to make the PCA useful. From the 18 variables entered into the PCA, six clearly interpretable components were identified explaining 62.1% of variance. Component loadings are shown in table 6.13. The components describe different themes and are classified as follows:

- **Component 1.** This refers to farmers' locus of control, or the value they place in advice from influential others (vets, farmers, government) to avoid bTB. This is the strongest component in the PCA explaining 18.3% of the variance.
- **Component 2:** This refers to respondents' trust in Government over bTB (10.7% variance).
- **Component 3:** This refers to farmers' social standing in the agricultural community (7.4% of variance).
- **Component 4:** this refers to the impacts and causes of bTB (7.0% variance).
- **Component 5:** this refers to farmers' self-efficacy and beliefs that they are able to do anything about bTB (6.3% variance).
- **Component 6:** this refers to farmers' relationships with their cattle (6.2% variance).

A seventh component was less clear to interpret. Explaining 6% of variance, variables loading onto this component referred to support from the local community and farmers' emotional connection to their animals. Due to the lack of clarity in this component it was not included in subsequent analyses. When components are compared with the bTB status of respondents, results suggest that farms with bTB are less likely to believe they can avoid bTB by following the advice of others than those farms without bTB (*p=0.001*). Farms with bTB are also more likely to believe that bTB has a big impact upon their business and have little confidence in staying clear of bTB (*p=0.003*).

Table 6.13: Principal Components Analysis of Survey Questions

Survey Variable	***Component Interpretation***	***Component***						
		1	2	3	4	5	6	7
My chances of getting TB are lower if I do what my own vet says	**Influence of others**	0.684	-	-	-	-	-	-
My chances of getting TB are lower if I follow what other farmers in my area do		0.633	-	-	-	-	-	-
My chances of getting TB are lower if I follow Government advice		0.684	-	-	-	-	-	-
If I buy in cattle this next year I will bring TB into my herd		0.474	-	-	-	-	-	-
The Welsh Government cares about reducing bovine TB	**Trust in Government**	-	0.827	-	-	-	-	-
The Welsh Government is doing a good job in relation to bovine TB		-	0.791	-	-	-	-	-
It is important to me to be a respected member of the farming community	**Social Standing**	-	-	0.781	-	-	-	-
I feel I am closely linked with the farming community in which I operate		-	-	0.845	-	-	-	-
Going under TB restrictions is a big problem for my business	**Impacts and Causes**	-	-	-	0.541	-	-	-
I am confident that my herd will not become infected with TB		-	-	-	-0.508	-	-	-
I would feel comfortable discussing the TB situation on my farm with my farming neighbours		-	-	-	0.54	-	-	-
There are too many badgers if their population is not properly managed		-	-	-	0.654	-	-	-
It is a matter of luck whether my herd goes down with bovine TB	**Self-efficacy**	-	-	-	-	0.798	-	-
There is nothing I can do from preventing my herd from going down with bovine TB		-	-	-	-	0.638	-	-
It is important for me to check my cattle at least once a day	**Relationship to animals**	-	-	-	-	-	0.763	-
To me, my cattle are just like human beings		-	-	-	-	-	0.718	-
I feel that local residents are unsympathetic towards farmers	**Unclear**	-	-	-	-	-	-	0.739
As a farmer it is important to remain emotionally detached from my cattle		-	-	-	-	-	-	0.703

Extraction Method: Principal Component Analysis.Rotation Method: Varimax with Kaiser Normalization.a Rotation converged in 11 iterations.

6.6.3 Multivariate Analysis

Ordinary Least Squares (OLS) regression was used for multivariate analysis. Four OLS models were constructed using the three well-being measures (ONS, WEMBWS and SPS) and a composite variable constructed using Principal Components Analysis as dependent variables. Independent variables included components from the PCA of farmer attitudes, farm characteristics, and bTB status (*see table 6.14 for full details*). These variables were selected because they were significant factors in the conceptual framework and/or have been identified as relevant in the descriptive or univariate analyses above. Stepwise regression was used at first to identify the most significant variables. However, other variables were entered into the model to ensure that sufficient variables reflected the conceptual framework.

Results of the four models are shown in table 6.15. Results are broadly consistent across the four models. The adjusted R^2 explain between 15% - 9% of the variance in the data with between 4-7 variables providing a statistically significant relationship ($p<0.05$). Variables that are significant in all four models include: farmers' trust in the Welsh Government and farmers' self-efficacy. Thus, farmers that trust the Welsh Government are significantly more likely to have higher levels of well-being than those that do not. Farmers with low levels of self-efficacy are significantly more likely to have low levels of well-being. These results are consistent with other studies (Enticott et al., 2015, Enticott et al., 2012c, Skuce et al., 2012) which suggest that trust in government and self-efficacy are linked to the adoption of preventive bTB practices such as vaccination and biosecurity.

In each of the models, however, farm characteristics and bTB status was not related to well-being. Thus, herd size, number of employees, and farmer gender were not related to well-being. Importantly, bTB status and the time to the next bTB test were also not significantly related to well-being. Similarly, farmers identifying bTB as their top farm pressure did not have statistically significantly lower levels of well-being to those that did not. Thus, whilst univariate relationships between well-being and bTB status appear to exist, when other factors are controlled for in an OLS regression, they do not appear to be significant. In fact, in three out of four models, the County bTB incidence

level was positively and significantly related to farmer well-being. That is to say that, when controlling for other factors, farmer well-being is higher in areas with the highest levels of bTB. These results are interesting, not least because they are counter-intuitive and contradict the attention directed to bTB and well-being by the NFU and other farmers' organisations. The results highlight the value of considering a range of factors rather than just one in considering farmers' well-being.

In 3 out of 4 models, finance pressures were significantly related to well-being: farmers citing finance as their top pressure were more likely to have lower levels of well-being. Farmers with higher levels of well-being were also significantly more likely to believe that others could help them avoid bTB. This reflects the findings on self-efficacy: well-being therefore appears to be connected to farmers' sense of fatalism about bTB which has been shown to exist in high risk areas of bTB (Enticott, 2008). By contrast, farmers who thought it was important to be a respected member of the farming community had higher levels of well-being in two out of the four OLS models.

Finally, farmers' attitudes to their cattle were significantly related to the ONS measure of well-being. Results suggest a negative relationship between care for cattle and well-being. This could be seen as surprising: forging emotional bonds with cattle could be seen to help farmers' emotional health. However, in the context of bTB, these emotional bonds may prove to cause more distress and anxiety as cattle are taken from farmers because of bTB. In removing cattle from the farm at the wrong stage of their lifecycle, farmers may experience higher levels of emotional distress, particularly where they have forged close emotional bonds to their cattle (Wilkie, 2005, Convery et al., 2005). In these circumstances, it may be that farmers emotionally distance themselves from their cattle as a form of coping or avoidance strategy and by consequence have higher levels of well-being.

Following this analysis, the four OLS models created display a low explanatory power which raises questions as to what may be the grounds for this result. Firstly, one explanation would be that the variables used within the OLS model may not have been fit for purpose however, a proportion of these have been incorporated and validated within previous research. Secondly, the suitability of the dependent variables which

were the SWB scales with farmers is questioned although these scales have been utilised and validated within other studies. It is acknowledged that these scales may not be the most appropriate for measuring farmer SWB, and that introducing an alternative scale, or the adjustment of these SWB measures are undertaken to incorporate farmers' accounts of personal well-being established at the qualitative interviews would be a more lucrative form of enquiry. Thirdly the variables selected were derived from two sources; the attitudinal variables together with farm characteristics and bTB status within the survey and the factors predicted within the conceptual framework considered significant to the social impact of bTB on farmers. A revision to the conceptual framework to include qualitative findings from the first interviews could have resulted in a different outcome

Where interviews uncovered evidence of many confounding factors which can impact on SWB, and whilst some of these influences were also highlighted within the farmer survey for example financial pressures, it can be presumed that qualitative methods may be a more effective method for capturing farmer well-being.

Table 6.14: Descriptive Statistics for Dependent and Independent variables

	Mean	***Std. Deviation***	***N***
Component score for all 3 Wellbeing Scales	-0.004	1.001	435
Under bTB restrictions (0 – No bTB, 1 - bTB)	0.22	0.412	435
Number Full TIme Staff	0.618	3.401	435
Total Cattle numbers	167	193.945	435
Gender (0 – female, 1 - male)	0.88	0.325	435
More than 1 month to next test (0 – more than 1 month, 1 – less than one month)	0.17	0.374	435
Finance is Main Pressure (0 – not main pressure, 1 – main pressure)	0.29	0.455	435
bTB is Main Pressure (0 – not main pressure, 1 – main pressure	0.17	0.374	435
bTB Incidence rate per 100 herd years 2012	10.87	5.302	435
Influence of others (PCA)	-0.031	0.997	435
Trust in Government (PCA)	-0.020	1.005	435
Social Standing (PCA)	0.026	1.009	435
bTB impacts and causes (PCA)	0.028	1.010	435
Self-efficacy (PCA)	-0.007	1.003	435
Relationship with cattle (PCA)	-0.003	1.008	435

Table 6.15: Results of OLS Regression

	a Dependent Variable: Component score for all 3 Wellbeing Scales		a Dependent Variable: ONS SCORE SUM		a Dependent Variable: WEMWBS Sum		a Dependent Variable: Stanford Presenteeism Scale	
	t	***Sig.***	***t***	***Sig.***	***t***	***Sig.***	***t***	***Sig.***
(Constant)	-1.470	.142	19.524	.000	28.728	.000	22.090	.000
Under bTB restrictions (1,0)	-1.262	.208	-1.172	.242	-.047	.963	-1.905	.058
Number Full TIme Staff	1.238	.216	.657	.512	.729	.466	1.666	.097
Total Cattle numbers	.286	.775	-.413	.680	.725	.469	.706	.481
Gender (1,0)	.893	.372	.251	.802	.442	.659	.932	.352
More than 1 month to next test (1,0)	-.770	.442	-.712	.477	-.388	.698	-.583	.560
Finance is Main Pressure (1,0)	-2.633	.009**	-2.898	.004**	-1.916	.056	-2.248	.025*
bTB is Main Pressure (1,0)	.474	.636	.819	.413	-.181	.856	.793	.428
bTB Incidence rate per 100 herd years 2012	2.431	.015*	.950	.343	2.698	.007**	2.515	.012*
Influence of others (PCA)	2.329	.020*	1.021	.308	2.220	.027*	2.773	.006**
Trust in Government (PCA)	5.892	.000**	4.334	.000**	6.100	.000**	5.253	.000**
Social Standing (PCA)	2.205	.028*	1.639	.102	3.756	.000**	.483	.629
bTB impacts and causes (PCA)	-1.864	.063	-1.482	.139	-2.045	.041*	-1.601	.110
Self-efficacy (PCA)	-4.640	.000**	-3.736	.000**	-3.239	.001**	-4.419	.000**
Relationship with cattle (PCA)	-1.887	.060	-2.277	.023*	-.636	.525	-1.766	.078
Adjusted R^2	0.146		0.091		0.131		0.121	
F	6.319		4.168		5.832		5.377	
Sig	0.000		0.000		0.000		0.000	

Note: *(p<0.05), **(p<0.01)

6.7 Conclusion

The previous chapter outlined farmers' views on what influenced their well-being, whereas this chapter has built on these views using a quantitative direction to the research. The chapter has analysed the farmer survey data in an attempt to establish what affects levels of farmer well-being. Initial descriptive findings from analysis of overall well-being scores in chapter five displayed lower levels for farmers compared to the UK population average, and this raised questions as to why this was the case. Firstly in this chapter survey data on farmer well-being was analysed alongside data gathered on farmer and farm characteristics which were highlighted within the conceptual framework as possible intrinsic factors influencing well-being. The analysis shows that farmer age can be a factor which affects well-being which is also pointed out in other studies (Riley, 2011, Price and Evans, 2009). Other farm factors such as enterprise type also appeared to have an impact on well-being which reaffirms findings from earlier research where dairy farmers display a lower well-being score (DEFRA, 2010a) but this pattern was only found in one of the well-being scales applied (ONS), the results of the remaining scales (WEMWBS, SPS and productivity scales) conclude that it is suckler beef farmers who posses lower well-being and productivity. Those farmers with smaller herd sizes displayed improved well-being levels compared with larger herds. Other farm characteristics such as the location and tenure type were not related to levels of well-being, however those farmers from within high bTB incidence areas did display higher well-being scores which was unexpected.

Those aspects which farmers had mentioned were causing them significant pressures on the farm including animal disease threats were analysed and concludes that a significant effect on levels of personal well-being and productivity are associated with farm finance and red tape and bureaucracy which supports findings within other studies (Butler, 2010, DEFRA, 2010a, Farm Crisis Network, 2009); those who mentioned finance as their top pressure were more likely to have lower levels of well-being. Animal diseases identified by farmers as problematic on their farms did not appear to be related with levels of well-being. Although it was anticipated that

personal well-being levels of farmers under bTB restrictions would be significantly lower than others, this hypothesis did not emerge from data analysis.

Some relationships were realised between well-being and bTB, for example the well-being of farmers where bTB restrictions had been lifted within less than 12 months were lower compared to farmers who had been out of restrictions for longer suggesting a long term impact on farmers despite the absence of bTB restrictions. There is some relationship between lower levels of well-being and productivity with proximity to a herd test.

By controlling for other potential factors, results of multivariate analysis concludes that despite farmers writing down bTB as their top pressure, this did not result in significantly lower levels of well-being compared to those who mentioned other factors as predominant pressures. A significant negative relationship was found for farmers who noted finance as a pressure.

The fact that personal well-being does not directly relate to bTB will be a sceptical conclusion to those farmers who displayed low levels of self-efficacy in relation to disease management. Those who displayed low self efficacy and believed it was a matter of luck if their herd went down with bTB and there was nothing they could do in preventing it had significantly lower levels of well-being. In fact, farmers with bTB were less likely to think that their herd would be free from restrictions in the future and more likely to say that bTB was a big problem for their business.

Farmers trust in the advice offered in relation to bTB control point towards a very low level of trust between farmers and the Welsh Government which has previously been recognised in research studies, (Enticott, 2008a). Multivariate analysis concluded that those who trusted government guidance on disease control showed significantly higher levels of well-being compared to farmers who did not agree with this group of survey statements. Those under bTB restrictions were less likely to think that advice from their vet or the government could offer help in disease prevention and instances where farmers have made their own conclusions on management of diseases on their

farms were stated in the conceptual framework (Wynne, 1992, Nerlich and Wright, 2006, Lobley et al., 2004).

Emotional attitudes of farmers to their cattle had a negative impact on ONS well-being scores which suggests that farmers may have learnt to adopt a diminishing attachment to their cattle once they are tested positive for bTB as a coping strategy, and it has become normalised practice on farms because of their experiences of losing cattle to bTB. Discussion around matters of coping strategies is undertaken further in chapter seven alongside findings from qualitative interviews.

A positive relationship was found between well-being and the support that farmers received within their local community. Farmers felt that it was important to be a respected member of the farming community which was highlighted as an extrinsic factor to well-being in the conceptual framework. Another finding from multivariate analysis displays a significant positive relationship between well-being and for those farmers within high risk bTB which also implies an association with well-being and the incidence of bTB within areas. Could this be because farmers have become accustomed with the higher disease risk associated within their area and have developed ways of coping to ease the impact of worry and stress associated with bTB which farmers have already pointed out in chapter five?

The final empirical chapter goes on to examine the findings of the third interviews with farmers where the survey well-being results were discussed with participants to ascertain their views on the reasons why the initial findings from the survey do not point towards a direct relationship between personal well-being and bTB. Combined with this, farmers' responses to results of the farmer attitudes statements from the survey are discussed further alongside their feelings on the rural demographics in their area, what involvement they have within that community and the importance of being respected within the community. Following that, interview data is discussed relative to what coping strategies that farmers are adopting that helps alleviate the impact of the pressures mentioned in this chapter, predominantly bTB.

Chapter 7: Coping with Bovine Tuberculosis

7.1 Introduction

Surprisingly, the previous chapter found that bTB was not a significant determinant of farmer well-being. The aim of this final chapter is to therefore explore this unexpected relationship. Why, despite constant news stories and speeches by farmers leaders, does there appear to be no relationship between farmer well-being and bTB? To what extent do these findings suggest that farmers affected by bTB have found ways of coping and living with disease? Or, to what extent do these results highlight methodological tensions in attempts to measure and identify well-being?

To answer these questions, the chapter draws on data from both the qualitative interviews and observations to examine how farmers may be managing these pressures along with findings from analysis of statements from the quantitative survey on farmers' attitude to bTB. In the first section, accounts from interviews are discussed as to how farmers have adapted their businesses to cope with bTB. Secondly, attention is drawn to the data findings on those aspects of farming life which contribute to farmer well-being and where the social influences as well as the social consequences of bTB are focussed upon. The findings from qualitative interviews on how the role of others closest to farmers and those within their community can have a moderating effect on a stressful circumstance linked to bTB. Alongside this the results of statements from section four of the survey are examined on farmers' attitudes and beliefs on bTB.

7.2 Coping with bTB: Management Strategies

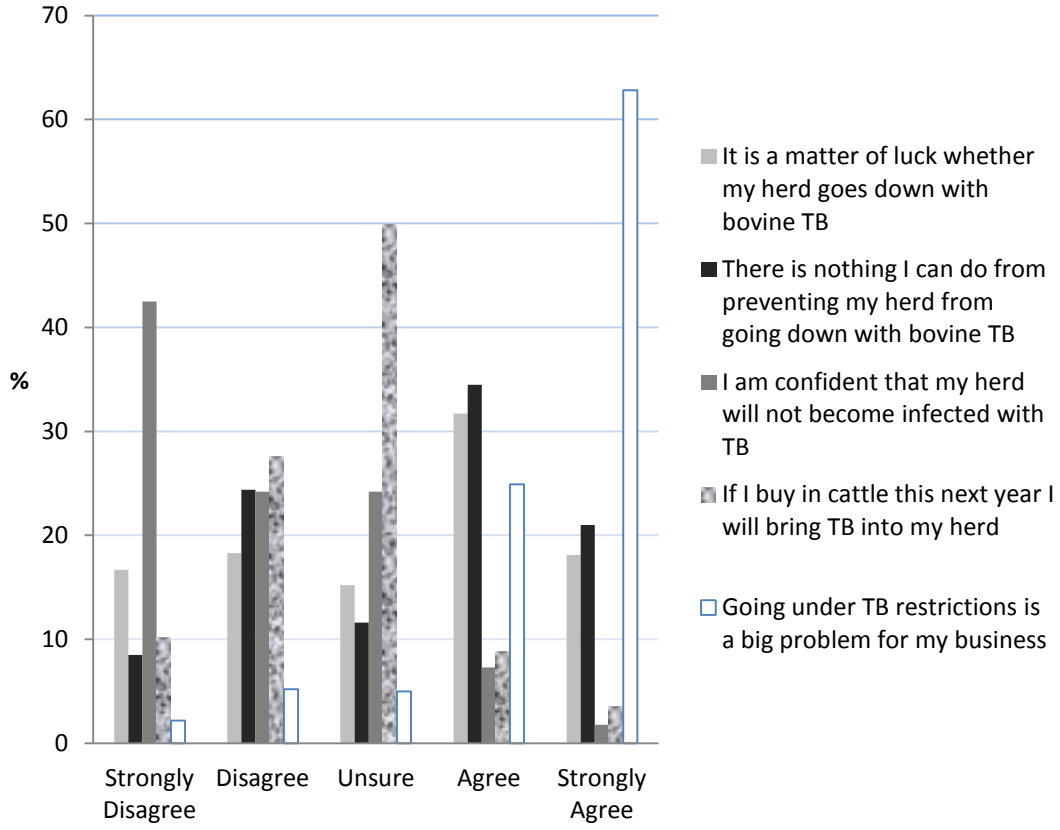
When farmers' herds are infected with bTB, regulations place constraints on the normal running of the farm. Cattle cannot be moved on or off the farm, cattle cannot always be moved between different blocks of grazing land, farms can become overstocked and production losses may arise either from the loss of reactor cattle or depressed production due to the stress of bTB testing for cattle. Adapting to these restrictions will vary between farms due to the availability of land and the implications

adaptation strategies may have upon farmers' cultural ideas of 'good farming'. Strategies identified in the farmer interviews are discussed below.

