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**An Economic Impact Assessment of Bovine
Tuberculosis in South West England**

Andrew Sheppard and Martin Turner



*Research Report
Number 9*

1 870558 86 32

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Research undertaken for
the South West of England Regional Development Agency by
the Centre for Rural Research

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***Price: £25
May 2005***

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Acknowledgements

This study was commissioned by the South West Regional Development Agency and a sub-group of the Strategy for Sustainable Food and Farming – Regional Implementation Steering Group. The research was undertaken by the University of Exeter's Centre for Rural Research between November 2004 and February 2005 under the direction of Martin Turner. The authors gratefully acknowledge the large number of people who have helped during the course of the project:

- The Project Steering Group
- Colleagues in the Centre who have been directly involved at some stage of the research: Allan Butler, Mark Fogerty, Matt Lobley and Professor John McInerney
- Brian Dinnis, who undertook most of the interview survey, together with contributions from Mark Fogerty and Liz Reddaway
- The farmers, more than one hundred throughout the Southwest, who took part in our surveys
- The various stakeholders (more than forty) who took part in our surveys
- The University of Reading staff who undertook much of the data analysis from the interview survey using their established TB template
- Our telephone interviewers: Mary Ackland and Helen Bowker
- Other colleagues at the Centre who contributed in various ways.

Responsibility for the contents of this report rests with the authors, and the views expressed are those of the authors and are not necessarily shared by other members of the University or by the University as a whole.

List of abbreviations

ADCR	Animal Disease Compensation Review
AHWS	Animal Health and Welfare Strategy
Bovine TB	Bovine tuberculosis
CAP	Common Agricultural Policy
DCs	Direct contacts
Defra	Department for Food and Rural Affairs
FCN	Farm Crisis Network
FMD	Foot and mouth disease
GOSW	Government Office South West
IR	Inconclusive reactor
MLC	Meat and Livestock Commission
MVF	Mole Valley Farmers
RSIN	Rural Stress Information Network
SWRDA	South West Regional Development Agency
WTO	World Trade Organisation

Executive summary

The research background

E1 Over the past decade, the rising incidence of bovine TB has resulted in recognised economic impacts on the agricultural and ancillary industries and this has been particularly evident in Southwest England. The range of economic impacts resulting from bovine TB are well recognised, and these have been exacerbated through having coincided with a period of considerable economic pressure on the agricultural industry.

E2 The government is currently developing a new strategy for tackling bovine TB. Bovine TB is acknowledged as one of the most difficult animal health problems facing UK farmers with the incidence now rising at 18 per cent each year, but there is no scientific consensus about why bovine TB is rising again (having apparently been brought under reasonable control by the 1970s), although there is increasing scientific evidence of a reservoir of infection in wildlife, particularly in badgers.

E3 This study was commissioned by the South West Regional Development Agency and a sub-group of the Strategy for Sustainable Food and Farming – Regional Implementation Steering Group to provide a firm evidence base of the economic and social impacts of the disease in the region.

The farmers' interview survey

E4 An **interview survey** of 61 farms was undertaken, of which seven were examined particularly closely as case studies, as well as being included in the general analysis. Forty of the farms visited for interview ran dairy herds, 21 did not. In most cases, the cattle enterprise used to designate the farm dairy or beef was the principal livestock enterprise on the farm.

E5 Twenty-seven farms with a dairy herd also produced beef, of which three had a beef breeding herd in addition to dairy cows. Of the 21 farms where beef was the principal cattle enterprise, 15 ran a beef breeding herd, making a total of 18 beef breeding herds in the farmer interview segment of the study. Three beef breeding herds and nine dairy herds reported pedigree status. One beef breeding herd and two dairy herds had organic status; both organic dairy herds were also beef producers in as much as calves from the dairy herd were reared for beef.

E6 The farms selected for interview were drawn from those in the South West England RDA known to have suffered a breakdown of bovine TB during the calendar years 2002 and 2003. Farmers approached were under no obligation to provide information, participation in the study being voluntary. The number of positive responses from farmers was rated excellent, with 75 per cent of those approached agreeing to be interviewed.

E7 The questionnaire was based on that used for the 2002 study, *Assessment of the economic impacts of TB and alternative control policies*, undertaken for Defra by the Department of Agricultural and Food Economics at the University of Reading. To ensure the validity of comparisons with the results of the Reading study, the essence

of the economic investigation was kept the same, and analysis of the results was sub-contracted to the Reading team that analysed the results of the 2002 survey, using the same methodology. Supplementary questions probed the social implications of bovine TB for the farmer, his or her family, employees and community.