7.2.1 Living with bTB – Managing Cattle

Whilst bTB could significantly impact upon the normal running of the farm, many farmers believed that there was little that they could do to avoid bTB. Farmers suggested that going under bTB restrictions was recognised as a big problem for their business and observed 88% of survey respondents agreeing or strongly agreeing with the statement *'Going under TB restrictions is a big problem for my business' (figure 7.1*). However, the farmer survey revealed that many farmers believed that bTB was a matter of luck and there was little they could do to avoid bTB (*figure 7.1*). As a result, many of the coping strategies revolved around living with bTB, rather than seeking to live without it.

Figure 7.1: Farmer attitude towards bTB infection in their herd



One strategy that farmers adopted to enable them to live with bTB was the shooting of newly born bull calves to prevent overstocking. This was a practice that happened

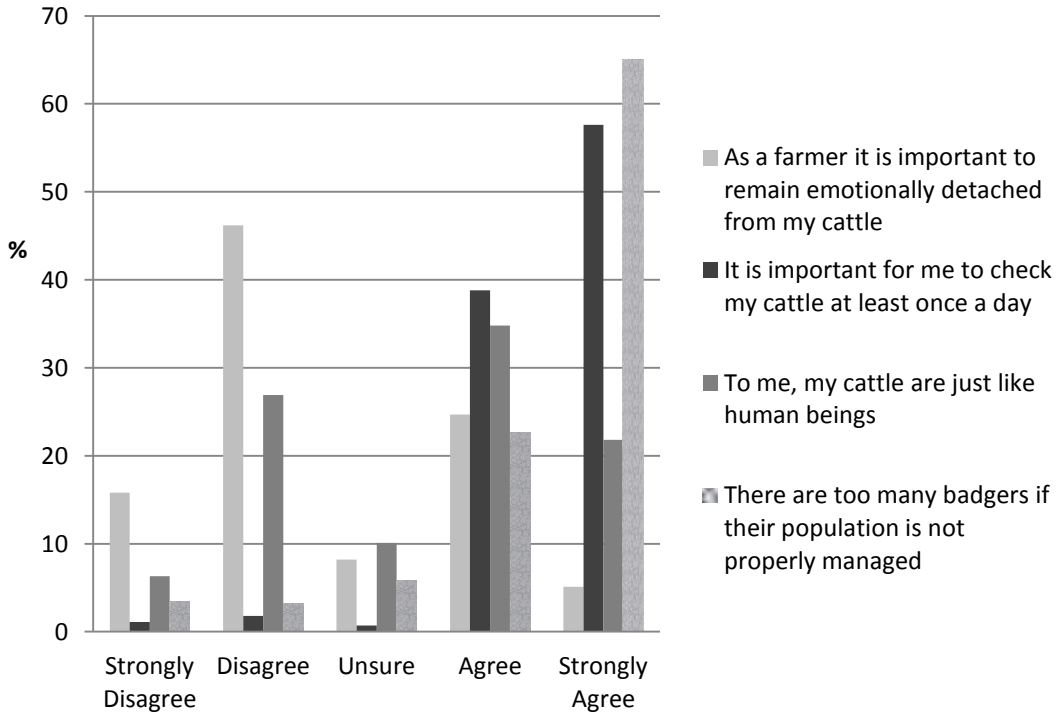
regularly in the past on some of the farms visited, specifically on dairy farms using a dairy bull. However different approaches had been adopted to cope with both the emotional impact of this and the work involved in having the carcases disposed. The example below mentions that the system of calf disposal had changed on their farm from having someone shooting them on the yard for a period of six years to now having them taken away on a lorry to the slaughterhouse.

> *"Well, it's better for us mentally than having the bloke on the yard every Sunday and shooting the…but it's better they go off the yard alive as well , it's for your own moral really, It's better for us, you get used to it…it was quite painful to start with I think you get used to it, you do get used to it, I know that sounds hard but...I just hoped that all bull calves could be born on a Saturday because they were being shot on Sunday so you only had to feed them twice, you didn't get attached to them, as long as they'd sucked the cow so you didn't even need to touch them, then that was fine but if they were born on Sunday night and you had to feed them a whole week and they get quite happy and quite lively…". (dairy farmers a, area 2).*

Farmers attitudes towards their cattle was outlined in the conceptual framework as an intrinsic factor where farmer emotional attachment decreases the higher the stocking rate of animals on the farm or whether a store animal is kept as opposed to a breeding animal (Wilkie, 2005, Riley, 2011). Statements were included in the farmer survey to determine farmers' attitudes towards their cattle which are summarised below. Figure 7.2 highlights that 62% of farmers felt they disagreed or strongly disagreed that it was important to be emotionally detached from their cattle with 30% agreeing or strongly agreeing with this statement. Further analysis with well-being variables highlights that the farmers who strongly agreed with this statement also displayed the highest SWEMWBS and presenteeism scores. One farmer talked about the pride he felt when seeing results of a breeding programme to improve his herd and the impact of bTB on the effort that he had put into this.

> *"Well we do quite a bit of embryo work, and it's seeing the calves and getting the ones that are better than the mother and worth a lot of money in theory. And what's pretty disheartening is when you come and you've got the best ones which have taken about 30 to 40 years to breed, and they go with TB. Although you get paid something for them, we probably don't get the value they're worth, and it's like a waste, you know." (dairy and beef farmer, area 4).*

Figure 7.2: Farmer attitudes towards their cattle



7.2.2 Adapting bTB testing

The second round of qualitative interviews were undertaken in the form of an observational visit to participants' farms during their bTB herd test and allowed direct insight into the actual pressures that occurred during this event. For a small fraction of farmer participants, walking and talking interviews were undertaken rather than observational visits at bTB testing. Reasons for this alternative approach were twofold; firstly because their herd test occurred at a date which did not coincide with the timeline window allocated for this session of interviews or secondly that participants had stated 'no' when asked if I could be present at herd testing time. The walking and talking interview still provided the opportunity to discuss with them the course of events and work that leads up to the bTB testing day, what happens during the test, who stands where, in which order the cattle are tested, where they are tested and so on. It was felt that by discussing this in-situ where the cattle were tested jogged the memories of participants as to the events at testing and provided visual detail of where these occur

Observations at bTB testing saw a number of varying types of cattle handling systems and procedures undertaken at testing. TB testing during morning milking was something that five dairy farmer participants carried out and it was felt that it was a practice that was becoming quite common in some areas. Farmers felt that it created less stress on the cows and for themselves as it saved time during the day where they could be catching up on feeding and bedding tasks. Discussion with vets at test observations also supports this system of testing at milking. However one dairy farmer said that he preferred to bTB test after the morning milking because of insufficient staff required for testing and milking simultaneously.

> *"It's certainly worth, for all those farmers that hadn't thought of it, or asked their vet would they do it, without a doubt that would halve their stress, something as simple as that, get that vet out sooner in the morning even if he's got to go home and go to bed, that's bringing loose, not only the stress on the farmer but stress on the cows of bringing them around twice because a lot of people say to me that they have mastitis something awful a day or two after testing and that's mostly stress so that halves it for everybody, so if we've got to work with it, let's try and make the system easier." (dairy farmer b, area 2).*

Dairy farms will start bTB testing early in the day during milking time. The additional workload involved around the week of bTB testing in relation to feeding and bedding animals meant that additional staff was fundamental in reducing pressure on the day, and if no staff were available, there was more pressure on the farmer on those days either side of testing and reading to catch up on work.

A farmer explains here his feelings during bTB testing and reading days, the fact that having been through the experience of losing cattle to bTB in the past ought to mean that he would feel accustomed to such events. Here he explains his concerns to what could possibly go wrong with descriptions of past test experiences.

> *" Wel mae'r diwrnod cyntaf yn stressful…mae'r da yn dod mewn chi'n meddwl odi rhain yn mynd i wneud niwed I'w hunain a jwmpo a ryw bethau a chi o hyd yn gofidio am rhywbeth felna achos jwmpodd un mas o'r crush fan hyn o'r blaen, a jwmpodd un dros ben yr iet gyda ni a lan i'r parc [cae] amser roedden yn testo… [intake of breath] diwrnod cyntaf, yr ail diwrnod chi'n gofidio…a ydy*

nhw'n mynd i basio…ni wedi colli lot o'r blaen blynydde nol wel bydde chi'n meddwl bydde chi'n cyfarfwyddo gyda'r peth, ond so chi'n [ddim yn] cyfarwyddo, mae e still yn canfod chi ar binau a chi'n nervous." (Beef farmer, area 3).[14]

Farmers may say that bTB herd restrictions are something that they eventually cope with as they can change their farming system to work around the constraints associated with bTB. Regardless of the length or number of times the farmer has been subjected to bTB restrictions, their feelings around herd testing causes unnecessary worry and pressure in relation to additional workload. bTB testing was highlighted by one farmer as having an impact on personal well-being and It was suggested that money from the proposed savings from a move to table valuations for bTB cattle in Wales could be offered to farmers to employ help for testing.

"The consequences of testing is possibly when well-being drops…if they [Welsh Government] go on to table valuations, perhaps they can use the saved money to put on farms to help sort out the testing days and experienced farm workers or a package available to hire local people for two days of the testing." (dairy farmer b, area 2).

Cattle handling facilities had been invested in, with some buying mobile cattle races which they can transport to various grazing sites during the summer months for testing. Other farmers have ensured that a cattle crush is available at all grazing land not adjoining the main holding.

Two of the larger dairy farms where I observed a TB testing or test reading day had cattle numbers around 400 to put through the crush and this was a regular occurrence every sixty days as both holdings had been under long term bTB restrictions. The rate of cow flow through the milking parlour and through the cattle race was noticeably

[14] *"Well, the first day is stressful…the cows come in and you think are any going to injure themselves by jumping and what have you, and you always worry about things like that because one jumped out of the crush here before, and another jumped over the gate and up to the field when we were testing…[intake of breath] on the first day, the second day you worry…will they pass…we've lost a lot in the past years ago, well you would've thought we'd get accustomed to it, but you don't adapt, it still finds you on edge and nervous". (Beef farmer, area 3).*

streamlined and was anticipated to an extent as these farms had been under restrictions for six years and more. However, these systems do not appear overnight and these farmers have had to experience testing in less organised circumstances before a fair amount of capital expenditure to ensure that animals can be handled adequately and quickly without potential danger situations and to have additional staff or voluntary help on the day. The physical side of bTB testing can be potentially dangerous for both farmers and vets with stories being relayed of incidents such as cracked ribs, being squeezed between an animal and a wall, broken arms, with a fatal incident in south west Wales in 2013 where a farmer was killed by his bull during the bTB test. In addition to this, there are farmers who have experienced stress in the time leading up to a test, and this was mentioned by two farmer's wives at interview that their husbands were noticeably more irritable during the days around testing.

It was found that farmers and vets mostly try and keep the mood of the conversation as light hearted as possible during bTB testing. There was an element of leg-pulling between some vets and farmers on various subjects such as a rugby match score over the previous weekend or discussions about neighbouring farmers, and the use of humour features here as a coping strategy within difficult situations for some farms.

However, it is surprising how certain farmers were different to others at bTB testing. This was particularly noticeable with one farmer when I attended a test reading day where she had warned me beforehand that she was a different person on test reading day, agitated, and acted like a kid on lemonade. This farmer had been quieter than I thought she would be compared to her first interview where she spoke at length about her interests in cow breeding and pedigree bloodlines of the breed of cattle she kept. On test reading day I expected this to come out more and hear her talk about her cows and discuss the breeding of families of some of them, but this never really transpired which surprised me. Another farmer who'd been milking whilst the vet and his clerk had been reading the test results was called over to be told that they had found a reactor. His response was quite different to the previous farmer in that another one reactor and five IR's were also found that day, and the farmer and his father seemed to take the news in their stride. The differences between these two farmers were that one was not under restrictions but felt an impending risk of bTB, with the latter having

had long term experience of losing cows to bTB.

7.2.3 Strategies for avoiding bTB

Although farmers did not believe that they could prevent bTB, some informal strategies were established that implicated an attempt to avoid bTB. The first of these related to the role of badgers in bTB transmission. Farmers' views on wildlife and badgers and the role they played in the translocation of bTB within cattle were given at interviews. One particular farmer's viewpoint on badgers on his farm was discussed where he remembered defending the badger setts on his farm with police to prevent badger baiters from disturbing setts and killing badgers in the 1970's. At the interview, even now over thirty years following this incident, and in spite of having had bTB breakdowns in his cattle, he was still protective of the badgers on his farm. He felt a sense of ownership of these badgers on his land, which he said were under his control which pleased him because he explained that they were clean badgers, he believed this as his cattle which had grazed fields where the setts were located had tested clear of bTB.

> *"…fi'n cofio yn diwedd y saithdegau o ni bant yn [Coleg] a oedd pobol yn dod lawr o'r Cymoedd i wneud badger baiting lawr tyllau…y bois hyn o'r Cymoedd, o nhw'n muscles a tattoos a 'rough' ofnadw a fi'n cofio bygwth nhw gyda'r heddlu os nad o nhw'n gadael y moch daear i fod. Ie ma da fi teimlad o berchen y moch daear yna… ond ma nhw dan fy 'control' i a sdim dim byd yn gwneud fi mwy plês na bod y dau cae hyn oedd ar y ffín ble roedd e'n [bTB] dod o, ni'n gwybod bod e wedi dod, a o ni'n gwybod bod ein sett ni yn lân. A hâf hyn nawr oedd e yn prawf dim dim ond yn unig i'r gwartheg oedd e'n prawf i moch daear yn hunan p'un ai nhw'n lan a …roedd y gwartheg wedi pori ar y caeau rownd ble oedd y sett ein hunain o ni'n gwybod oedd yn lân… cyn bod ein prawf mis Medi yn dod a o ni'n gwybod oedd hwn yn test nid yn unig ar y gwartheg, roedd yn test ar y moch daear a aethon ni'n glir, ni dal i fod a moch daear clir a ni wedi watcho bod y bygythiad yna i'n moch daear ni…ma hwnna'n edrych ar y peth yn hollol wahaniaeth ond yw e, dim y bygythiad i'n gwartheg ond y bygythiad i'n moch daear ni. (dairy and sheep farmer, area 1).*[15]

[15] *…I remember at the end of the seventies I was away in [College] and people were coming here from the Valleys to badger bait down the setts…these boys from the Valleys, they were all muscles and tattoos and very 'rough', and I remember threatening them with the police if they didn't leave the badgers alone. Yes, I do have*

Opposing views of this were more commonly heard which supports the findings from the survey statement. At the beginning of the final visit to one farm who had been under long term bTB restrictions there were discussions around the bTB situation on their farm since the previous visit and of how some of the participating farms which had been under long term restrictions were now bTB free. They enquired whether those farmers had 'done anything about the problem themselves' meaning that had these farmers tackled the wildlife problem on the farm and had eradicated the source from wildlife on their farms?

> *'off the record, have they done anything about the problem themselves, or didn't you ask? …we've heard the same as you that there's quite a few [farms] going clear [of bTb] and we're thinking perhaps it our turn [laughing] but it just seems to be lingering…". (dairy farm a, area 2).*

When discussing one farmer's belief on how he thought his herd had become free of bTB and around his discussions with those in this farming community when seeking advice on bTB, he was not prepared to say specifically what this was whilst the digital recorder was running

> *"Well, we are [talking to other farmers] but not with that thing on [pointing at the voice recorder and laughing], I'll tell you when that's been turned off". (Dairy farmer e, area 2).*

A television programme had reported on the bTB problems at Gatcombe Park in Gloucestershire prior to these final interviews where Princess Anne talked to reporters about the bTB problem that she'd had in the herd and the loss of valuable rare breed genetics of some of the cattle that had to be culled. Farmers at interview commented on her 'sensible' approach to bTB eradication with her ideas on controlling badgers by

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a feeling of ownership of those badgers…but they're under my control and nothing makes me more pleased that those two fields on the farm boundary where it [bTB] was coming from, we know that it came, and we knew that our sett was clean. This summer now, it was a test not just for the cattle but it was a test for the badgers themselves and whether they were clean and …the cattle had grazed on the fields around these setts we knew were clean…before our September test arrived and we knew it was a test not just for the cattle, it was a test on the badgers and we went clear, we still have clean badgers…and we've observed that the threat is there for our badgers…and that is looking at It from a different perspective isn't it, not the threat to our cattle, but the threat to our own badgers." (Dairy and sheep farmer, area 1).

gassing.

Secondly, another example of attempting to avoid bTB included the use of lay treatments. (Skuce et al., 2012, Enticott, 2008a, Enticott, 2008b) suggests that farmers develop their own epidemiologies to understand disease transmission, which informs their own preventive behaviour. One example of this was a farmer participating in the qualitative interviews where he believed that by having addressed disease problems with a health plan drawn up with his own vet, with specific reference to the attention given to fluke control; it had had a contributing factor towards his herd becoming free of long term bTB restrictions. Other farmers relayed their beliefs in links between bTB and other diseases such as BVD and also in the use of treatments used for parasitic levels of fluke in cattle. This was something that was raised during interviews with vets when asked if they had seen any disease prevention or management practices being carried out which farmers believe would help get a clear bTB test.

> *"There's various semi-myths about fluke control, a lot of farmers would have given a flukicide just before the TB test because they're convinced that if they do that that means they're going to pass the test. The actual science is that if an animal has got fluke in it it's less likely to react to the test, except that if the fluke is sufficient enough it could be debilitating them. So you don't discourage that because it's actually an intricately good thing to be doing, to be keeping the fluke under control, but they're doing it for the wrong reason". (Vet, area 2).*

It was believed that a downside for farmers in administering a fluke control prior to a bTB test was that if cows reacted positive to the test, the implications of removing that animal from the farm meant they could not enter the food chain and had to be shot on farm and taken to be incinerated as a result of the length of withdrawal period of flukicides.

Farmers within a high risk area relayed the practice of dividing up a group of cattle into smaller groups for the purpose of pre movement testing in stages before taking them to market. This would then reduce the risk of one animal reacting to the test and being unable to trade at all. An example of this was given by a farmer at interview of a neighbour who pre movement tested all his store cattle together and his farm had to

be put under restriction, meaning he could not trade.

7.3 Coping with bTB: The Role of Social Support

The development of coping strategies to deal with bTB was a key element of the conceptual framework. It was recognised that coping strategies could be both positive and negative. Farmers seeking to adapt to bTB may find some solutions relatively easy. Others, whether they are initiated by the farmer him/herself or by copying other farmers suggestions may involve hard work, time investments, and may be compromised by changes in regulations.

Previous research has provided evidence as to how social influences in relation to animal disease have helped farmers in handling difficult circumstances (Convery et al., 2008, Convery et al., 2007, Mort et al., 2005, Bickerstaff et al., 2006, DEFRA, 2010a, Fisher, 2013, Naylor and Courtney, 2014, Farm Crisis Network, 2009). This section therefore explores the impact of different social groups in coping with farming and bTB. Firstly, the immediate farming family is considered; secondly, the local farming community; and thirdly the wider local community.

7.3.1 Support from the Immediate Family

Talking through any issues affecting the farm business was imperative as one farmer told me that her sons got reminded often by showing them a picture of an ostrich:

> *'…it's no good burying your heads in the sand, don't be an ostrich, it's better to talk things through' (dairy farmer b, area 2).*

When asked who they would turn to for help relative to personal problems, the majority of participants said they would discuss personal dilemmas between their spouses or close family members. One farmer explained that everyone would come to him to talk about personal problems and he had to sort his own out, but a common theme arising from this line of inquiry was that farmers were resilient individuals and were used to having to sort out their own problems.

In a number of farms interviewed, three of them had immediate family members who were practising vets and so their first response would be to ask advice on any animal disease problem with these family members. One farmer told me that his son would telephone his brother from the milking parlour to ask him a question in connection with an animal related problem instead of asking his father.

Humour was another aspect of coping discussed in the literature review (Parkhill et al., 2011) and was one strategy that was recognised on a farm where it was admitted at interview that there was a lot of laughing involved every day between the parents and their son, regardless of the worries that were relayed at interview where bTB had removed breeding cows and a bull and restrictions did not allow restocking or selling of store cattle, therefore the impact on cashflow was enormous.

Farmer well-being levels during a test were felt as the worst time in relation to bTB and especially if a breakdown in the herd occurred when their best cows went down, but after sitting down to think and discussing it with the family, things felt better. The uncertainty about how a bTB breakdown would affect the business and how it would carry on in turn affects well-being. However, it was felt after a period of time under restriction, or having experienced more than one herd breakdown, the knowledge they had that the business could carry on running, albeit with different challenges, alongside bTB regulations seemed to make life easier and the emotional effects following a failed bTB test were not as profound as the initial herd breakdown.

> *"Yn ystod y prawf, y diwrnod chi'n mynd lawr a'ch dâ gorau chi'n mynd yn wael,…yr ansicrwydd fel mae eich busnes yn mynd I fynd, fel mae fe'n [bTB] cael dylanwad ar eich busnes, ond r'ôl eistedd lawr, siarad a meddwl...erbyn hyn rydym wedi dod yn gyfarwydd gyda TB a chi'n gwybod bod eich busnes yn mynd I gario mlân, a falle bod y 'dip' yna ddim mor fawr yr ail waith…ac yn gwybod bo ni'n gallu dod trwyddo fe.". (dairy and sheep farmer a, area 1).*[16]

[16] *"During the test, the day you go down with your best cows you feel bad,…the uncertainty as to which way your business will go, how it [bTB] will have an influence on your business, but after sitting down to discuss and think…by this point we're accustomed with TB and know that our business will carry on, and maybe that dip is not so huge the second time…knowing that we can get through it." (Dairy and sheep farmer a, area 1).*

Farmers have adapted their routines during bTB testing days through carrying out additional work such as feeding and bedding the day before and bringing in additional staff usually family or farming friends and neighbours to give a helping hand; an example was given when a bTB test fell on a Monday which meant that there was double the work to do the day before on a Sunday.

> *"My father who is in his seventies comes and stands in a gap or helps out with escapees, and my mother will finish preparing the lunch whilst I'm outside testing". (dairy farmer c, area 2).*

One farmer explained that he always tried to bTB test on the days when his wife wasn't working as she was a calming influence and that he tended to get stressed because of it. Family relationships can become strained during stressful working days such as bTB testing.

> *"[bTB] testing day does tend to test relationships because it's a very stressful day, but as we've done it more often we've got better at it and it's a case of asking all and sundry to help out and family comes out of the woodwork on testing day, but it does test the nerves."(dairy farmer b, area 4).*

Children were also involved during bTB testing, where on one farm in particular I attended a bTB test, the kids had gone to bed early the previous evening because the farm was bTB testing the next day and it was the school holidays. The eldest child who was 8 was up at 4.40 am at the same time the vet arrived and his 6 year old sister was up soon afterwards. They spent all day talking and helping out in their own way. They enjoyed showing their pet lambs and what surprised me the most was their knowledge of the cattle's names or numbers and the stories they talked about in association with that cow's behaviour, progeny or other peculiar fact.

> *"The kids actually like TB testing. My middle son, he's 6, nearly 7, he started to write the numbers down for the vet last time. I was there checking, but he quite enjoyed it. They quite like it because everybody's there doing something. The vet's there and they sort of have a laugh with the vet and they like the company just as much as the job. They like handling stock anyway, cattle or sheep, so it's like an adventure to them. They don't see the downside. I don't think they'd*

probably be too happy if they took one of their favourite calves. (dairy and beef farm, area 4).

Another farmer who had recently become free from long term bTB restrictions talked about going to the mart and taking his young son as his own father took him there as a child.

"I don't seem to have found the time to go to the mart, I haven't been for a few years…our son who is six now has never been, I remember going to the mart with my father… you don't get many farm sales these days either" (dairy farmer e, area 2).

The support of close family has been recognised here in the context of bTB and events in relation to testing. This was also a factor which constituted towards good personal well-being for farmers within chapter five. Connections between both of these would certainly be a moderating factor in the effects of bTB on personal well-being.

Going to market also featured significantly at interview as a form of support to farmers through the sharing of knowledge and conversation on not only bTB but a whole range of other matters. This will be discussed in the next section alongside other support perceived by farmers from within the farming community.

7.3.2 Support from Local Farmers

When it came to receiving support from farmers for bTB, the market was often an important place where farmers could access advice and share tips between each other. Farmers discuss the bTB situation on their farm at market with others and for this example on what course of action had been taken by AHVLA on their farm during a bTB breakdown and concluded that it is by and large an inconsistent policy for farms relative to testing cattle and working towards a bTB free existence.

"A lot of farmers speak to each other in market and somebody said 'oh I had some tested and this is what they'd done' so you think oh perhaps that's what

will happen for us and then they [AHVLA] come along 'we're not going to do that now we're doing something…" (beef and sheep farmer, area 4).

Going to market also provided a kind of 'social release' for farmers who had been freed from long-term restrictions of bTB and were able to trade cattle at a market. Typically, these farmers described a new found freedom, and a return to a social environment that had been missing from their lives for so long. For example, one farmer who had been to market to sell calves following a period of 10 years being under bTB restrictions came home and relayed to his son a list of farmers whom he had seen that day, they discussed the bTB status of these farmers and their farms as they had assumed that they too were under bTB restrictions. A similar story was told by a farmer who said that they hadn't seen some people at the mart for a number of years and it was an opportunity to have conversations with them.

But this new found freedom was not always positive. One farmer who had been under bTB restrictions for six years was faced with the dilemma and worry of how other farmers would react or say in view of him attending market and selling cows. He felt concerned that others would not want to buy his cattle as he had only just come out of long term bTB restrictions. The farmer felt that if he didn't destock before his next bTB test in a few months there was a risk of him being bTB restricted again and he felt that he could well be facing huge problems that were linked to overstocking which had already been experienced:

"I think I'll try one cow to see how it goes…there's a time limit there again to destock before the next {bTB] test, I'll be in more of a mess if I don't do anything…price isn't really a big factor". (dairy farmer d, area 2).

Sometimes, this new found freedom resulted in trivial arguments between farmers and their families. For instance, one farmer and his wife whose herd had been bTB restricted for eight years reported arguing over whether they should take a newly born calf to market. Previously, the option would never have been open to them.

At interview the majority of farmers felt that they would be comfortable discussing their bTB situation with their farming neighbours and they hoped that any information on TB breakdowns would be forthcoming from their own neighbours. Farmers interviewed in high risk areas felt that a large proportion in that area had had bTB at some point and that there was not the stigma with the disease now compared to historically. One farmer thought that a major weakness of the bTB eradication scheme was that AHVLA were not disclosing bTB breakdowns to neighbouring farmers and others also felt this too as neighbours may want to move cattle away from boundary fields to decrease the risk of disease transmission. The reaction from one neighbour when he received a phone call from this farmer was to say that he would not hold it against him for telling him his herd was under bTB restrictions.

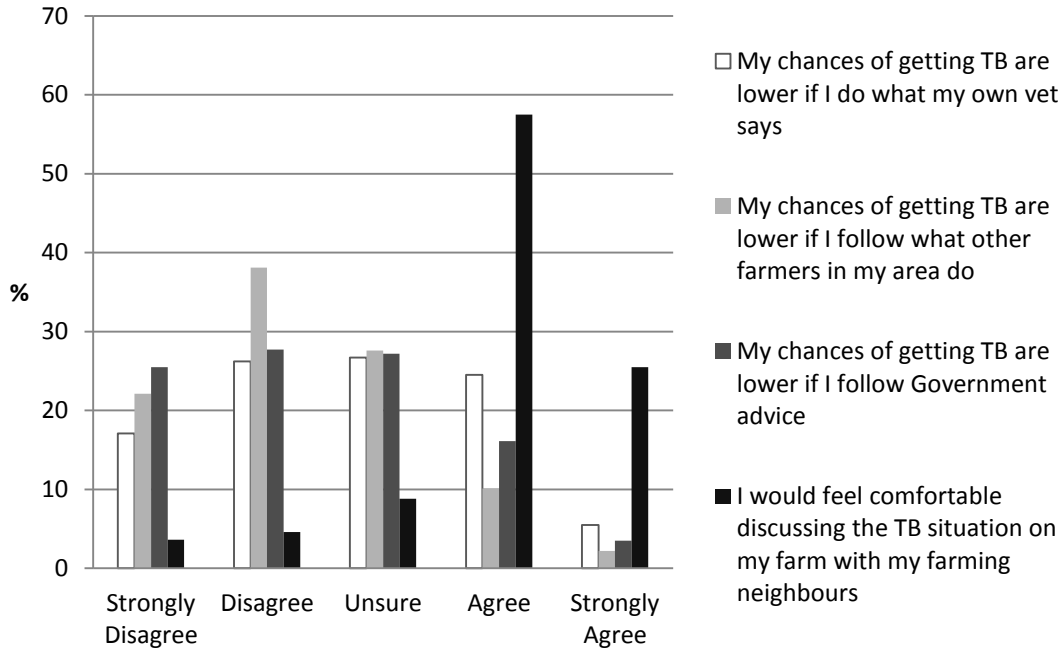
> *"Yn yr ardal ma lot o ffermwyr ddim yn dweud eu bod nhw lawr â TB ond rwy wedi cysylltu gyda'm cymdogion a bydde ni'n credu bydd ffermwyr yn dod nôl atai pan fyddan nhw I lawr [a TB]. Gwnaeth un ffermwr ymateb 'oh wel, wnai ddim dala fe yn dy erbyn'." (dairy farmer a, area 1).*[17]

Although there were two examples given at interview where participants talked about farmers within their community not admitting that they had had a bTB breakdown with a report of one farm who did not admit their herd had bTB and had gone to such measures as temporarily stopping the relief milker coming to the farm because he would see the reactor cows which had been clearly marked with spray marker by the valuer.

In figure 7.3, the viewpoints of farmers to a statement in the survey '*I would feel comfortable discussing the TB situation on my farm with my farming neighbours*' resulted in 83% of respondents agreeing or strongly agreeing with this statement.

[17] *"In this area a lot of farmers don't say they're under TB restrictions but I've contacted my own neighbours and believe that farmers will get back to me when they're down [with TB]. One farmer responded 'oh well, I won't hold it against you." (Dairy farmer a, area 1).*

Figure 7.3: Farmer viewpoints on sources of advice on bTB



Not all farmers were involved within their direct community or within their closest farming community. Some were heavily involved within their immediate community undertaking roles such as a Parish Community or County Councillor, school governor or an active member of a farming union or farmer discussion group. On the other hand there were farmers who rarely or never attended social community events or other events involving farmers. Reasons behind this were numerous with one farmer quoting that a local group of farmers were too 'clicky' and even though he had tried to join the group social events, he felt he belonged to the alternative group within his area that he called the 'odd-bods'. Other farming families who had young children felt they would only socialise within the immediate community if events were being held through the school their children attended primarily due to time deficiencies with farming and having a young family. This did not matter somewhat to farmers who raised this point as they did achieve some social engagement with farmers through discussions groups or at farm business organised meetings.

One farmer describes coping with bTB as

> *"…heads down and carry on, you've got to cope with it you have no choice. You talk to neighbours as others are in the same position, asking each other what*

they'd do with a bunch of calves for example and you may want to do the same'.(dairy farm d, area 2).

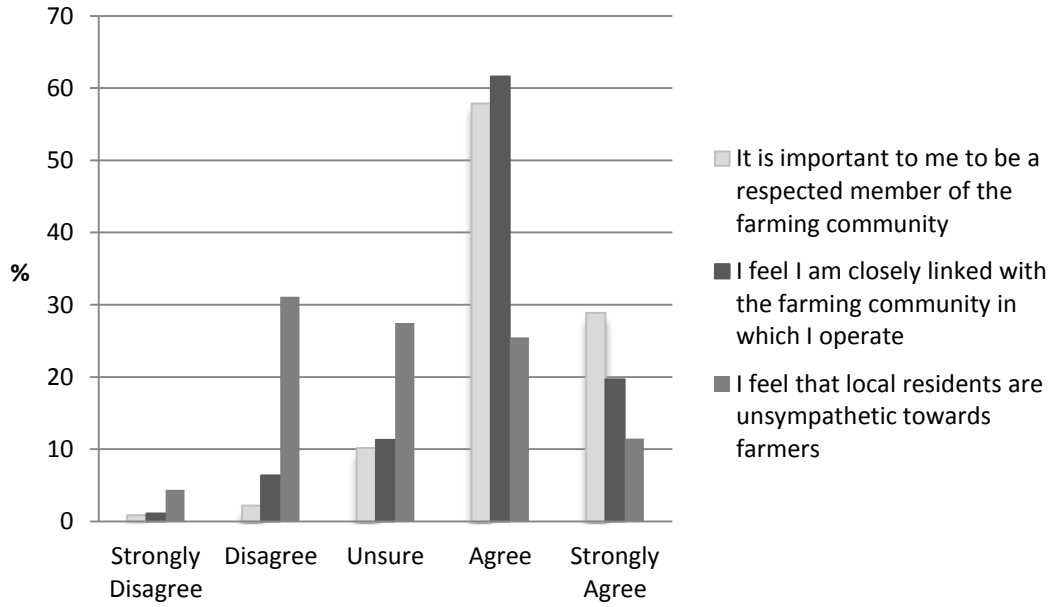
It was felt that particular people will feel very depressed in relation to their bTB problems, some will have the attitude "there's nothing we can do about it", and there are those that tend to blame themselves. One farmer believed that by co-operating with other farmers, a problem shared is a problem halved,

"I'd hate to be in a situation where we'd be wiped out. If you let one or two losses get to you, you're better off out of it". (dairy farmer, area 1).

The importance of social networks is recognised in the survey of farmers with 81% of farmers agreeing with the statement that it was important for them to be closely linked with the farming community in which they operated (see figure 7.4). Farmers who agreed to the importance of having close links with the farming community also displayed the highest well-being and presenteeism and work productivity scores.

Similarly, when farmers were asked for their views on the statement '*It is important to me to be a respected member of the farming community*', the majority of respondents (87%) shared in this strong belief by agreeing that it is important to be a respected member of their farming community.

Figure 7.4: Farmer attitudes to others within their community



This data supports findings from the qualitative interviews where farmers were inclined to feel linked to the farming community, more so than with the population within their closest villages. For example, one farmer believed that it was better to be respected by her fellow farmers than from those within her closest community. Farmers at interview referred to the term 'good farmer' during discussion around this particular statement and were probed further for examples of what their views of what this term meant together with examples of how a 'bad farmer' conducted themselves. A series of examples of a good farmer were given as those farmers who cared for their animals appropriately, kept their farms tidy in appearance, didn't break the law and made a respectable living for their family and they've served their community for years.

> *"I'd much rather be respected in the farming community than the general community…it's your peers, isn't it." (dairy farmer d, area 2).*

One farmer takes a different viewpoint at interview and talks about the pressure of expectation on farmers to be respected in their community by their peers and there may be a case that those showing less concern to be respected to have a better quality

of life without the needless worry of what other farmers thought of them which in turn would not have an effect on their work productivity.

> *"I agree you have to be respected. Farmers are quite bad for 'having a go', you don't want to be in that group really. It's not like any other business, it's out there for everyone to see, you can take an animal to mart and see if it's good or bad, people see over your hedges, they can see in your field, it's all out there for people to see and you can't hide it. People that are farming know exactly when they look over your hedge or at a cow what your standards are in life, it makes you pull your own socks up and doesn't give you any room to have a lapse". (dairy farmer b, area 2.*

These quotes highlight the significance of the 'good farmer' (Burton, 2004). Whilst Burton refers to the good farmer as a normative influence upon the way farmers behave, the farmers interviewed for this research highlight the pressure that ideas of good farming bring provided by the constant visibility of their business. However, at least one farmer recognised the futility of the constant search for excellence, arguing that a good farmer was one who had a good life balance:

> *"There is no point working all hours of the day having beautiful cows, well looked after, but you never see your wife and kids and your home life is a mess". (dairy farmer d, area2).*

Being a respected member of the farming community and having bTB in the past would have had an associated stigma. However, it seems that because bTB is so widespread in higher risk areas, it is unusual for a farmer not to have been under bTB restriction and therefore the 'good farmer' status is not compromised.

7.3.4 Support from Professionals

Questions to farmers on who they would turn to for advice on bTB more often than not would result in them replying their own private vet.

> *"Advice on TB is obtained from our vet, the only person we see really. Our vets are quite frustrated when they don't get a say with AHVLA on certain animals, they're just told to test and read the test…in the early days they would've liked*

to have an input as to what happened but never got consulted. Our vet had a go at them in the past…they used to do silly things like put us on severe reading with no pattern to it; they're supposed to start giving out advice but…ultimately our own vets should be involved, knowing our farm history and situation, or at least an input on what happens in policy that's made by a politician and not a vet. It should be down to the vets and farmers". (dairy farmer , area 4).

There are circumstances where farming participants have suggested that farmers within their community would seek advice from them as they had long term experience of bTB regulations. The notion of not knowing what the immediate impact of bTB restrictions on their herd and consequently their business will bring as a result of a herd breakdown has seen farmers seek help from trusted individuals to ask for their advice on a set of circumstances. Farmers believe in turning to other farmers who have experience of a problem and with whom they can discuss issues openly without being judged or castigated. One farmer explained how he had an advisory visit from AHVLA staff after the second time the farm had gone down with bTB and conveyed a negative picture as to how he was advised on what he could and could not do under bTB restrictions. In fact he had considered sending his part time worker to the meeting when he reflected upon how little use the advice was and his lack of appreciation of it and felt that any problems were usually dealt with by themselves. Additionally on how very little trust he had towards AHVLA as they were not very helpful when he telephones them up with queries or when he receives inconsistent answers from staff which even his own vet was unsure as to what advice was accurate.

"Yr ail waith aethon ni lawr nawr [a TB] mae'r Ministry yn hala rhywun mas I siarad a chi I ddweud be chi'n gallu neu dim yn gallu gwneud…dysges I ddim byd wrth y cyfweliad…does dim lot o ffydd gyda fi atyn nhw , a dweud y gwir…dim yn helpful iawn pan I chi'n ffonio nhw lan, neu ma un yn gweud un barn a rhywun arall yn rhoi barn arall a pan I chi'n gofyn I'ch milfeddyg dyw e ddim yn gwybod pa un barn sy'n iawn". (dairy farmer, area 1).[18]

[18] *"The second time we went down [with TB] the Ministry send someone out to tell you what you can or cannot do…I learnt nothing from this interview…I haven't got much trust towards them, to tell the truth…not very helpful when you ring them up, or someone says one view and someone else has another view, and when you ask your own vet he doesn't know which opinion is correct". (Dairy farmer, area 1).*

When farmers were asked at interview who they would turn to for advice on animal diseases, the majority of participants said their own vet. On occasions farmers would discuss some specific ailments with an animal health company representative whom they would have dealt with in the past. This usually took place when the company rep turned up on the farm, and farmers would not specifically go out of their way to contact them in between their visits. Three dairy farmers talked about the information and advice provided by National Milk Records (NMR) following milk sample testing in relation to surveillance of Johnes disease levels within their herd. One farmer told me that she would never stop milk recording as the information she gained from it was valuable for herd management of diseases such as Johnes, and as a result of this report she would only feed milk to calves from cows which had no indication of this disease to avoid passing on-any infection to youngstock. Local knowledge of an animal disease was told by one farmer who described how he gained information on a disease he called 'red water disease' and how it affected his cattle. Discussion of this with an elderly local farmer who had experience of this specific disease which was associated with the local land type meant that he could also pass on the information to his own vet.

In relation to where farmers would seek advice on matters in relation to the farming business, various examples were specified such as soil testing through a farmers' co-operative, some employed the services of a farm business consultant whom they felt helped with thinking processes and discussion of business planning with. Others would approach their accountant to discuss any issues in relation to farming finance. Participants who were members of a discussion group felt that when they visit group members' farms in turn, all elements of the farm was discussed ranging in subjects from farm costings, farm buildings and the livestock, and participants felt that this challenged them by receiving frank opinions from associated group members.

> *"The Discussion group gives an opportunity to meet farmers, there are elements of trust within the group and there are still new members joining, it's not a glorified farm walk…we bounce ideas, get information on grazing techniques*

and comparable farm profit costs on a pence per litre basis…" (Dairy farmer e, area 2).

Difficult decisions involving family members resulted in one farmer turning to trusted professionals for advice and help. When farmers were asked the question 'who they would turn to if they had personal problems'?, one particular farmer mentioned that he would approach his own GP with any personal problems if he felt he couldn't sort them out himself, but he felt that it can sometimes be difficult to 'see the wood from the trees' in relation to farm related problems when you're 'in the thick of it' every day, and felt that you sometimes had to stand back and be almost one step removed to see a way forward to some problems. This farmer explained how he had obtained the advice of a trusted professional in order to be able to settle a difficult decision involving family members and succession, and described it as one of the hardest decisions he had to do in order to ensure the future succession of the family farm. This course of action had been on hold for some length of time, with the farmer carrying on farming whilst enduring ill-health to ensure that the farm was appropriately succeeded by one of the family. Succession of family farms is explored as a theme in research by (Price and Evans, 2009) where patrilineal inheritance was a social practice which farming families expected as customary. However in this particular case, due to difficult family circumstances the daughter and son-in-law were asked to take on the farm.