E8 The average number of reactors was 10.8, 5.6 for the beef herds, and 13.5 for the dairy herds. Fifty-six per cent of respondents had three or less reactors and 21 per cent four to ten reactors. Those figures correspond closely to the 2002 Reading figures. The farms with 11 or more reactors included one dairy farm with 200 reactors, one with 50 and two farms with, respectively, 38 and 37. The largest number of reactors on a beef farm was thirty-six.

E9 The results of the survey are represented graphically in the same way as were those of the Reading study. The total cost of a TB breakdown before compensation or insurance and the cost net of Defra compensation can be compared directly with corresponding charts in the Reading report and in doing so it is readily seen that the magnitude of those values and their distribution is very similar to those presented in the earlier Reading report.

E10 For the great majority of dairy herds represented in the survey and for all beef herds the cost of a TB breakdown was less than £20,000. The value of cattle slaughtered was 66 per cent of the total cost of a breakdown on a beef farm and 65 per cent of that on a dairy farm. On dairy farms the total breakdown cost per animal slaughtered ranged from £279 to £12,120 per animal. On beef farms the total breakdown cost per animal slaughtered ranged from -£475 to £2415 per animal. Where, in individual cases, the total breakdown cost per animal was not closely related to the value per head of animals slaughtered, it was because high testing costs were incurred but the number of animals slaughtered was small. Although the total farm cost of a breakdown was in a few cases rather large (at most, almost £120,000), it was related to large numbers of animals rather than high unit costs or values.

E11 Defra compensation reduced the net cost to relatively small proportions for a broad middle band of both dairy and beef producers affected by TB. Amongst beef farms, those whose Defra compensation exceeded total costs of the breakdown were approximately equal in number to those whose costs exceeded the Defra compensation. Sixteen (43 per cent) of 37¹ milk producers and 12 of 21 beef producers (57 per cent) showed net gains after Defra compensation. In a few cases the per farm gains involved substantial sums.

E12 However, for 80 per cent of both beef and dairy farms, compensation sums were relatively small. Only five beef producers and eight milk producers received more than £10,000 in Defra compensation.

E13 Many respondents were not insured against a TB breakdown and just one beef producer and eleven milk producers received insurance payments. In general, sums paid to those insured were not great, with only one receipt exceeding £10,000.

¹ Three milk producers declined to disclose compensation sums received from Defra. They are therefore not included in compensation and net gain or loss calculations.

Insurance payouts therefore made little difference to the pattern of net gains and losses from TB.

E14 Farms that gained the greatest positive contribution to farm income from TB tended to be those that had many reactors taken. In contrast, farms that suffered a long breakdown but had few animals taken incurred breakdown costs in excess of the compensation paid.

E15 The survey obtained much detail of testing costs, the costs of isolating reactors and inconclusive reactors, the cost of movement restrictions, disinfection costs, restocking, and the long term costs associated with TB. Details of all of these are presented and discussed.

E16 Seven farms were selected as **case studies** on the basis of special characteristics either of the farm or of the nature of the TB breakdown, or the way in which it was handled. The case studies included dairy and beef herds, small medium and large, pedigree and organic farms, each with features that made them of even more than general interest. However, many features, particularly those related to the difficulties arising from movement restrictions, were also common on farms not selected for special study.

The farmers' telephone survey

E17 This covered 50 farms in the South West RDA province known to have suffered a TB breakdown in calendar years 1998, 1999 or 2000. Twenty five of the farms contacted for this segment of the study had dairy herds, the balance were beef herds, but, including dairy farms also producing beef, a total of 38 farms produced beef. A single respondent, a former beef producer, no longer had a cattle enterprise and reported that the decision to give up cattle production was related to problems with TB.

E18 Thirty-seven of the newly surveyed farms (74 per cent) had suffered a further TB breakdown in the period between January 2002 and January 2005, with one reporting two new breakdowns in that period. Eight (16 per cent) had changed their cattle enterprise size or farm enterprise mix as a direct result of TB. One dairy farm had started a beef production enterprise that it did not previously have, one had taken on more land to rear the extra numbers of cattle resulting from movement restrictions, whilst one had started a spring calving section of the dairy herd with heifers that could not be sold.