7.3.5 Support from the Local Community

When talking about the social mix of people in his area, this farmer felt that the general public were a bit too far removed from farmers, but felt that initiatives such as Open Farm Sunday and television programmes such as 'Lambing Live' helped in educating people in where their food comes from, how a farm is run and why it is run in that way. He believed that news coverage of the flooding of farmland in Somerset in 2014 had made the public more aware of the farming situation. In addition, it was important for farmers to have a presence on Community Councils to explain issues such as why dogs needed to be kept under control and why footpaths were muddy in

the winter months, why hedges were trimmed at certain times of the year and felt that explaining to them what is happening would stimulate an interest rather than making people feel ridiculed. He also believed that schools had a role to play in educating the public as to where food came from.

One farmer I visited was very conscious of farming in the middle of a rural village when it came to some tasks such as slurry spreading where she had an understanding with her contractor to only spread slurry on frosty days when the roads and land are dry to avoid depositing muck and mud on the road. This farm had strived to work with residents to avoid conflict with those living in the village, and if any there were any issues with cows eating flowers from gardens for example she has invited villagers to come and discuss it first to avoid any potential maliciousness.

> *"I'm on the Community Council, and when we carry out a survey, I reckon a quarter of the village are locals, it's like a dormitory village, come home to sleep, go to work, never see them". (dairy farmer e, area 2).*

By contrast, another farming couple felt that the location of the farm and some of the land they rented was too close to the village and believed it was an element of threat to the way they wanted to farm because of interference from some living close by and their lack of understanding of farming ways.

> *"…too many outsiders…even that we haven't got that many new people living close by, they are giving us grief now, there is people, they're sticking their nose in everything". (dairy farm a, area 2).*

Attitudes towards the social mix of the local population were asked both at interview and within the postal survey and farmer's views on this statement generated a variation in responses. Results from the postal survey to the statement *'I feel that local residents are unsympathetic towards farmers'* outlined in figure 7.4 give a mixed response with 37% agreeing or strongly agreeing and 36% disagreeing or strongly disagreeing. Farmers who disagreed with this statement also displayed higher work productivity scores overall and felt they made the least proportion of mistakes in their work time.

At interview, one participant talked about when the village community used to help out on farms at harvesting, and the connectedness that used to be between the local community and the farm.

> *"I think that's one thing where I've seen a difference from being here now and when I was a child, and I can remember when we had hay the whole village would be here helping us and now we don't, now we make silage we see nobody, the village is... we don't know anybody that lives in the village any more, hardly, and they've lost contact with the farms and it's happening…if it's happened to us it's happened to every farm, they've lost the touch, they don't know what's going on". (dairy farmer d, area 2).*

One farm I visited had a public road going through their farmyard and the farmer explained that some people stop and take an interest in the farm and others were indifferent. One farmer who farmed close to an urban conurbation explained his thoughts on local residents feelings about bTB compared to people who lived in more rural villages who may understand the facts about the disease more.

> *"Os nad yw e'n effeithio rhai yn eu poced dy'n nhw ddim yn becso'r damn abiti TB. Falle bod nhw ddim yn deall y sefyllfa…galle bod pobl o cefn gwlad yn deall fwy [am TB]". (dairy and sheep farmer a, area 1).*[19]

A lack of understanding of farming ways was mentioned by another farmer who used the example of bTB where he did not feel comfortable in talking to members of the general public about, he feared that if they knew more details on issues such as bTB and that IR cattle enter into the food chain then it could create more vulnerability in consumer trust for their milk and meat products.

> *"It's quite a decent village, we've had no complaints but I don't think people understand what goes on on farms. Most people live here have some farming connection, they're not unsympathetic here…they wouldn't have a clue about TB issues, it's not something you want to talk about really with them…meat from IR's going to the food chain…I'm amazed it's allowed to happen. TB*

[19] *"If it doesn't affect people through their pockets they don't care a damn about TB. Maybe they don't understand the circumstances…maybe those from rural areas understand more [about TB]". (Dairy and sheep farmer a, area 1).*

doesn't affect the general muscles, but you try telling that to the general public." (dairy farm d, area 2).

One farmer talked at length about how the rural community where he had lived in all his life had changed considerably with a large growth in housing and population numbers as a result of being so close to an urban area. He talked about the type of demographics that had moved in to the area and their attitudes towards living in the countryside. Here he gave an example of the volume of traffic he had to contend with when crossing the road with his milking cows twice daily in the grazing months.

"…there was that sort of relationship in the rural communities then, it certainly isn't here now. You're getting the older people coming in and they've got this idea of what they think the countryside should be, and I think this is what is spoiling it. I used to know everybody. You never locked the door. We cross the road with the cows by day. It's nothing for us to have twenty cars either side waiting for us to put the cows across, and they wouldn't be patient. They've fallen out with their wife or had a thick head after last night. We've had them driving into the middle of the cows. "Oh I didn't realise". They are in cloud cuckoo land. But that's how things have changed.". (dairy farmer a, area 1).

Similarly, one farming couple said they had friends who had no links with the farming industry and they felt that when they met with their friends the conversation did not revolve around the doom and gloom of events relative to farming and they felt that sometimes farmers can be their own victims who would only eat, breathe and sleep farming.

This section has outlined ways in which farmers receive support from close family, their peers within the farming community, other professionals and their views on rural demographics where they live. Previous to that the coping strategies of farmers were outlined where findings show how they had adapted the management of their business to cope with bTB. In combination, the analysis of qualitative and quantitative data is relayed as to farmers' attitudes towards the statements in the survey relative to the handling of bTB by Government and their belief as to disease risk to their herd and to their business and attitudes towards their livestock. The opinions of farmers as to

the future for their herd in relation to bTB are discussed below by comparing coping behaviours to a chronic risk trajectory.

7.4 bTB and Well-being: Floating in and out of restrictions

Eight of the research participant's herds which had been under long term bTB restrictions had been clear of bTB at the point of the third visit to their farm. A proportion believed that it would not be a permanent position and thought that they would probably be under restrictions again following their next test in a few months. Farmers forecasted what the future would hold for their herds relative to bTB and that they believed they would 'float' in and out of disease restrictions for periods of time. This would allow them to 'clear out' a number of livestock during bTB free times and to let the herd return to some form of normality within the daily management context of a cattle enterprise. This scenario avoids overstocking within farm buildings and one in which calves can be traded and older cows culled to allow replacement heifers to move into the herd. The notion of having the herd free of bTB restrictions and allowing the business to return to some sort of normality could be a factor of coping for certain farmers. The phases of a 'chronic risk trajectory' described in chapter three (Kenen et al., 2003a) can be compared with a farmers' opinions and feelings within the 'floating cycle' they described of being in and out of bTB restrictions. Table 7.1 describes how this trajectory may be applied to farmers compared with Kenen et al., (2003a) portrayal of women at a greater risk of genetic cancer. A stable risk trajectory is described as the time when a farm is in-between the herd annual bTB test and deliberations of disease contraction may be lower than when a downward trajectory of a risk phase for a farmer is present when a reactor or inconclusive result is found during a test. This downward phase will encompass the time leading up to a re-test of an inconclusive reactor (IR) The comeback phase is described as to when a farmer is given news of a clear test result or an IR cow re-test result is clear. The authors established that women developed various coping strategies in order to put the issue of disease risk at the back of their mind and 'to get on with their lives'. This was apparent from farmers' attitudes during the final interviews where they had become free from bTB restrictions after a long period of controls. The risk of bTB did not

appear to be affecting their everyday routines on the farm and it appeared as if they were carrying on despite threats of bTB restriction again in the future.

Table 7.1: Phases of chronic risk trajectory

	Women	**Farmers**
Stable	Between annual cancer screenings	Herd in-between annual test
Downward	If there is a false positive found, time between receiving original result and follow up procedures.	If a reactor/inconclusive is found/time between additional test results
Comeback	Notification that the screening result was not a true positive	Notification that inconclusive/herd is bTB free

Even though farmers may believe that a bTB free status would be short lived, it allowed them to have an opportunity to bring some relief to the additional workload involved in caring for surplus livestock through selling and possibly reducing hidden costs identified by farmers at interview such as keeping older, problematic cows in the herd with higher cell counts and lameness issues and being able to buy in first or second calvers those that had previously had to be slaughtered in relation to bTB. The consequences of this would be the effects on their workload and therefore their overall quality of life. The emotional effects of bTB are a result of various challenges farmers have to face in relation to herd breakdowns on their farm. This could be killing cattle, or losing bloodlines of cattle where they have bred those genetic bloodlines over a number of years, having cattle shot on farms or calves having to be shot because the alternative of keeping them until finishing was not an option.

Attitudes of farmers in relation to bTB 'there's nothing we can do about it' and by working their business around the problem allows them to carry on and cope. This was a realisation by one farmer after quite a few months of being under bTB restriction, and eventually changed the structure of his enterprises as keeping calves from the dairy herd to sell on as store cattle meant that the farm would become

overstocked very quickly due to movement restrictions. One farmer explained their beliefs on the implications of not coping with long term bTB restrictions.

> *"Some people have been under for eleven, twelve years round here, I mean they've had to, that is life now isn't it, they've got their head round it because you do get your head round it, you can't keep on whingeing about it, you've got to get your head round it somehow and you've got to try and farm round it and if you can't do that then you're going to go down health wise, money wise, everything is going to go".(dairy farmer, area 2).*

Farmers have discussed how the consequences of bTB have affected their business and how they have managed to adapt their business to cope with the restrictions and to be able to carry on farming within the constraints. Not all farmers get accustomed with aspects which affect them emotionally for instance seeing cattle and calves taken away or seeing their animals being shot on the farm.

7.5 Conclusion

Although farmer personal well-being levels per se are not significantly proven to be affected directly by levels of bTB restrictions on farms, there are certain stages during a bTB breakdown which can make life difficult for farmers which may not have easily been highlighted by means of a well-being measure. This raises questions as to why this methodological approach may not have captured well-being levels at these stages that farmers at interview have highlighted to be stressful and demanding in relation to bTB. Is it the case that there is no difference between farmers' well-being and their bTB status and the results of the previous chapter are valid or is there evidence to argue differently? Alternatively, it could be that farmers have discovered ways to overcome these problems through learning from others or from their own past experiences.

Data analysis findings from the well-being survey could not solely determine that the social impacts of bTB eradication specifically had an effect on farmers' personal well-being but rather on specific aspects of their business such as overstocking where increased workload caused stresses. It could be suggested that a slightly different approach to the timing of the well-being questions at around the point of a bTB herd breakdown or a bTB herd test with a subsequent assessment may provide more

accurate data relative to the effects of bTB on farmer well-being levels. Unfortunately, due to the limitations of performing this research approach at various time points to coincide with bTB test dates of respondents it would of meant that this study would primarily be supported by quantitative data and possibly have a decreased sample size.

Farmers have expressed who they would rely on for advice when faced with personal problems, business related issues and livestock disease management, which primarily will be limited to a small quantity of trusted individuals.

Although bTB restrictions were acknowledged as presenting big problems for the majority of farmers' businesses, there are pressures within the farming industry which a significant number of farmers have recognised they are facing within this study which influences their personal well-being such as finance, red tape and bureaucracy, paperwork and form filling. It is typical on any farm to possess a certain level of animal disease and livestock losses; largely there are steps that can be taken to prevent, control or eradicate these problems within most animal disease occurrences. However as bTB is primarily out of the farmers control, it can make life stressful for farmers and they are resigned to the fact that they cannot do anything about the disease. Losing healthy cattle before the end of their life cycle on the farm creates emotionally stressful situations and this is exasperated in many cases by the method of removal of these cattle from the farm by having them shot dead on the premises or because of the sheer volume of numbers being taken away at one time.

The role of other players within the bTB bubble such as government, vets and the farming community all play a part in how farmers are able to deal with a bTB herd breakdown situation. Farmers under long term bTB restrictions have had to restructure their businesses in order to be able to continue to farm as they feel that such is the limiting nature of the Government bTB restriction policy to their livelihood and for the next generation.

This study has created a contribution to the social research evolving around farmers and bTB eradication in that it shows that bTB does not have a significant effect on the everyday lives of farmers other than at specific points in time such as matters relative

to the time around TB testing their cattle. On the whole farmers have learnt to adapt their businesses and cope through a wealth of social connections in meeting and talking to not only other farmers in marts and meeting places, but also to trusted professional individuals and those family and friends they have a close relationship with.

Farmers have emphasised that aspects of well-being to them translates to the importance of the quality of life that they lead, their health and social connectedness with family and friends. For any person, these social attributes would be a firm foundation in supporting their emotional qualities when faced with the pressures of risk and dealing with losses and the strain of workload in relation to bTB testing and overstocking.

Chapter 8: DISCUSSION AND CONCLUSIONS

8.1 Introduction

The aim of this study was to establish the social impacts that bTB were having on farmers and to understand how farmers cope with the consequences of a bTB herd breakdown. The research also explores what other significant pressures farmers are faced with and how this impacts on their working lives. This chapter discusses to what extent the findings have been able to address the research questions outlined at the beginning of the thesis. Integral to this is an extended reflection on the apparent reasons behind the disparity in the findings derived from the mixed methodology approach. Discussion around the method adopted to measure farmer well-being and the rationale behind this is evaluated against alternative options. Consideration is then given on initial ideas early on in the process to employ another method of capturing the social impact of bTB in the form of a diary approach and discussion around whether this, or other methods, may have been better placed in addressing the research questions.

The conceptual framework developed from the original literature review is returned to and updated in light of the analysis of the findings arising from the empirical study. Conclusions are then drawn on the broader contributions of this study to the existing literature - in particular, research related to health and environmental risk, foot and mouth disease and bTB. Proposals as to how the revised conceptual framework could be implemented within future research are then presented.

8.2 Reflection on Methodology

There were multiple benefits in adopting a mixed methods approach which included a quantitative postal survey, qualitative interviews and participant observation during herd bTB testing. The triangulation of research methods used to reaffirm and expand on aspects of bTB testing, coping factors and attitudes of farmers to statements on bTB, which formed the focus of the final interviews on farms, was particularly beneficial. As a consequence of employing well-being measures in the survey

alongside other data gathered through survey questions and statements, and combined with qualitative interview data, it can be claimed that the strength of the empirical data is sufficient in providing answers to the research questions within this thesis. Despite a problematic association between aspects of bTB and farmer well-being raised by farmers at interview, there are some indications from univariate analysis signifying that those farmers under bTB restrictions within high risk disease areas have lower well-being. However further multivariate analysis did not conclude a relationship between levels of farmer well-being and their bTB status. These contrasting messages are an extraordinary finding which may be explained by the methodological approach undertaken in gathering data on farmer well-being at one particular point in time.

It is evident that there is a degree of disparity between the quantitative and qualitative findings. Whereas the interview participants relayed their stories from experiences of living with bTB, the survey results suggest that there is no significant impact on farmer well-being as a result of bTB. That farmers at interview were relaying one set of accounts and the survey respondents giving another, is suggestive of a methodological issue. It could be disputed that the survey findings achieved the aim of answering the research questions, and that an alternative approach to the survey would be required to establish findings of the interviews where farmers are saying that bTB affects their well-being. One option would be through a refinement in the deployment of the well-being scales to substantiate the findings in the qualitative interviews. This could be undertaken by focusing on a sample of farmers at different time points closely following a bTB herd breakdown. In parallel, rather than validating findings from the quantitative survey analysis during the final interviews with farmers, an alternative strategy involving a greater focus on the well-being themes which emerged from the first qualitative interviews may also have proved more insightful. Such an approach would have been informed by the development of well-being specific closed questions for the farmer survey. In addition to this, the opinions and beliefs of interview participants could also have been explored further through revisions to the survey design, with this potentially resulting in some survey results displaying greater alignment with the qualitative findings. These modifications to the methodology may

have developed an alignment of the findings to the qualitative and quantitative results with the hypotheses that bTB has an impact on farmer well-being. Matters which may also have contributed to the discrepancy in the findings surrounding the limitations to the data and the response rate of farmers, in particular from the sub sample under bTB restrictions at the time of survey deployment are discussed below.

8.2.1 Non response bias and limitations to the data

Data confidentiality issues provided limitations to the selection of the survey sample where the researcher could only provide the data holders with the basic criteria of a random sample of farms consisting of three sub groups. Another issue which may well be a contributor to the findings was the sample size of respondents from farms under bTB restrictions. It could be the case that farmers who are already suffering the consequences of bTB in their herd had lower SWB and may not have had the desire in expressing their feelings by responding to the survey which could be an outcome of longer term stress (Deary et al., 1997, Willock et al., 1999, Diener and Suh, 2000). Of the total sample of farmers, one third of these were under bTB restrictions, and overall survey responses generated 21% of farms under bTB restriction. However when looking at response rate by sub group, the non bTB group generated a 37% response whereas the bTB farms generated a much lower 19% response which could indicate a degree of non-response bias. One of the points raised at interview when discussing farmer well-being levels from the survey was that possibly those farmers whose well-being levels that were already affected/feeling low would not have responded to the survey.

A section at the end of the survey asking for 'any other views' in relation to how bTB affected farmers' well-being was not analysed to a great extent due to limitations on time, however it is anticipated that this may have only made a minimal contribution to the empirical findings. One further potential limitation was that whereas the measurement of population well-being typically aims to evaluate changes in SWB levels over two or more points in time, the measurement of farmer well-being was undertaken at only one point in time. Despite acknowledgement of these limitations, the substantive aims of establishing farmer well-being were nevertheless achieved,

and the figures obtained through this study have established good baseline data for the well-being of farmers in Wales. However there are no other comparable studies of farmer well-being using these scales to substantiate the findings.

8.2.2. Capturing farmer subjective well-being: determining which approach

This section provides further explanation as to why this study opted for an evaluative self rather than an experiencing self approach in measuring well-being (Dolan and Metcalfe, 2011, Dolan et al., 2006). The research explored the impact of bTB eradication on farmer well-being through the use of subjective well-being measures (ONS Quality of Life Scale and short WEMWBS) and productivity measures (SPS) to establish any relationship between their encounters with bTB and their levels of personal well-being. It was anticipated that the incorporation of the ONS Quality of Life measure and the short WEMWBS within the survey would enable subsequent analysis to investigate the hypothesis that bTB had an impact on levels of farmer well-being. These *evaluation approach* scales enable individuals to provide a self-assessment of their feelings and how well their life is going over a time period of between two and four weeks. The evaluative make-up of the statements combining both hedonic and eudaimonic perspectives play a complimentary role in measuring SWB.

Additional substantiation to base the decision to adopt these particular measures within the survey were founded on firstly, the adoption of measures with an evaluative approach to establishing SWB within previous research with farmers using the GHQ12 (Peck et al., 2002, Hounsome et al., 2011, DEFRA, 2010a). Secondly, the application of the ONS Quality of Life and the SWEMWBS within national population surveys enabled the comparison of results with general population SWB levels whereas no known awareness of self-reported experienced well-being measures were available on this scale. Thirdly, it was essential that any temporal effect on the response rate from farmers together with an appropriate time frame for recall of events for respondents was deemed suitable.

Alternative approaches to well-being measurement using an *experience approach* aim to capture self-reported feelings such as levels of happiness (Kahneman et al., 2004).

However some methodological issues have been highlighted with reservations as to the robustness of this approach in measuring well-being (Kashdan et al., 2008). In follow on, it has been suggested that alternatives to measuring SWB should be considered using a combination of evaluative and eudaimonic aspects (National Academy of Sciences, 2013, Dolan and Metcalfe, 2012). This dual approach has implications on the type of measures which may have proved more effective for adoption within the current study, particularly if some of the outcomes are to be transferred into quantifiable evidence for bTB policymakers. Accordingly, the following section discusses an alternative approach to measuring well-being through a diary approach.

8.2.3 Personal impacts of animal disease: a diary approach

The adoption of a diary-based method was initially considered when originally planning the methodology. Grounds for not taking this method forward was decided upon due to the anticipated quantity of data for analysis which would be generated through interviews and a quantitative survey and the time involved around that.

The use of diaries can be evidenced within existing research on the impact of animal diseases on farmers and the effects of an environmental risk. Notable studies which have used this approach as a means of establishing the social impact of an animal disease on farmers include that of Mort et al;(2005) and Convery et al; (2005) whilst researching the FMD disaster of 2001. Diaries have also been used as a methodological technique for researching the everyday challenges of the impact of flooding (Sims et al., 2009) (as previously reviewed within the environmental risk perception literature in chapter three). In addition to capturing personal feelings, within the current study it was acknowledged at an early stage of methodological thinking that diaries could provide a means to understanding how the personal process of recovery evolves following a bTB breakdown and could capture emotional accounts of the circumstances and consequences of bTB (for example, feelings of attachment to their livestock). Had they been deployed, using material from the analysis of these diaries as a basis to a follow up interview would also have increased the validity of the qualitative data for this study.

If farmers had been asked to document their feelings on a daily basis over a period of time, it could have revealed a different perspective to the existing findings rather than purely relying on participant recall at interview and observation at a bTB test which would not have necessarily grasped some specific stressful events or moments. Recording significant events close to the time of occurrence would be a valuable exercise for both farmers to view historical entries and for the research. It has been suggested that diaries have a valuable role to play in social research by providing a different perspective to interviews when capturing responses to risk related aspects (Hawkes et al., 2009), and when combined within a mixed methods approach. The Day Reconstruction model or method (Kahneman et al., 2004) is one approach which has been adopted within well-being research to capture individuals' experiences at frequent intervals on a daily basis. However, predicted problems connected to this include that it relies on farmers filling in diaries on a regular basis, meaning for example that responses at busier times on the farm could be overlooked. Also relevant here is that the burden of paperwork was highlighted as a key influence on farmer well-being from both the survey and the interviews. On the other hand diaries permit the recording of accounts from more than one person on the farm. Developments in technology have allowed this method to be utilised through a smartphone (Killingsworth and Gilbert, 2010) which could be an alternative aspect to consider for this method with farmers, however one drawback may include the risk of age bias. Therefore the recruitment of suitable participants would be a key factor in avoiding inconsistencies for this method which is a particularly encouraging recommendation within any future research of this kind.

8.3 Contribution to existing research

The following section goes on to consider how this study builds on existing literature in relation to risk, FMD and finally bTB in which it has closest association with. Before that the positioning of the research is discussed within the literature.

8.3.1 Positioning of research

Positioning of the work undertaken is within a collection of other research which have investigated the social impact of bTB on farmers (DEFRA, 2010a, Farm Crisis Network,

2009). Whereas the former study has focused on the economic effect of bTB on farms (DEFRA, 2010a) and has incorporated the GHQ-12 SWB measure, the latter provides a greater social impact dimension of bTB to the research where the effects of financial hardship as a result of bTB are discussed and farmer well-being is touched upon. Both have highlighted the impact of bTB pressures on farmer workload, their feelings of helplessness in controlling the disease alongside the pressures it brings to the family and farm staff. The findings in this thesis builds upon these two studies where farmers give their accounts of what well-being means to them and what they believe influences this where this research displays the impact of bTB on measured levels of personal well-being through the use of subjective well-being scales. The findings display lower well-being for farmers under bTB restriction in high risk areas and reconfirms some of the conclusions from the DEFRA study (DEFRA, 2010a). Relationships established between the well-being of farmers and their sense of fatalism of bTB builds on the work undertaken in the adoption of disease preventative practices (Enticott, 2008a, Enticott et al., 2012c, Enticott et al., 2015) and adds another dimension to this literature where SWB levels are associated with the wider epidemiological status of an area. Alongside this, an understanding is achieved as to how farmers attempt to manage the stresses of bTB on their business and on a personal level in the form of coping strategies which farmers have adopted as a result of bTB which helps them manage. Therefore this study has initiated a more holistic account of the social impacts of bTB amongst farmers than previous investigations.

8.3.2 Contribution to literature

This study builds on a small number of studies (DEFRA, 2010a, Farm Crisis Network, 2009); by not only measuring levels of farmer SWB and establishing its relationship with bTB, but presents what farmers perceive is the meaning of well-being to them. It identifies what influences their well-being together with how they react and cope with these pressures.. Where the Farm Crisis Network study has focussed on the social impact of bTB on farmers and their businesses and suggests an association with bTB and farmer well-being, there was no measure of SWB adopted in this investigation. However, the Defra study employs a well-being measure (GHQ-12) as part of their wider remit of establishing an account of the impacts of bTB on farmers and their

businesses. The findings to the research questions outlined at the beginning of this thesis aim to fill a knowledge gap where other studies have recognised a problem with farmer well-being and bTB. A summary of findings to these questions is outlined next together with the key points from this study which contribute to and build on the literature reviewed in chapters two and three on risk, FMD and bTB which are summarised in figure 8.1. Following this, the conceptual framework drawn up from the literature reviewed is revisited, discussed and revaluated by taking into account the significant findings revealed from data analysis.

8.4 Reflection of key findings and Conceptual Framework

8.4.1 Summary of findings

The research questions outlined at the beginning of the thesis are restated below. The findings are summarised based on these questions.

- What does the concept of well-being mean to farmers and what do they believe affects it?
- What factors influence levels of well-being amongst farmers?
- How does bTB impact upon farmers lives?
- To what extent does bTB affect farmers' well-being?
- How do farmers adapt and cope with bTB?

What do farmers associate with personal well-being

This research provides a key contribution to the knowledge around the meaning of well-being to farmers and what aspects of their lives they associated with personal well-being. It was through the qualitative interviews with farmers that five broad themes were established. Firstly, farmers identified their health and the health of their family. Secondly, happiness was associated with personal well-being, with respondents feeling it was important that they enjoyed their work and were able to handle stresses associated with farming as a result of having a positive state of mind. Thirdly, feeling respected and valued by others was something which farmers reported as contributing to their well-being. Fourthly, freedom and individuality was linked by farmers with being allowed to get on with their jobs, despite the limitations that they felt were

Figure 8.1. Summary of key contributions to existing literature

bTB literature

- Farmers have developed management strategies to cope and reduce the risk to their business of a bTB breakdown by changing farm management strategies; livestock enterprise mix adjustment, easing the stress of dairy bull calf disposal, adapting herd testing facilities, and adopting lay measures for controlling the disease.
- The role of social support from immediate family, local farmers, the local community and from professionals such as vets and advisers featured as forms of coping with the disease.
- Farmers believed that by floating in and out of bTB restrictions enabled them to trade livestock and cope with the consequences of over/understocking and the hidden costs associated with bTB.
- The meaning of well-being to farmers was associated with health, happiness, respect, freedom/individuality and the environment.
- Factors which influence farmer well-being were established as the weather, red tape and bureaucracy, finance, farm management and social relationships.
- Farmers under bTB restriction in high risk areas have lower SWB levels.
- Farmers' bTB history and the wider level of bTB in their area is related to farmers' attitudes towards bTB. In other words, farmers with bTB have less optimistic views towards doing anything about it because they think they have a high chance of getting it.

Risk literature

- Farmers at risk of bTB had fatalistic attitudes towards disease prevention.
- The use of heuristics was identified in relation to beliefs in disease control where a small number of farmers had taken on alternative aspects of managing the disease.
- Farmers with previous experience of dealing with a bTB breakdown felt that knowledge/experience of how they previously dealt with the consequences was an advantage.

FMD literature

- The FMD literature highlighted the low levels of trust in Government by farmers and levels of confidence in Government ability to control the disease, this study confirms this attitude by farmers in the context of bTB..
- A sense of social release was mentioned by FMD farmers once the threat of disease had gone away and they could leave their farms, and this was found for those farmers who attending a cattle market having become free of bTB after a few years of restrictions.
- Farmers seeking support from close family and their peers within this study restates this strategy as a form of coping with the FMD research on frontline workers and farmers

being forced upon them by bureaucracy and 'red tape'. With farming viewed by farmers as a way of life, being in control of their own destiny was therefore fundamental to farmer well-being. Fifthly, the physical environment of the farm was also highlighted by farmers as influencing their personal well-being.

Factors influencing farmer well-being

The pressures associated with farming were at times interconnected, with one (or more) affecting another. Within the qualitative findings, influences which had a negative impact on well-being were bureaucracy, government policy, rural demographics. At the same time, examples provided by respondents of those which impacted on each other were the weather and financial pressures. The pressures identified by farmers within the survey were summarised into seven categories. The weather was recognised as a significant pressure by survey respondents which caused them stress. Farmers at interview also pointed out a seasonal dimension to well-being, with examples given of different tasks during the farming calendar such as cattle turnout in Spring and seeing new life at lambing time.

The relationship between red tape and bureaucracy was also raised as influencing factors. Farmers felt that mandatory paperwork imposed upon them through, for example, government regulations, farm assurance inspections or livestock movements caused stress and prevented them from spending time physically farming. The pressure of deadlines linked to some of this paperwork meant ultimately a financial penalty if it was overdue. The links between bureaucracy and bTB affected farmers' quality of life through the volume of paperwork received by farmers following a bTB breakdown and their feelings towards the handling of bTB eradication by government.

The influences of work on the farm to well-being were established through interviews with particular dislikes associated with paperwork and bTB testing and the risks of injury associated with it. Positive well-being influences reported by respondents included looking after their livestock and seeing the results of a planned breeding programme. Some also noted the positive rewards gained from showing cattle and involving their children with such activities. Equally however, the strain between family members on some farms was also mentioned as an influence on well-being.

Farmers attitudes to others within their rural community did not generate any relationship with well-being from the survey. There were farmers at interview who farmed near to large towns and felt that there were circumstances where rural dwellers lacking in understanding of farming ways caused problems at times such as when taking cattle across a busy road. Interestingly, farmers who thought it was important to be a respected member of the farming community had higher levels of well-being. The survey concluded that being closely linked to their farming community was important for farmers (81%) and they also believed that it was important to be a respected member (87%) of that community.

bTB impact on farmers

Where bTB was recognised as the third highest pressure from the survey by farmers, the finer details on how this impacted on farmers' lives were discovered at interview and through participant observation. Examples of these were the impacts of overstocking due to a halt on livestock movement and the additional costs of feeding more animals. The loss of milk income after losing lactating cows to bTB was another, alongside higher vet costs as they were forced to keep older cows in the herd to maintain milk volume. Finally the costs associated with bTB testing and the time lost in days where other jobs could have been undertaken on farms, were also highlighted.

A less optimistic view in controlling bTB was displayed by those farmers under restriction and coupled with lower levels of trust in the ability of Government to control bTB. Farmers under bTB restriction had low confidence in relation to advice from both vets and the government, and also believed that bTB was a big problem for their business. However, farmers at interview felt that it would be their own vet that they would turn to for information on bTB. Those with bTB also believed their herd would not be free of bTB in the future and that there was nothing they could do to prevent it. Although these farmers did not believe that other people could offer them support on bTB control, farmers in low risk areas felt more confident of advice from their vets and were more likely to express that they were confident their herd would not go down with bTB.

It was widely (83%) agreed that farmers felt comfortable discussing bTB with their neighbours. The fact that farmers with bTB felt more comfortable in doing so than others, also suggests that being under bTB restrictions is no longer such a stigma as it was in the past. The lack of social connection with their peers was one area where farmers felt they missed out on when under bTB restrictions.

How does bTB affect farmer well-being?

There appears to be a link between farmer well-being and the disease epidemiology of an area. Farmer well-being is highest in areas with highest bTB levels when all other factors are controlled for. However when analysis looked at only those farms in a high risk area, the well-being of farmers with bTB was lower for two scales compared to others without bTB or who had never had bTB.

The findings on self-efficacy indicated that farmers with higher levels of well-being were more likely to believe that others could help them avoid bTB: well-being therefore appears to be connected to farmers' sense of fatalism about bTB which has been proven to exist in high risk disease areas (Enticott, 2008a, Enticott et al., 2012c, Enticott et al., 2015).

Farmer's attitudes to their cattle suggest a negative relationship between care for cattle and well-being. This is in contrast with other findings which report that forging emotional bonds with cattle could be seen to help farmers' emotional health (Wilkie, 2005, Convery et al., 2005). However, in the context of bTB, these emotional bonds may prove to cause more distress and anxiety as cattle are taken from farmers because of bTB. In removing cattle from the farm at the wrong stage of their lifecycle, farmers may experience higher levels of emotional distress, particularly where they have forged close emotional bonds to their cattle.

How do farmers cope with bTB?

Ways of coping and adapting to bTB were established where changes were made to the management of the farm and farmers had adapted their enterprises, grazing management or systems of bTB testing to be able to cope with long term restrictions. These strategies point towards how farmers learned to cope alongside the disease

rather than without it. The management of overstocking of cattle due to movement restrictions involved shooting dairy bull calves. Whilst experiencing calves being shot on farm were distressing for farmers, some became accustomed to this practice; others felt better if calves were taken from the farm alive.

Although the survey findings established that farmers' attitudes towards their cattle had a negative effect on their well-being with one scale (ONS), forging emotional bonds with their cattle was subsequently unearthed at interview as being a positive aspect for farmers' quality of life. Farmer survey respondents who have experienced losses of livestock to bTB appear to have lower than expected levels of emotional attachment to their animals compared with findings from interviews. The emotional stories relayed at interviews of the distress of losing cattle unexpectedly provided evidence that there is a strong human-animal attachment between farmers and their cattle. Despite having endured bTB restrictions for a number of years, farmers felt that the experience of bTB testing was always stressful. To cope with herd testing, farmers have developed ways of overcoming or mitigating difficulties in order to reduce pressures on the day. It was common, for example, to find dairy farms bTB testing during morning milking.

Attempting to avoid bTB by controlling wildlife was something that was commonly mentioned at interview. Farmers believed that others were undertaking their own wildlife control measures to eradicate bTB in their locality. The survey result also showed farmers in agreement (88%) that the badger population should be properly managed. Findings from other research undertaken in Wales by Cross et al., (2013) established that 10.4% of farmers had admitted to illegally killing badgers. It appears that farmers put heuristics into practice here by removing wildlife, believing that in doing so they could reduce their risk of bTB. Farmers also reported administering a fluke control prior to a herd test to avoid bTB reactions in their cattle. Research has established that fluke infestation in cattle with bTB suppresses the extent of their reaction to the tuberculin test (Claridge et al., 2012).

In addition to changes to aspects of the farm business, the impact of social support as a form of coping with bTB appears to have a protective effect on the pressures which

farmers encounter with bTB. The support from family, including children during bTB testing was one way of coping with the additional workload involved. Family support also helped to cope with a bad test result where talking through how it would impact on their business made farmers feel better about the situation. Using humour in conversation with the vet and others present during a bTB test was also evident on testing days as a form of coping.

Farmers felt that having the knowledge of how they had coped in previous bTB breakdowns was an advantage as this recognition of experience and knowledge that they could to carry on farming alongside the different challenges of bTB made life easier. Passing this knowledge onto other farmers also featured as part of contributing to farmer well-being where significantly higher levels were found for those who perceived they were supported by their local farming community. Some felt it was a form of 'social release' following a long period of bTB restrictions, which they had missed and were glad to be able to interact with other farmers.

8.4.2 Reflection of Conceptual Framework in alignment with key findings

The conceptual framework established in chapter three captured themes emerging out of the literature review considered as valuable in establishing the research methodology. Following data analysis the themes established that contributed positively to farmer well-being were those closely associated with their work. Happiness to farmers was associated with a sense of belonging on their farm and the benefits of good health were associated with well-being. The type of life satisfaction which farmers felt was invaluable was associated with their physical surroundings, the farm location and with their animals.

Attitude to their work is closely associated with farmer well-being. Aspects of their work which gave them pleasure were identified alongside seasonal dimensions where examples such as lambing and seeing cattle turned out gave them a sense of satisfaction. Data analysis suggests that the less time spent working on the farm had a positive relationship with well-being and productivity. It was felt that working with their animals gave tremendous satisfaction to farmers, and stories of the close affiliation farmers had with their cattle were relayed at interviews.

Close social and family collections were contributing factors to well-being. Farmers who felt that it was important to be a respected member of the farming community displayed higher levels of personal well-being. Respect from others in their community had a positive relationship with farmer well-being. Freedom and individuality was viewed as a key contributor to well-being and being able to get on with their work without the influences of red tape and bureaucracy. Managing the farm and making it look orderly was associated as a 'protective' factor in relation to well-being. The attributes of a good farmer come into play here where their peers could see if hedges had been trimmed or fields had been reseeded, therefore linking with the strong belief that farmers think it is important to be respected by their peers.

In relation to bTB, farmers who had high levels of well-being also showed confidence in receiving information from others in controlling bTB. Farmers felt that having prior knowledge of the impact of bTB on their business made the pressures of subsequent breakdowns slightly less problematic, although it would bring different challenges on each occasion. bTB testing during morning milkings and streamlining the cattle handling procedure was recounted at interview as alleviating pressures and contributing to better well-being levels.

Extrinsic factors where farmers felt closely linked with the farming community in which they lived contributed to well-being with those at interview describing the roles they had taken on within their community. Farmers agreed that they would feel comfortable discussing bTB with their farming neighbours which points to an absence of a stigma which was associated to being under bTB restrictions in the past. In fact high levels of bTB within an area were associated with higher well-being results.

The themes identified within the conceptual framework which had a negative effect on well-being were those associated with specific age groups and the pressures between family members working alongside each other caused difficulties for farmers. A negative relationship was established for farmer well-being and having no labour on the farm, pointing towards social connection as a vital aspect of supporting well-being. Another consideration here is that farmers may have a higher workload as a result of no staff which contributes to lower well-being.Beliefs in disease transmission where

those farmers who considered there was nothing they could do to prevent their herd going down with bTB also displayed lower levels of well-being linked to their self-efficacy and fatalistic attitudes towards disease prevention. The use of heuristics was identified in relation to disease risk where a small number of farmers had taken on alternative aspects of managing the disease themselves as a coping strategy, for example using a fluke control to improve the outcome of a test result or by controlling the badger population.

A negative relationship was discovered between well-being and farmers attitudes in caring for their cattle. Farmers attachment with their cattle was raised at interview as having a positive impact on life satisfaction, however losing cattle to bTB may affect this attachment where farmers detach their emotions from cattle tested as inconclusive or positive for bTB.

Extrinsic factors which affected farmer well-being were linked with bureaucracy, government policy; rural demographics and examples of those which impacted on each other were the weather and financial pressures. Weather conditions provided stressful situations at harvest as a result of unpredictable climatic conditions. Finance and red tape had a significant negative relationship with farmer well-being. Despite farmers reiterating that they were farming for the quality of life rather than for the profits, it is illogical that financial pressures were the most significant pressure affecting levels of well-being. Unreasonably high levels of paperwork brought on by red tape and bureaucracy also brought pressures as deadlines were associated with submitting a large proportion of the paperwork. The volume of paperwork linked to a bTB breakdown was also raised by farmers at interview as stressful.

Lack of trust in government had an intervening effect on well-being where survey findings gave a strong response in agreeing with statements on the trust farmers had with government. The perceived handling of issues related to bTB by government was a strain to farmers who raised this point at interview. Having an element of trust from those who provide guidance on disease control was highlighted within the conceptual framework. In the survey, farmers also displayed low confidence in advice given by

their own vet, more so within high risk areas, but with contrasting views given towards reliance on vets for bTB advice at interview.

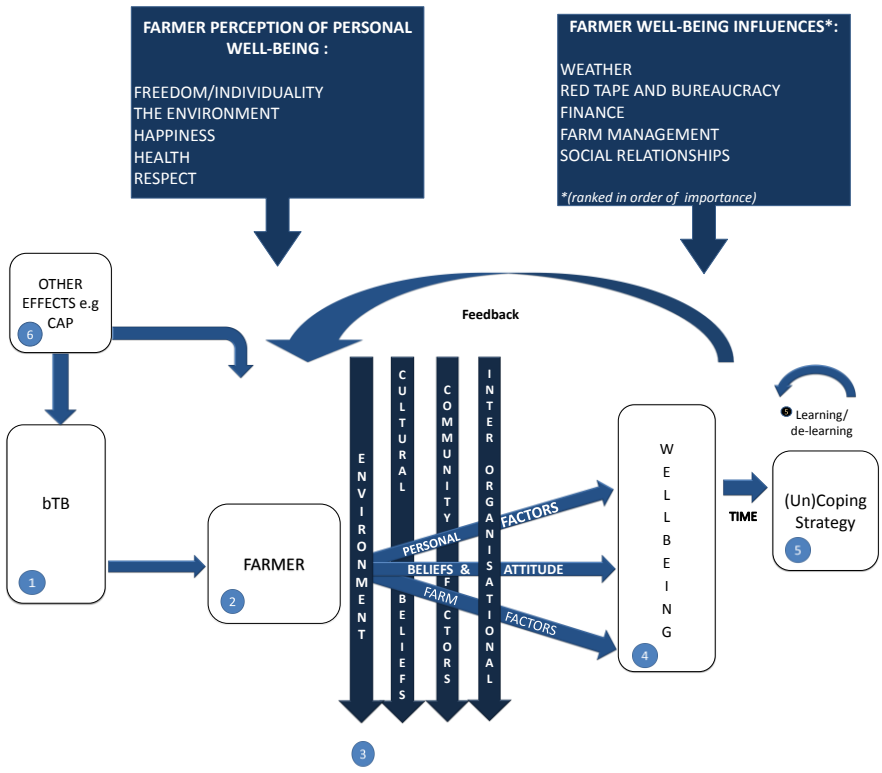
The lack of understanding by rural residents was raised at interview with examples provided by those farming very close to large towns or in the centre of a village where not all residents had an understanding of farming ways. However, no significant relationship was established between well-being and local residents within the survey.

From these results it can be confirmed that the conceptual framework was invaluable in informing the development of research methods for data collection and the approach to data analysis. Figure 8.2 outlines a revision of the original framework to reflect on findings and the main themes which emerged from this study to include what farmers perceived what the meaning of well-being was to them and what influences their well-being. Following this, the implications of the use of this revised framework in future research is considered.

8.5 Consideration for further research

For subsequent research that focuses on the impact of a specific aspect of farming on farmer well-being, this study provides baseline levels of farmer well-being in Wales. The data would also prove valuable as a baseline within any evaluation or a change in bTB policy or to disease incidence. Further research focussing on the monitoring of farmer well-being levels in association with bTB should target the concentration of data gathering within high risk bTB areas. It is proposed that the monitoring of farmer personal well-being for those affected by bTB is undertaken over longer periods of time where this quantitative survey has possibly failed to capture some of the impacts of stressors linked to bTB on levels of well-being. Due to the unpredictable nature of disease incidence in specific areas, a single measurement of farmer well-being may not be the most appropriate approach. One route of building upon the findings from this study would be to incorporate the results of where farmers have stated their understanding of personal well-being and what influences those levels within closed questions to ascertain any changes in beliefs and attitudes.

Figure 8.2: Revised Conceptual Framework



It is proposed that further research within this context should adopt a diary approach alongside qualitative interviews. Similar to previous studies where farmer diaries were used as a methodology for establishing the longer term effects of FMD (Bailey et al., 2006), capturing farmers feelings over a period of time during a bTB breakdown in this way may uncover additional information to what has been obtained already. Diaries may also generate a greater understanding of farmers' relationships with their cattle in the context of human-animal attachment, and the need for greater understanding of how farmers cope with losing their cattle to bTB. Whether, for example, they detach themselves emotionally at a specific point in time, or whether they become accustomed to the practice from experience.

For future research, it is proposed that having supplementary bTB details for the sample of farms combined with a focus on establishing well-being for those farmers within specific areas of greater bTB incidence or 'edge areas', would be beneficial. This may give different results to those arising from the current study. Notably, the attitudes of farmers to the disease within lower risk areas may be very different to those who have experienced or lived with the potential risk for a longer length of time.

It was suggested earlier within this chapter that future consequences of government bTB eradication policy could bring additional pressures on farmers. There is a need for further research in order to establish the most valuable way of firstly, communicating disease breakdown incidence within an area directly to farmers and secondly, to understand what would be beneficial in helping farmers alleviate the impacts of a herd breakdown. Recommendations channelled to government should include who would provide support and in what format.

8.6 Proposals for Improving Farmer Well-being

One of the drivers for this study, in understanding how bTB impacts on farmers through measuring well-being and in understanding their attitudes to disease control, was the contribution it could make towards recommendations to improve levels of farmer well-being. Evidence points towards lower well-being amongst farmers who do not believe that the Welsh Government is handling bTB eradication, and who do not trust information and guidance from Government on ways to control bTB in their own herd. This recognises a need for an alternative route to empowering farmers, through guidance and help on disease control measures based on trusted and practical sources. The use of trusted individuals such as their own vets has proven to be successful (Enticott, 2008a, Enticott et al., 2012a) because of the pre-determined levels of trust, the practicality of the advice and the local knowledge of those vets to the farmer's circumstances. This study reiterates that this element within current bTB policy should continue and the role of farmers' own vets should not be undermined.

Farmers felt happy about discussing bTB with their neighbours, however the policy of not communicating bTB breakdowns to neighbouring farms by government also created problems with farmers as they felt that neighbours would want to know this information in order to move grazing cattle from neighbouring fields for instance. There is a recognised need to increase the opportunities available to farmers in enabling discussion of their bTB problems with their peers. This however cannot be delivered through a facilitated Government mechanism because of the low levels of trust in authority revealed by farmers. Farmer engagement on bTB issues could be delivered through trusted organisations, for example, the Royal Welsh Agricultural

Show. At the same time though, evidence suggests that this is something that also has to be delivered on a local level as disease problems differ between areas. This would also be the case for the inconsistencies in control measures being advised to farmers by government offices/officials across Wales, which were identified as a stressor by farmers.

Previous studies have pointed out that the 'power of the local, and the web of detailed associations in the local, are integral to the implementation of any strategy of (flood or disease) containment, disaster management or recovery' (Bailey et al., 2006). Although policymakers have centralised contingency plans in place for such disasters, it is the association with the local knowledge and people that makes the carrying out of these plans possible, it empowers any form of plan. To build upon these recommendations, other considerations would be to adopt role models within farming communities who would act as 'biosecurity champions' through a system of knowledge transfer on farms for aspects of bTB disease management. Findings from this study have established the feelings of farmers towards others within their farming community and where they are happy to discuss disease issues with trusted individuals. .

The feasibility of using the expertise amassed in relation to lay measures of bTB control by farmers which have been adapted to be more practical compared to some of the impractical guidance provided by government officials needs to be considered. The combination of trusted aspects of other farmers within farming communities, with discussion of ideas around disease management measures could generate appreciation for the impact of bTB control amongst those farmers with low self-efficacy. The endorsement of this approach by the farming unions would also be vital to assist in supporting positive beliefs in disease management measures on farms.

Changes which farmers have made to their businesses as part of a coping strategy to alleviate pressures of a breakdown and bTB regulations have been highlighted in chapter seven. Having knowledge of what can be expected following a herd breakdown would be advantageous in the face of uncertain times for farmers immediately after the testing. A recommendation to disseminate these strategies in the form of farmer case studies to other farmers could be feasible at a farm event.

Examples could be technical information on rearing dairy calves to finishing, building design for safe handling systems, herd health management to incorporate fluke control particularly in dairy herds, investigation of options available to farmers for calf disposal in specific areas or looking at the development of an alternative market for calves from dairy herds under restriction. This form of knowledge transfer could be combined with biosecurity information conveyed by a local vet rather than relying on state vets to relay this. This approach could yield an interest from those who currently feel there is nothing they can do to prevent bTB leading to a potentially higher rate of engagement of farmers applying control measures after seeing practical options which have worked for others.

The question on how to enhance the measurement of farmer well-being and how this is applied into policymaking needs to be explored further. Recommendations include undertaking a follow up study to measure levels of farmer well-being following a significant decrease in bTB incidences, or a modification to the current eradication policy, in order to establish how impacts of bTB change over time. Although it would be difficult to place a financial value on the cost of bTB to farmer well-being, it is recommended that any future evaluation of the current bTB policy should consider placing a financial value on the social impacts of bTB based on levels of presenteeism and work productivity as a direct consequence of bTB restrictions. The burden of hidden costs to farmers surrounding bTB control has been highlighted in this study. In particular, stressful events concerning bTB testing was one area where farmers highlighted that future changes to bTB policy should enable them to obtain funding or support specifically to assist with the additional workload of bTB testing.

If bTB eradication is a priority for government, then it is plausible that there will be continuing consequences for farmers as a result. How this would affect farmer well-being is something that the government needs to establish, and take into account by building a strategy of support to help farmers cope with these implications. This could mean a different format in the way a bTB breakdown is handled with greater responsibility and involvement of a farmer's own vet in the process. Alternatively, a reserve of money could be allocated to farmers under bTB restrictions with extreme consequences, such as a hardship fund, or in providing aid for employing labour at bTB

testing. Another factor which may limit their ability towards adopting disease control measures could be financial pressures. The significance with financial pressures is that these may be hard to detect due to farmers not feeling comfortable in discussing such matters with vets and government officials. Furthermore, for farmers with financial pressures, compensation for cattle losses may not be sufficient to replace livestock where other debts have a priority. This was found to be a problem in the case, for example, of station owners in parts of Australia (Lehane, 1996) where destocking compensation went to pay debts rather than replace livestock. Empirical findings have also shown that there is a need for wider government review to lessen the burden of red tape and bureaucracy recognised as stressors within this research which are presented to farmers from government. Further research on these aspects will need to be considered to include farmers' perspectives on what would be beneficial.

8.7 Concluding remarks

This study has been the first comprehensive assessment of farmers' well-being in relation to bTB and provides a different perspective on farmers' mental health to that found in previous studies. In the past there have been few studies which have researched the social impact of bovine Tuberculosis on farmers, where the association between bTB and its consequences on farmers has been explored here at length, with some indications that those farmers under bTB restrictions within high risk disease areas have lower well-being. However, an equally notable and valid conclusion to be drawn from this study is that the connection between bTB and farmer well-being is much more complicated than originally envisaged. Further research is thus urgently required if we are to advance our understanding of the complex relationships involved. Moreover, reflections drawn from this study point towards the need for any such future research to prioritise further in-depth qualitative methods of enquiry.

To conclude, it has been rewarding to be able to understand how farmers portray what brings meaning and quality to their working lives, and the coping strategies they are adopting to handle these pressures. Having undertaken this research, it has enabled a greater understanding of the influence of diseases such as bTB on the well-being of

farmers, and has provided both the conceptual and methodological tools to take this forward.

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Appendix 1

Details of Subjective well-being, Presenteeism and Work Limitations scales

Wellbeing

A. General Health Questionnaire

The General Health Questionnaire (GHQ) was developed as a measure of mental health and wellbeing by Goldberg and Blackwell, (1970). The original 60 item GHQ consisted of a four point scale for each item. Presently a range of shortened versions are obtainable including the GHQ-30 (without items relating to physical illness), the GHQ-28 (assesses somantic symptoms, anxiety and insomnia, social dysfunction and severe depression), the GHQ-20, and the GHQ-12 (reliable and sensitive short form) are available, with the latter most commonly used. This latter 12 item scale has been used in the context of measuring well-being within previous research with the farming population.

The scale is asking whether the respondent has experienced a particular symptom or behaviour recently. Each item is rated on a four-point scale (less than usual, no more than usual, rather more than usual, or much more than usual). Questions relate to current feelings, and cover a range of positive and negative affect and therefore related to the hedonic aspect of subjective wellbeing.

B. Psychological Well-Being Scale (PWBS)

Who? This scale was originally developed by Dr Carol Ryff in 1989 (Ryff and D., 1989) as an 84 item instrument with six sub scales comprising of 14 items per scale.

How? The six sub scales were developed from aspects that are deemed vital elements for a person to flourish: self-acceptance, positive relationships with others, autonomy, environmental mastery, purpose of life, and personal growth.

What? The questions are all linked predominantly with the measurement of the eudaimonic aspect of wellbeing specifically flourishing accounts.

A full Ryff scale consists of 120 items, 20 items on each of six-subscales however there is evidence of use of a 9 item used in a longitudinal study and a shorter 3 item scale being used in national surveys. The overall scoring on this instrument is supposed to represent a person's Psychological Well-Being.

C. Measuring Positive Mental Health: Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS)

It aims to measure a respondent's mental wellbeing from the items outlined in table A1.1 and covers both hedonic and eudaimonic perspectives. It is designed to monitor the mental well-being of groups of people over time, and before and after interventions or programmes by comparing mean scores.

The Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS) was developed in 2006 by researchers at Warwick and Edinburgh Universities for evaluating the mental health of a population within the Scottish Health Survey. It was developed from a revised and shortened version of the Affectometer 2 scale which was originally developed by Kammann and Flett, (1983), with the aim of monitoring changes in wellbeing over time and looks at both positive and negative mood status and the balance between them.

The 14 point scale was developed from another scale (Affectometer 2) with the nature of questions in connection with a person's positive feelings and thoughts and embraces both hedonic and eudaimonic perception of wellbeing. Each item is scored on a 5-point Likert-style scale ranging from 'none of the time' (1) to 'all of the time' (5) on the basis of experience within the previous 2 weeks.

Other uses of the WEMWBS are outlined as an assessment of the impact of interventions on the mental wellbeing of a population sample. Individual questions from WEMWBS could potentially be used to generate conversations within a qualitative research scenario and to guide focus groups. The WEMWBS could frequently be included in the context of a questionnaire containing other questions so that other information about respondents can also be captured (Stewart-Brown and Janmohamed, 2008).

WEMWBS has been evaluated as an indicator of mental health and well-being within the veterinary profession in a cross-sectional study among a representative sample of 3200 veterinary surgeons practising in the UK (Bartram et al., 2011) The 14 point scale was embedded into a larger 120 question survey to UK veterinary surgeons in 2007. The validity of the scale as a general indicator of mental health and wellbeing has been reinforced by the study results from vets. A shortened version of this scale (SWEMWBS)which includes seven of these statements has been used in the UK Household Longitudinal Study (University of Essex. Institute for Social and Economic Research, 2013) and the results were incorporated into the personal well-being domain of the ONS National Well-being Wheel of Measures (ONS, 2013a).

The collection of data from respondents has been administered in a self-completion format. This has been either via computer assisted self interviewing whereby respondents are invited to enter their responses directly into a computer or by the self-completion on paper formats. There is currently no evidence of this scale having been tested in an interview situation.

Table A1.1: The Warwick-Edinburgh Mental Well-being Scale (WEMWBS)

Below are some statements about feelings and thoughts.

Please tick the box that best describes your experience of each over the last 2 weeks

STATEMENTS	**None of the time**	**Rarely**	**Some of the time**	**Often**	**All of the time**
I've been feeling optimistic about the future	1	2	3	4	5
I've been feeling useful	1	2	3	4	5
I've been feeling relaxed	1	2	3	4	5
I've been feeling interested in other people	1	2	3	4	5
I've had energy to spare	1	2	3	4	5
I've been dealing with problems well	1	2	3	4	5
I've been thinking clearly	1	2	3	4	5
I've been feeling good about myself	1	2	3	4	5
I've been feeling close to other people	1	2	3	4	5
I've been feeling confident	1	2	3	4	5
I've been able to make up my own mind about things	1	2	3	4	5
I've been feeling loved	1	2	3	4	5
I've been interested in new things	1	2	3	4	5
I've been feeling cheerful	1	2	3	4	5

D. Measure of Affect: Positive and Negative Affect Scale (PANAS)

This scale was developed by Watson and Clark, (1988) as a two 10-item mood scales that encompass the Positive and Negative Affect Schedule (PANAS). It aims to measure the two key dimensions of mood – positive and negative using two 10 point scales which are primarily related to the hedonic aspect of SWB.

How was it developed? – was developed from the results of questionnaires containing a large number of mood terms. These terms were then divided into either those related to Positive affect (PA) or Negative Affect (NA). The PA scale consists of a total of 10 descriptors or items: *attentive, interested, alert, excited, enthusiastic, inspired, proud, determined, strong* and *active.* The NA scale also consists of 10 items: *distressed, upset* (distressed); *hostile, irritable* (angry); *scared, afraid* (fearful); *ashamed, guilty* (guilty); and *nervous, jittery* (jittery). The PANAS scale was initially tested within a 60 term questionnaire in a random arrangement, and it was also used on its own (20 items) and has derived similar results. Participants were requested to rank on a 5-point scale (in the order of '*very slightly or not at all', 'a little', 'moderately', 'quite a bit',* and '*very much'*) the degree to which they had encountered each mood state during a particular time frame. These time frames or 'temporal' subdivisions are listed at the bottom section of Table 2 below:

Table A1.2: The PANAS Scale

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent [INSERT APPROPRIATE TIME INSTRUCTIONS HERE]. Use the following scale to record your answers.

1 very slightly or not at all	**2** a little	**3** moderately	**4** quite a bit	**5** extremely

interested	Irritable
Distressed	Alert
Excited	Ashamed
Upset	Inspired
Strong	Nervous
Guilty	Determined
Scared	Attentive
Hostile	Jittery
Enthusiastic	Active
Proud	afraid

Time instruction
Moment (you feel this way right now, that is, at the present moment)
Today (you have felt this way today)
Past few days (you have felt this way during the past few days)
Week (you have felt this way during the past week)
Past few weeks (you have felt this way during the past few weeks)
Year (you have felt this way during the past year)
General (you generally feel this way, that is, how you feel on the average)

E. . Day Reconstruction Model

Briefly, the Day Reconstruction Method (DRM) was developed by Daniel Kahneman (Kahneman et al., 2004) and is primarily associated with the hedonic aspect of SWB. The DRM simply asks people to write a diary of the main events or episodes of the day before (i.e. yesterday) and evaluate these according to similar criteria (I was feeling depressed, happy and so on). Some researchers deem that this can be a more costly method of measuring SWB.

F. 2.7.5 Life Satisfaction: The Satisfaction with Life Scale

The Satisfaction with Life Scale (SWLS) is a five-item scale developed by Diener et al. (1985) to assess the evaluative account of SWB in the general population rather than affective reactions. It is a multiple item scale to measure life satisfaction (outlined below) and is also often used by researchers trying to validate their own scales such as Ryff's Psychological Well-Being scale suggesting it is widely considered to be an important measure of cognitive evaluations of well-being. No time frame for completion is specified but is considered practical as relatively quick to complete (approx 2 mins) (Dolan et al., 2006).

Table A1.3: Satisfaction with Life Scale (SWLS)

DIRECTIONS: Below are five statements with which you may agree or disagree. Using the 1-7 scale below, indicate your agreement with each item by placing the appropriate number in the line preceding that item. Please be open and honest in your responding.

1 = Strongly Disagree
2 = Disagree
3 = Slightly Disagree
4 = Neither Agree or Disagree
5 = Slightly Agree
6 = Agree
7 = Strongly Agree
_____1. In most ways my life is close to my ideal.
_____2. The conditions of my life are excellent.
_____3. I am satisfied with life.
_____4. So far I have gotten the important things I want in life.
_____5. If I could live my life over, I would change almost nothing. (Diener, 1985)

G. General Health Questionnaire

The General Health Questionnaire (GHQ) is a measure of current mental health. The questionnaire was originally developed by Goldberg and Blackwell, (1970) as a 60-item instrument but presently a range of shortened versions including the GHQ-30 (without items relating to physical illness), the GHQ-28 (assesses somantic symptoms, anxiety and insomnia, social dysfunction and severe depression), the GHQ-20, and the GHQ-12 (reliable and sensitive short form) are available, with the latter most commonly used. The GHQ-12 includes six positive and six negative states and a choice of four options for each in which the presence or intensity of the state over the last few weeks is related to its usual frequency or intensity, thereby creating a 36 point 'Likert' scale (Likert, 1932), which is used to allow the individual to express how much they agree or disagree with a particular statement (Dolan et al., 2006).

The scale asks whether the respondent has experienced a particular symptom or behaviour recently. Each item is rated on a four-point scale (less than usual, no more than usual, rather more than usual, or much more than usual); and for example when using the GHQ-12 it gives a total score of 36 or 12 based on the selected scoring methods. Questions relate to current feelings, and cover a range of positive and negative affect and therefore related to the hedonic aspect of SWB.

Table A1.4: General Health Questionnaire (GHQ-12) Survey

We want to know how your health has been in general over the last few weeks.
Please read the questions below and each of the four possible answers. Circle the response that best applies to you. Thank you for answering all the questions.

We would like to know how your health has been in general, over the past few weeks. Please answer the following questions by circling the number that best applies to you. Have you recently...				
	Much less than usual	Same as usual	More than usual	Much more than usual
Been able to concentrate on whatever you are doing?				
Lost much sleep over worry?				
Felt that you were playing a useful part in things?				
Felt capable of making decisions about things?				
Felt constantly under strain?				
Felt that you couldn't overcome your difficulties?				
Been able to enjoy you normal day-to-day activities?				
Been able to face up to your problems?				
Been feeling unhappy and depressed?				
Been losing self-confidence in yourself?				
Been thinking of yourself as a worthless person?				
Been feeling reasonably happy, all things considered?				

H. SF-36

The SF-36 questionnaire was first made available in a "developmental" form in 1988 and in "standard" form in 1990 (Ware and Sherbourne, 1992). It was designed for use in clinical practice and research, health policy evaluations, and general population surveys such as the *Welsh Health Survey* and was constructed for self-administration by persons 14 years of age and older, and for administration by a trained interviewer in person or by telephone or for use online.

It contains 36 questions and consists of 8-scales: 1) limitations in physical activities because of health problems; 2) limitations in social activities because of physical or emotional problems; 3) limitations in usual role activities because of physical health problems; 4) bodily pain; 5) general mental health (psychological distress and well-being); 6) limitations in usual role activities because of emotional problems; 7) vitality (energy and fatigue); and 8) general health perceptions. The survey is available in both standard (4-week) and acute (1-week) recall versions.

I. Eurobarometer

The Eurobarometer was established in 1973 and is a series of surveys carried out twice annually and is referred to as the 'Standard Eurobarometer. It is an interview based population survey carried out across European Union countries. However there are additional Eurobarometer surveys referred to as 'Special' and 'Flash' studies, the former investigating particular areas, for example 'Climate Change' and 'The Common Agricultural Policy'. The latter is carried out on an ad-hoc basis using telephone interviews which produce faster results with examples of topics researched in 2011 being 'Attitudes of European entrepreneurs towards eco-innovation' and 'Youth attitudes on drugs'. Additionally the Eurobarometer carries out qualitative surveys to explore more in-depth reactions and feelings of social groups towards a particular topic. One recent report carried out was the 'Qualitative survey about Well-being' which was carried out during early 2011 in eight member states to determine the priorities for wellbeing within a society for 2030 (TNS. Qual+, 2011b). This report

follows on from an earlier study in 2010 within 15 member states in order to determine the factors associated with wellbeing (TNS. Qual+, 2011a).

Table A1.5: Eurobarometer survey

Interviews are one to one in people's homes.

Questions	**Response scale in order of presentation. (Most have a 'don't know' option).**			
On the whole, are you satisfied, fairly satisfied, not very satisfied or not at all satisfied with the life you lead?	Very satisfied (4)	Fairly satisfied (3)	Not very satisfied (2)	Not at all satisfied (1)
How would you judge the current situation in each of the following: Your personal situation? The financial situation of your household?				
What are your expectations for the next 12 months? Will the next 12 months be better, worse or the same, when it comes to: Your life in general? The financial situation of your household? Your personal job situation?				

J. ONS Measures

A review carried out by ONS as to what types of subjective wellbeing data is being collected by UK social surveys is produced by Waldron, (2010) and outlines how the data could be utilised. A conceptual framework has been developed by ONS for measuring subjective wellbeing and is outlined by Tinkler and Hicks, (2011). The questions are grouped into either evaluative, experience or eudaimonc types of SWB measures.

I would like to ask you some questions about your feelings on aspects of your life. There are no right or wrong answers.

For each of these questions I would like you to give an answer on a scale of nought to ten, where nought is 'not at all' and 10 is 'completely'.

Overall how satisfied are you with your life nowadays? *(where nought is 'not at all satisfied' and 10 is 'completely satisfied')*	
Overall to what extent do you feel the things you do in your life are worthwhile? *(where nought is 'not at all worthwhile' and 10 is 'completely worthwhile')*	
Overall how happy did you feel yesterday? *(where nought is 'not at all happy' and 10 is 'completely happy')*	
Overall how anxious did you feel yesterday? *(where nought is 'not at all anxious' and 10 is 'completely anxious')*	

K. Cantril's Self-Anchoring Ladder

The Cantril Ladder of Life, sometimes referred to as Cantril's Ladder, was developed by Dr Hadley Cantril (Cantril, 1965)and is a form of wellbeing assessment and measures overall life satisfaction. It is a measurement technique that asks people to rate their present, past, and anticipated future satisfaction with life on a scale or ladder numbered 0 to 10, therefore it can be closely related to the evaluative aspect of SWB. In the case of life satisfaction or life quality, the subject is asked to describe the best possible life quality s/he can imagine for the top of the ladder, and the worst possible life quality imaginable for the zero point on the ladder. It can be self administered or by interview and only takes five minutes to complete. The Cantil Ladder has been used by ONS together with life satisfaction questions which concluded that the use of questions from different approaches to measuring SWB seems to complement each other and enhance information collated.

What does it look like?

Table A1.6: The Cantril Self-Anchoring Scale consists of the following:

Please imagine a ladder with steps numbered from zero at the bottom to 10 at the top. *The top of the ladder represents the best possible life for you and the bottom of the ladder represents the worst possible life for you.* *On which step of the ladder would you say you personally feel you stand at this time? (ladder-present)* *On which step do you think you will stand about five years from now? (ladder-future)*

(Cantril, 1965)

L. Meaning in Life Questionnaire

The Meaning in Life questionnaire (MLQ) was developed by Steger et al., (2006) who define meaning in life as the 'sense made of, and significance felt regarding, the nature of one's being and existence'. This is linked with life satisfaction and is related to the concept of eudaimonc wellbeing but is not totally exclusive to eudaimonic motives, as there is evidence to show that there is overlap with hedonic motives (Huta and Ryan, 2010).

Presenteeism

The following scales have been used specifically to measure presenteeism:

M. Stanford Presenteeism Scale (SPS)

Developed by Cheryl Koopman at Stanford University in 2002 (Koopman et al., 2002) to measure the health impacts of workers on their productivity and their ability to concentrate at work. This scale, known as the Stanford Presenteeism Scale (SPS) was developed and tested with 34 items on a sample of county health workers. The results from this test were analysed resulting in a six item scale which would principally represent presenteeism and is known as SPS6. The six questions outlined below have a Likert 5-item scale ranging from 'strongly disagree' to strongly agree' to a statement with the total scores providing an overall presenteeism score. One problem that has been identified with the SPS6 by Lofland et al., (2004) is that the results cannot be directly translated into monetary units.

Table A1.8: Stanford Presenteeism Scale (SPS6)

Directions: Below we would like you to describe your work experiences in the **past month**. These experiences may be affected by many environmental as well as personal factors and may change from time to time. For each of the following statements, please circle one of the following responses to show your agreement or disagreement with this statement in describing *your* work experiences in the past month.

Please use the following scale:

Circle:

1 if you strongly disagree with the statement

2 if you somewhat disagree with the statement

3 if you are uncertain about your agreement with the statement

4 if you somewhat agree with the statement

5 if you strongly agree with the statement

Statement		**Your work experience in the past month:**				
1	Because of my (health problem),* the stresses of my job were much harder to handle.	1	2	3	4	5
2	Despite having my (health problem),* I was able to finish hard tasks in my work.	1	2	3	4	5
3	My (health problem)* distracted me from taking pleasure in my work.	1	2	3	4	5
4	I felt hopeless about finishing certain work tasks, due to my (health problem).*	1	2	3	4	5
5	At work, I was able to focus on achieving my goals despite my (health problem).*	1	2	3	4	5
6	Despite having my (health problem),* I felt energetic enough to complete all my work.	1	2	3	4	5
* Note that the words “back pain,” “cardiovascular problem,” “illness,” “stomach problem,” or other similar descriptors can be substituted for the words “health problem” in any of these items.						

N Work Limitations Questionnaire (WLQ)

The WLQ measures the degree to which individual employees are experiencing limitations on-the job due to their health problems, and health-related productivity loss (Presenteeism). Respondents are asked to rate their ability to perform tasks associated with their work, specifically the amount of time in the prior two weeks respondents were limited on-the-job. The questionnaire was developed by Lerner

(Lerner et al., 2001) and has been used in respondents with chronic pain, depression, rheumatoid arthritis and other states of health. Additionally, it is highlighted by Allaire (2003) that by using an algorithm, the WLQ scale scores can be converted into an estimate of productivity loss.

The questionnaire consists of 25 questions with a shorter version consisting of 8 items and scoring can be carried out manually with an estimated time taken of 10 minutes and versions are available via internet, telephone and post. There are four sub-scales which are divided up into work related areas:

- Time Management Scale has 5 items which focus on difficulties in relation to handling time and work demands.
- Physical Demands Scale consists of 6 items and reports on a person's physical ability to perform job tasks.
- Mental-Interpersonal Demands Scale is made up of 9 items and deals with cognitive occupational tasks and social interactions in relation to work.
- Output Demands Scale consists of 5 items concerning diminished work quantity and quality

There is evidence within research which has demonstrated its validity and reliability in several populations. One example of this questionnaire being used is by Lerner et al., (2002)who assessed the WLQ's performance when conducted with patients with osteoarthritis, which is a leading cause of work disability and productivity loss. Additional research carried out by Lerner et al., (2003) to assess the impact on productivity due to physical or mental health conditions of employees showed that for every 10% increase in reported work limitations on the WLQ scales, work productivity declined approximately 4 to 5%, and concluded that employee work limitations have a negative impact on work productivity.

Appendix 2

FARMER WELL-BEING SURVEY

ABOUT THIS SURVEY

This research is examining farmers' well-being in relation to animal diseases.

The study is part of a postgraduate study carried out within Cardiff University and is funded by the Economic and Social Research Council and the Welsh Government.

Information that you provide in this survey will remain **CONFIDENTIAL** and **ANONYMOUS.** Participation in the research is voluntary. The survey should take about 15 minutes to complete.

The survey is in four sections. Firstly, it asks some general questions about your farm. Secondly it asks about the pressures facing your farm at the moment. Thirdly, the survey asks about your well-being. Finally, it asks about your views on animal diseases.

ANSWERING THE QUESTIONS

Most questions ask for **your personal perception** in relation to a simple statement about your personal well-being or issues affecting your farm.**Example:**	Strongly Disagree	Disagree	Unsure	Agree	Strongly Agree
I was able to finish hard tasks in my work.	☐	☒	☐	☐	☐

If you have any queries, please contact Delyth Crimes: 07533 972 196, email; crimesdm@cardiff.ac.uk

When you have completed the survey, please return it using the pre-paid envelope by **7th June 2013** to: **FREEPOST RLTZ-HBYJ-BRRA, Delyth Crimes, Cardiff University, Cardiff, CF10 3WA**

YOUR HELP WITH THIS RESEARCH IS GREATLY APPRECIATED

SECTION 1 – YOUR FARM

First of all, can you tell me about you and your farm?

1.1 What is your position in the farm business (please tick the most appropriate option)

Farmer ☐	Farm Manager ☐	Other ☐	

If other, please describe below:

.....

.....

1.2 How many people work on the farm?

Family Members	Number		Employed	Number
Full-time			Full-time	
Part-time			Part-time	
Seasonal			Seasonal	

1.3 Which of the following best explains your farm's status?

(please tick the most appropriate option)

Owned ☐	Tenanted ☐	Mixed tenure ☐	Contract / Share farming ☐	Other ☐

If other, please describe below:

.....

.....

1.4 What is the main enterprise of the farm? (please tick the most appropriate option)

Dairy ☐	Suckler Beef ☐	Beef Stores ☐	Beef Finishing ☐
Arable ☐	Sheep ☐	Pigs ☐	Other ☐

If other, please describe below:

.....

.....

1.5 What are the farm enterprise details?

Total number of cattle on the holding?	
Total number of sheep	
Total acreage of arable crops	
1.6 Is the farm in a CheCHs accredited herd health scheme? **For example:** *HiHealth herdcare, Premium Cattle Health Scheme (SAC), NML Herdwise*	☐ No ☐ Yes ☐ Don't know

SECTION 2 – FARMING PRESSURES

When you think about your farm, what would you say are the top 5 pressures that make farming stressful? Please write them down in order of importance.

1	
2	
3	
4	
5	

I now want to ask you some questions about animal diseases on your farm. Which diseases would you say present most problems on your farm? Please write them down in order of significance.

1	
2	
3	
4	
5	

SECTION 3 – YOUR WELL-BEING

I would like to ask you some questions about your feelings on aspects of your life. There are no right or wrong answers.
For each of these questions I would like you to give an answer on a scale of nought to ten, where nought is 'not at all' and 10 is 'completely'.

Overall how satisfied are you with your life nowadays? *(where nought is 'not at all satisfied' and 10 is 'completely satisfied')*	
Overall to what extent do you feel the things you do in your life are worthwhile? *(where nought is 'not at all worthwhile' and 10 is 'completely worthwhile')*	
Overall how happy did you feel yesterday? *(where nought is 'not at all happy' and 10 is 'completely happy')*	
Overall how anxious did you feel yesterday? *(where nought is 'not at all anxious' and 10 is 'completely anxious')*	

Over **the last 2 weeks**, how would you say you've been feeling? Please read these statements and tick the box that describes how you've been feeling.

	None of the time	Rarely	Some of the time	Often	All of the time
I've been feeling optimistic about the future	☐	☐	☐	☐	☐
I've been feeling useful	☐	☐	☐	☐	☐
I've been feeling relaxed	☐	☐	☐	☐	☐
I've been dealing with problems well	☐	☐	☐	☐	☐
I've been thinking clearly	☐	☐	☐	☐	☐
I've been feeling close to other people	☐	☐	☐	☐	☐
I've been able to make up my own mind about things	☐	☐	☐	☐	☐

I now want to ask you some questions on how you feel about your work on the farm and how well you think you work by thinking about **your work experiences in the past month...** *(Please tick one box in each row to indicate your answer).*

	Strongly Disagree	Disagree	Unsure	Agree	Strongly Agree
The stresses of my job were much harder to handle.	☐	☐	☐	☐	☐
I was able to finish hard tasks in my work.	☐	☐	☐	☐	☐
I've been distracted from taking pleasure in my work.	☐	☐	☐	☐	☐
I felt hopeless about finishing certain work tasks.	☐	☐	☐	☐	☐
At work, I was able to focus on achieving my goals.	☐	☐	☐	☐	☐
I felt energetic enough to complete all my work.	☐	☐	☐	☐	☐

I now want to ask you some questions about how well you feel you've been working on the farm **over the last four weeks**.

Please read the following statements and answer with a percentage figure between 0 and 100.

For example, if you feel you've been as productive as usual then you would write 100%, but if you feel you've only done half as much work as you would normally, write 50%

In the last month, the percentage of my time that I was as productive as usual was:		%
Compared to my usual level of productivity, in the last month the percentage of my work that I was able to accomplish was:		%
In the last month, the percentage of my work time that I was likely to make more mistakes than usual was:		%

SECTION 4 – YOUR VIEWS ON BOVINE TUBERCULOSIS

I now want to ask you some questions about what you think about Bovine Tuberculosis

Is your herd currently under restrictions due to TB on your farm?	**Yes** ☐	**No** ☐
If No, when was the last time you were under TB restrictions? *Insert date in the box provided***...**		
The farm has never been under TB restrictions	☐	

When is the date of your next TB test?	

To what extent do you agree with these statements about bovine Tuberculosis?

(Please tick one box in each row to indicate your answer).

	Strongly Disagree	Disagree	Unsure	Agree	Strongly Agree
It is a matter of luck whether my herd goes down with bovine TB	☐	☐	☐	☐	☐
My chances of getting TB are lower if I do what my own vet says	☐	☐	☐	☐	☐
There is nothing I can do from preventing my herd from going down with bovine TB	☐	☐	☐	☐	☐
Going under TB restrictions is a big problem for my business	☐	☐	☐	☐	☐
I am confident that my herd will not become infected with TB	☐	☐	☐	☐	☐
My chances of getting TB are lower if I follow what other farmers in my area do	☐	☐	☐	☐	☐

My chances of getting TB are lower if I follow Government advice	☐	☐	☐	☐	☐
I would feel comfortable discussing the TB situation on my farm with my farming neighbours	☐	☐	☐	☐	☐
The Welsh Government cares about reducing bovine TB	☐	☐	☐	☐	☐

	Strongly Disagree	Disagree	Unsure	Agree	Strongly Agree
The Welsh Government is doing a good job in relation to bovine TB	☐	☐	☐	☐	☐
If I buy in cattle this next year I will bring TB into my herd	☐	☐	☐	☐	☐
It is important to me to be a respected member of the farming community	☐	☐	☐	☐	☐
I feel I am closely linked with the farming community in which I operate	☐	☐	☐	☐	☐
I feel that local residents are unsympathetic towards farmers	☐	☐	☐	☐	☐
As a farmer it is important to remain emotionally detached from my cattle	☐	☐	☐	☐	☐
It is important for me to check my cattle at least once a day	☐	☐	☐	☐	☐
To me, my cattle are just like human beings	☐	☐	☐	☐	☐
There are too many badgers if their population is not properly managed	☐	☐	☐	☐	☐

If you have any other views on how bovine TB affects your well-being, please provide them below:

SECTION 5 – PERSONAL DETAILS

Finally, I'd like some details about you and your farm.

What proportion of your time is spent working on the farm?	%

How old are you?	**Under 25** ☐	**25-34** ☐	**35-44** ☐	**45-54** ☐	**55-64** ☐	**Over 65** ☐

Are you male or female?	**Male** ☐	**Female** ☐

In which of these areas is your farm?			
Anglesey	☐	**Mid Powys**	☐
Gwynedd	☐	**South Powys**	☐
Clwyd	☐	**South Glamorgan**	☐
Ceredigion	☐	**Mid Glamorgan**	☐
Pembrokeshire	☐	**West Glamorgan**	☐
Carmarthenshire	☐	**Gwent**	☐
North Powys	☐		

THANK YOU FOR TAKING THE TIME TO COMPLETE THIS QUESTIONNAIRE.

Please return it in the FREEPOST envelope provided

Appendix 2 – Farmer Survey covering letter

Name

Address Line 1

Address Line 2

Address Line 3

Post code

Date

Dear

FARMER WELL-BEING SURVEY

I would like to ask for your help with research looking at farmers' well-being in Wales which is being conducted at Cardiff University. The aim of this research is to examine the impact of animal disease on farmers' well-being and what influences the use of disease control practices amongst farmers.

Could you please complete the enclosed survey which should not take more than 15 minutes of your time. Once completed, please return it to Cardiff University in the **FREEPOST** envelope by **7th June 2013**.

The research is supported by the Welsh Government and AHVLA, and is funded by the Economic and Social Research Council. AHVLA is distributing this survey on behalf of Cardiff University and your responses back to Cardiff University will remain **anonymous.** Your reply will be **confidential** and shall not be shared with any third party. Results from the survey will be useful for policymakers and voluntary groups involved in supporting farmers who have been affected by animal disease outbreaks.

If you have any other queries or require another copy of the questionnaire, please contact the project organiser:

Delyth Crimes

PhD researcher

School of Planning and Geography

Cardiff University
King Edward VII Avenue
Cardiff,
CF10 3WA

Tel - 07533 972 196; e-mail crimesdm@cardiff.ac.uk

Yours sincerely

Delyth Crimes

Appendix 2 – Survey reminder letter

Name

Address Line 1

Address Line 2

Address Line 3

Post code

Date

Dear

FARMER WELL-BEING SURVEY

You may recall that I recently wrote to you asking you to complete a survey about the impact of animal disease on farmers' well-being.

I would be extremely grateful if you could complete and return the survey by June 7th. It is important that as many farmers as possible complete the survey so

the full range of social impacts affecting farmers in Wales can be examined. If you have already completed the survey, please ignore this letter

The research is supported by the Welsh Government and AHVLA and is funded by the Economic and Social Research Council. Results from the survey will be useful for policymakers and voluntary groups involved in supporting farmers who have been affected by animal disease outbreaks.

If you require another copy of the questionnaire or have any other queries, please contact me directly.

Thank you once again for your time and co-operation.

Delyth Crimes

PhD researcher

School of Planning and Geography

Cardiff University
King Edward VII Avenue
Cardiff,
CF10 3WA

Tel - 07533 972 196; e-mail crimesdm@cardiff.ac.uk

Yours sincerely

Delyth Crimes

Appendix 2 cont…

RESEARCH PARTICIPANT INFORMATION SHEET

Research title: Accounting for the Social Impacts of Animal Disease: The Case of Bovine Tuberculosis

We would like to invite you to take part in our research study. Before you decide we would like you to understand why the research is being done and what it would involve for you. This information sheet aims to outline the study and your potential involvement. Any further questions you may have will be answered by the researcher.

Purpose of the study – The aim of this research will be to examine in more depth the links between policy attempts to eradicate animal disease – specifically bovine tuberculosis (bTB), the impact of animal disease on farmer wellbeing and changes in the disease control practices of farmers. The study results will provide useful information to policy makers about the social costs of animal health and farmers motivations for implementing disease control. The study is timely as it comes at a time when governments are attempting to eradicate animal disease whilst sharing the burden of responsibility with the farming industry. This means that understanding farmers' behaviour in relation to disease control will be a crucial element to policy decisions.

The study has been divided into three phases: firstly a series of interviews with vets, secondly an 18 month phase of farmer interviews and thirdly, a postal survey of farmers across Wales.

Why have I been invited? – The sourcing of recruitments to the second phase of this research was carried out following discussions with vets in areas of Wales which have a higher incidence of bTB. Approximately sixteen participants will be taking part in this phase of the study.

Do I have to take part? – Taking part in the research is entirely voluntary; we will describe the study and go through this information sheet with you. If you agree to take part, we will then ask you to sign a consent form. It is up to you to decide to take part in the research. You are free to withdraw at any time, but data collected up to the point of withdrawal may be retained and used in the analysis.

What is expected of me if I take part? – If you were to take part in the study we would ask you to participate in a series of regular discussion with the researcher over a period of 18 months. It is anticipated that the researcher will visit you on your farm every few months for a discussion covering your daily lives and practices on the farm. This should take approximately 1-2 hours of your time at each visit.

With your consent, details of this conversation will be both audio taped and written down before being analysed. The researcher will act as a contact for you between visits if you have any questions.

Risks/benefits of taking part – There are no foreseeable risks to you as a participant in this study. All information obtained from participants will be made anonymous and confidential and will not be shared with a third party.

What will happen to the results of the study? – Your participation in the study will provide valuable evidence to groups and policymakers whose remit has direct relevance in supporting farmers in relation to the social impacts of bTB and other animal diseases. The results of the research will be published as part of a postgraduate thesis which will be made available to study participants.

Who is organising and funding the research? – The postgraduate research is supervised by Dr Gareth Enticott at the School of Planning and Geography at Cardiff University. Sponsorship has been provided for this study by the Economic and Social Research Council and the Welsh Government.

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Appendix 2 cont…

CONSENT FORM

Research Project: **Accounting for the Social Impacts of Animal Disease: The Case of Bovine Tuberculosis**

Thank you for considering taking part in this research. If you have any questions please ask a member of the research team before you decide whether to take part. You will be given a copy of this Consent Form and Research Participant Information Sheet to keep and refer to at any time.

- I confirm that I have read and understood the Research Participant Information Sheet dated 27/6/12 for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

- I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my care or legal rights being affected.

- I understand that if I withdraw from the study the data collected up to the point of withdrawal may be retained and used in the analysis.

- I agree to take part in the study.

Print name.....

Signature.....

Date.....

Appendix 3

This section comprises of the interview schedules associated with the qualitative research as follows:-

- Interview schedule for Vets
- Farmer interview schedule visit 1
- Walking and talking questions
- Farmer interview schedule visit 3

Interview schedule for Vets

Introductory section

The purpose of the study is to examine in more depth the links between policy attempts to eradicate animal disease (bTB), the impact of animal disease on farmer wellbeing and what influences coping strategies amongst farmers. The PhD study is being carried out within Cardiff University and is funded by the Economic and Social Research Council and the Welsh Government.

The vet will be made aware that the interview results will be treated as confidential and any details provided from individuals will only be used by the researcher for the purpose of this PhD. The vet will be asked if they mind if the interview is recorded as to ensure that any important points that come up during the interview are not missed.

Section 1. In this first section I want to ask about what happens when you find a reactor on a farm

(Estimated time - 10 minutes)

	Question	Theme	Prompt
1.	Can you tell me about the last time you found a TB reactor on a farm?	TB	• What happened? • Can you tell me about the history of the case? • How did the farmer react? • How did the breakdown affect the farm business? • How did the breakdown affect the farmer (longer term)? • How does this compare with other TB breakdown incidences? • Can you tell me about another case? • Explore another case in the same way as the last case

Section 2. We've spoken about your recent experiences; I want to ask you some questions now about how TB affects you personally and the practice.

(Estimated time = 15 minutes)

2.	Can you tell me how you feel when you found those TB reactors?	TB	• In general how has working to eradicate TB affected you? • Explore the reasons
3.	Do you enjoy conducting TB testing work?	TB	• Explore the reasons why/why not • What other work do you enjoy – reasons why? • How important is conducting TB work for the practice? Explore the balance with other forms of work • How has the balance in TB work changed over time? • How important are farmers to the practice? How has this changed over time? • What about the farmers – how have they changed over the years? • What would you say are the most pressing issues for farmers at the moment?

Section 3. Next I would like to ask you some more general questions about the effect of TB on farmers in this area

(Estimated time = 10 minutes)

4.	You've spoken already about some of the impacts of TB on farmers – can you tell me now in general how TB has impacted upon farmers in this area?	TB/social impact	• Encourage the vet to mention social impacts and not only effect on businesses. • When was the last time you witnessed a farmer become anxious by TB? How did you react to the situation? • How does the impact of TB vary between different types of farmers?
5.	How do farmers cope with the pressures of living with TB within this area?	Farmer stress	• Do farmers speak about TB with other farmers in the area? • Is there a stigma attached to TB • Can you provide examples of farmers that may have been **under TB restrictions for a long time** and how they may be coping? v. those that may not have been affected?

Section 4. The next set of questions covers disease management by farmers in order to try and understand the drivers behind any adoption of disease prevention measures on farms.
(Estimated time = 10 minutes)

6.	What changes have farmers made to the way they farm as a result of TB?	Farmers coping strategies/risk	• What kinds of changes / practices have they made • Why were these changes made? • Did the vet play any role in them? • Do farmers ask you specifically for advice on TB control measures? In your experience, what have you seen are the 3 most valuable approaches that farmers carry out to improve a situation when the farm has TB? What in your opinion are the 3 least useful approaches you've seen and why? If no, ask vet's opinion on why they have not changed their practices? • Why do you think some farmers make changes and others do not?

Final Section

Explain what happens next.

The specific areas of Wales chosen for this phase of the PhD have been derived using data from the Welsh Government bTB annual surveillance report for 2010 showing the proportion of herds with new bTB incidents by Unitary Authority. The next stage is to recruit farmers within specific areas of Wales to carry out a series of interviews with. A number of individual farmers/farming families recruited will agree to take part in a discussion with the researcher on at least 3 occasions for an overall time span of 18 months in order to be able to fully capture any effects that TB may be having on these farmers.

The vet will be asked to provide suggestions for suitable farmer contacts in their area that could take part in the qualitative interview phase of the PhD.

Thank them for their time.

Farmer Interview Schedule visit 1

Introductory section

The purpose of the study is to examine in more depth the links between policy attempts to eradicate animal disease (bTB), the impact of animal disease on farmer wellbeing and what influences coping strategies amongst farmers. The PhD study is being carried out within Cardiff University and is funded by the Economic and Social Research Council and the Welsh Government.

The farmer will be made aware that the interview results will be treated as confidential and any details provided from individuals will only be used by the researcher for the purpose of this PhD. The farmer will be asked if they mind if the interview is recorded as to ensure that any important points that come up during the interview are not missed.

Section 1. To begin with I'd like to ask you some general questions about the farm

(Estimated time = 15 minutes)

1.	Can you tell me about the history of the farm?	Farm history	• Explore how many generations have farmed here, the type of enterprises historically and what they are now. • Explore reasons for choice of enterprises • Establish whether land is in several parcels and how this is managed
2.	How do you see the future of the farm? What might the future hold for you and your family on this farm?	Future plans/Threats	• Can you describe what you hope to see happening in the future for this farm? • How does the reality of your daily life compare with your hopes and dreams? • Explore examples of what ideas they have and whether/how other family members are involved in the plan? • Establish motivations behind future plans e.g. business profitability, quality of life, farming for the next generation... • What threats do you foresee that could prevent your hopes and dreams becoming a reality for this farm? • Establish whether the farmer believes he has some element of control over these threats?

Section 2.In the next section I want to discuss with you about the meaning of well-being and what this means to you personally?

(Estimated time - 15 minutes)

	Question	Theme	Prompt
3.	How do you feel about farming at the moment?	Farming	
4..	Now for something completely different – could you explain what does well-being mean to you?	Wellbeing	• Could you describe in your own words what you understand by the term well-being? • Do you have an idea of words or associations with well-being that spring to mind, at this stage? • Do you have an idea of what well-being may mean to you personally? E.g. quality of life • Explore reasons behind why they refer to these personal well-being meanings? • Would you be able to provide me with other examples in relation to well-being?
5.	Next I want to explore what events or activities on the farm gives you pleasure in your work? Can you tell me what activities that you enjoy?	Wellbeing in relation to farming	• Can you provide me with examples of recent experiences of these? • Explore events in more detail, why do they make them feel that way? • How would you describe the way these activities affects you as a person?

6.	How does this compare with other less enjoyable activities?	Wellbeing in relation to farming	• • What particular events or situations do you dislike? • Can you provide examples/experiences? • How do you feel when a circumstance makes your everyday working life less pleasurable? • Explore how the time of year makes their work enjoyable/less enjoyable? • How do they feel about their working life on the farm at various times of the year?

Section 3. We've spoken about the type of activities and situations on the farm in relation to your own well-being, I now want to ask you some questions around how TB affects you personally and the farm business.

(Estimated time = 15 minutes)

7.	When was the first time the farm had TB?	TB/disease history	• Can you remember what happened? • Do you remember how you felt about it back then? • Explore the reasons • What was it like to be on the farm during that time • How does this compare with your feelings now in relation to bTB on your farm? • Explore reasons
8.	Can you describe to me the work involved around bTB testing time?	TB testing	• Can you describe to me what your feelings are around the time of bTB testing? • Explore the reasons why • How did it feel the last time you were testing? • What was it like to be on the farm during that time? • How does this compare with other times when you're not bTB testing? How does this compare with other events on the farm? • What other work do you enjoy – reasons why?
9.	To what extent do you feel **at risk** of getting Tb on this farm?	Risk	• Explore the reasons behind their feelings

10.	Tell me about what your life was like on the farm before any effects of a TB breakdown?	Farming life pre TB	• Explore the reasons

Final Section

(Estimated time: 10 minutes)

Finally, in order to measure farmer well-being, I would like to ask you to complete a set of questions and statements which are established wellbeing measures. *(The ONS and WEMWBS scales below will be provided on a separate piece of paper for individuals to fill in at the end of the interview).*

Firstly I would like to ask you four questions about your feelings on aspects of your life. There are no right or wrong answers. For each of these questions I'd like you to give an answer on a scale of nought to 10, where nought is 'not at all' and 10 is 'completely.

Overall how satisfied are you with your life nowadays? *(where nought is 'not at all satisfied' and 10 is 'completely satisfied')*	
Overall to what extent do you feel the things you do in your life are worthwhile? *(where nought is 'not at all worthwhile' and 10 is 'completely worthwhile')*	
Overall how happy did you feel yesterday? *(where nought is 'not at all happy' and 10 is 'completely happy')*	
Overall how anxious did you feel yesterday?	

The following set of statements are also aimed at measuring well-being and are based around a person's feelings and thoughts. I will read out the statements and ask you to respond what best describes your experience of each over the **last 2 weeks.**

For each of the questions please use one of the following options;

None of the time – Rarely – Some of the time – often – or All of the time

STATEMENTS	None of the time	Rarely	Some of the time	Often	All of the time
I've been feeling optimistic about the future	1	2	3	4	5
I've been feeling useful	1	2	3	4	5
I've been feeling relaxed	1	2	3	4	5
I've been feeling interested in other people	1	2	3	4	5
I've had energy to spare	1	2	3	4	5
I've been dealing with problems well	1	2	3	4	5
I've been thinking clearly	1	2	3	4	5
I've been feeling good about myself	1	2	3	4	5
I've been feeling close to other people	1	2	3	4	5
I've been feeling confident	1	2	3	4	5
I've been able to make up my own mind about things	1	2	3	4	5
I've been feeling loved	1	2	3	4	5
I've been interested in new things	1	2	3	4	5
I've been feeling cheerful	1	2	3	4	5

- Is there anything else you want to say?
- Is there anything else you want to ask me?

Explain what happens next:-

- agree on when the next visit will take place on the farm and leave contact details in case they need to change the date .
- Establish when their next herd TB test is due and ask whether I could observe at testing time.

Thank them for their time.

Questions for Walking and Talking interviews

These visits are intended to act as a substitute for attending a Tb test on a participant's farm. The purpose is to get the farmer to show the researcher how they manage their TB test, what the set up is and what are the actual practical problems they experience.

These interviews will feature in situ around where the TB testing is carried out on the farm and the participants will be asked to show me whilst discussing the TB test. Other areas of discussion might be around other issues such as the problems of biosecurity, and also to get them to speak about their favourite activities and parts of the farm. Much of this is about putting what people say into the actual context as opposed to what they say in the kitchen, and having conversations around the things they are actually talking about as a means of stimulating discussion and reflection.

Questions	***Prompts***	***Theme***
Q1. Show me how you manage the TB test	• going through the set up of the test • where the animals are tested • which animals are done first • roles of people involved • the order of the day • timings • the preparation the day before • the work involved before test reading day • what is the system at test reading day	TB test
Q2. Things said at interview in relation to TB testing which may inform further discussion – explore further	• what were you feelings during the last test • what do you talk about during the test • did you feel tired/drained	TB testing
Q3. What are the problems they experience, ask for example of last test, how did they overcome it		TB /Stress Coping
Q4. Discuss other issues such as problems of biosecurity	• have they seen badger setts or signs of badger activity on the farm • if so, how is it managed	Biosecurity Risk
Q5. Discuss their favourite parts of the farm and their favourite activities	• relationships with livestock • lifecycle of cattle on the farm • ask in relation to its effects on their personal well-being	Well-being

Finally the participants are asked to complete a wellbeing questionnaire before leaving the farm

Farmer Interview Schedule visit 3

Introductory section

The purpose of this third and final research visit is to establish what has been happening on the farm since the last visit approximately 12 months ago. The questions will be led by initial enquiry into how farming life has been for the participants since my second visit. A proportion of these visits would have been during a TB test, and conversation will begin around this subject. The questioning will then go on to explain the farmer survey and the research findings from this. The gaps in knowledge arising from the farmer survey around social contacts/coping relative to bTB. Further questioning will address how farmers deal with managing animal diseases (apart from TB) in general on their farms.

Total estimated time = 1 hour

The farmer will once more be asked if the interview can be recorded as to ensure that any important points that come up during the interview are not missed.

Section 1. To begin with I'd like to discuss with you what's been happening on the farm since my previous visit during the TB test/walking and talking interview? Then I want to go on and discuss the postal survey results and your views on these and some questions around managing farm animal diseases apart from TB.
(Estimated time = 35 minutes)

	Question	Theme	Prompt
1	What's been happening on the farm over the last year? (both relative to TB and any other events on the farm which they can recall).	Farming general/Farm TB situation	• Ask for examples of events • Ask about TB situation since the test I was present at 12 months ago/or last visit (explore feelings on this)
2	One of the questions in the survey was asking farmers to list the top five most problematic animal diseases on their farm. Apart from TB can you tell me which diseases cause you problems here on the farm? 1. TB 2. 2. General diseases 3. General diseases 4. 4. Fertility 5. Cattle foot related	Animal disease/ Farming pressures	• Can you list them in order of importance • Explore the reasons why • Can they provide examples? • What measures do they undertake to manage the disease e.g. how often they vaccinate/test • Who do they discuss the management aspects of these specific disease with? How often?
3	In the survey some people said they get support from others in their area in relation to TB. What do you think of that?	TB and Coping	• Explore reasons

	How would you say that farmers cope with the pressures of living with TB in this area?		• Can you give me an example?
4	In the survey there was a statement stating '*I feel that local residents are unsympathetic towards farmers*' Can you tell me a bit about the social mix of residents within this rural population?	Rural community / social capital	• What are your feelings on the social mix within your area? • Explore reasons? • Can you give me examples of good/bad rural demographics e.g. lack of understanding of farming ways or knowledge on animal diseases, relative to bTB, strong influence of action groups •
5	In the survey there's a statement stating '*It is important to me to be a respected member of the farming community*' with 87% of respondents agreeing or strongly agreeing. In what way do you think it's important to be a respected in the farming community you belong to? Are you involved in activities within your community?	Farming community/ social capital /coping	• In what way? - Explore reasons • What other activities do they participate in outside the farm? • Prompt for examples of a respected farmer, their behaviour/activity
6	When you had a TB breakdown who did you turn to for advice? Who would you turn to for advice on other animal diseases? Who would you turn to if you had a problem in relation to the business?	TB and Trust/ advice/ information	• Prompts could be close family, farming friends, farming community/neighbours, trusted professional, own vet, charities, Farming Unions • Explore the reasons why? • What did you gain out of speaking to them?

	Who would you turn to if you had personal problems?		• How often would you discuss some of these particular issues? • Do you think it's important to talk about it? • Can you describe to me an example of when you asked someone for advice?

Section 2.In the next section I want to discuss with you about the results of the farmer survey such as farmers views on aspects of bTB, the well-being results in relation to TB farm restrictions and how do these figures compare with your well-being results.

(Estimated time - 15 minutes)

	Question	Theme	Prompt
7.	Your levels of well-being are higher/lower in relation to the average level for farmers who responded to the survey This is what the survey figures said on average levels of well-being of those farmers who responded. Mean ONS = 25.8 Mean SWEMBS 23.8 Explain how this compares with the general UK population average ONS = 29.5 , SWEMWBS = 25.2	Wellbeing	• Display using a summary table to assist • Compare and discuss results • Why do they think their level of well-being is higher/lower than the survey farmers? • Explore the reasons
8.	The well-being results of those farms under TB restriction from the survey is (ONS = 24.4 & SWEMWBS= 24.08) compared to (ONS= 26.0 & SWEMWBS= 23.8) for those not under restriction. These figures show there was little difference between wellbeing and farmers with or without TB. What did you expect it would be?	Wellbeing	• Explore the reasons why

Section 3.

(Estimated time: 10 minutes)

We've spoken about the survey results and in relation to your own well-being results , finally, I would like to ask you again to complete the set of questions and statements which are related to measuring personal wellbeing.
Firstly I would like to ask you four questions about your feelings on aspects of your life. There are no right or wrong answers. For each of these questions I'd like you to give an answer on a scale of nought to 10, where nought is 'not at all' and 10 is 'completely.

Overall how satisfied are you with your life nowadays? *(where nought is 'not at all satisfied' and 10 is 'completely satisfied')*	
Overall to what extent do you feel the things you do in your life are worthwhile? *(where nought is 'not at all worthwhile' and 10 is 'completely worthwhile')*	
Overall how happy did you feel yesterday? *(where nought is 'not at all happy' and 10 is 'completely happy')*	
Overall how anxious did you feel yesterday?	

The following set of statements are also aimed at measuring well-being and are based around a person's feelings and thoughts. I will read out the statements and ask you to respond what best describes your experience of each over the **last 2 weeks.**

For each of the questions please use one of the following options;

None of the time – Rarely – Some of the time – often – or All of the time

STATEMENTS	None of the time	Rarely	Some of the time	Often	All of the time
I've been feeling optimistic about the future	1	2	3	4	5
I've been feeling useful	1	2	3	4	5
I've been feeling relaxed	1	2	3	4	5
I've been feeling interested in other people	1	2	3	4	5
I've had energy to spare	1	2	3	4	5
I've been dealing with problems well	1	2	3	4	5
I've been thinking clearly	1	2	3	4	5
I've been feeling good about myself	1	2	3	4	5
I've been feeling close to other people	1	2	3	4	5
I've been feeling confident	1	2	3	4	5
I've been able to make up my own mind about things	1	2	3	4	5
I've been feeling loved	1	2	3	4	5
I've been interested in new things	1	2	3	4	5
I've been feeling cheerful	1	2	3	4	5

- Is there anything else you want to say?
- Is there anything else you want to ask me?

Thank them for their time in participating in the research.

END