E19 Seeking to discover if previous experience of a TB breakdown resulted in testing being absorbed into the routines of the farm, respondents who had suffered a further breakdown in the past three years were asked if the disruption and the cost of testing were now more, less, or much the same as previously. The majority thought the disruption the same, but the cost greater.

E20 Fifteen (30 per cent) had restocked with purchased cattle following the most recent breakdown and a further four had bought cattle following an earlier breakdown, making a total of 38 per cent with an experience of re-stocking with purchased animals. However, the majority (62 per cent) had not. Farms using livestock markets, dispersal sales and private transactions as sources of replacement stock were

fairly evenly balanced, but dairy farms principally bought from dispersal sales and privately, beef producers from markets. Eleven of the 19 farms that had purchased stock following either the most recent or an earlier breakdown reported no difficulty in finding satisfactory replacements. Four had experienced difficulty in finding non-mainstream animals – particular breeds or, in one case, organic livestock – and three found that they had bought in disease problems.

E21 Most respondents considered that their business had suffered long-term effects as a result of persistent TB breakdowns, though the majority of the effects cited, such as hassle and stress for themselves, even the need to take out loans because of cash flow difficulties, might be seen as hopefully not long term.

E22 The importance attached to problems that might at first sight be only for the duration of the breakdown should not be underestimated, however. Most effects complained of were because of movement restrictions, consequent overstocking, overwork, pressure on facilities, the necessity to purchase inputs that would normally be home-produced, and resulting cash flow problems. Many of the farms surveyed had been under restriction for an extended period, and the great majority in the telephone survey had suffered at least two breakdowns. Because of the general lack of profitability in farming in recent years, it may be that on a significant proportion of affected farms, financial and other problems that might, in more profitable times, have been quickly left behind once movement restrictions were lifted, will persist for much longer.

E23 Eleven farms had diversified enterprises (mainly Bed and Breakfast and Farm Cottages) and another a separate off-farm business, but none reported any effects of TB on those businesses.

E24 Nine farms said that because of TB difficulties they had taken out or increased a loan to overcome losses or cash flow problems; fifteen had cancelled or postponed investment in stock, premises or equipment; sixteen had cancelled or postponed expansion plans, eight had diversified into other or new lines of business.

E25 Measures taken to reduce losses caused by TB included establishing a separate, TB free farm and attempting to take out TB insurance, which was refused. Seven had taken bio-security measures, in particular reducing wildlife access to areas used by cattle and cattle access to wildlife areas, so as to reduce any cross-species infection.

E26 Thirty of the fifty respondents said their farm's TB breakdown had affected their own daily life, 20 that of their family or household, 10 their employees (of 22 with employees), and 27 their community. Stress was by far the most frequently recorded affect. Worry, depression and distress on parting with livestock were also common, and the extra workload was again mentioned. Family relationships and marital problems were cited, and there was some recognition that a discomfited head of the business makes a difficult family member, workmate and employer. Many respondents who commented on community effects were in hotspot areas; some spoke of sympathy and concern from the wider community. However, many responses were summed up by two in particular; "Initially, members of the farming community were very secretive if they had TB, now everyone is a lot more open and talk freely" and

“The farming community is very tense about the situation, but the general public is not aware of the problem”.

The stakeholders’ survey

E27 In addition to farmers, 41 farming, ancillary industry and rural stakeholders were interviewed to discover the impact of TB on their activities. Some have been much affected by TB, and not all negatively, but many have not. The stakeholder contacts included veterinary practices, abattoirs, livestock hauliers, cheese makers, various agricultural suppliers, auctioneers, an insurance company, farm-based tourist attractions, District Council tourism offices, several organisations providing social support, and miscellaneous others.

E28 Questions put to the various stakeholders varied according to their business or other interest in agriculture. Where appropriate, they were asked if TB had brought benefit to their business. Veterinary practices admitted to having gained work and enhanced contact with their customers through TB testing, though the work was not without its frustrations. Valuers too had gained work, but did not find it particularly profitable, one describing it as a loss-leader, or a service to customers; another that the work helps to keep contact with farmers under movement restrictions and eventually attract them back to the auction markets.

E29 Other businesses mostly thought that TB had either had a negative impact, or none to speak of. Agricultural suppliers thought that the balance of farmers spending more through keeping more stock because of movement restrictions and those spending less was about even, though two agricultural engineers were both very downbeat about TB. Two livestock hauliers with TB reactor haulage contracts said they had benefited, two without that they had not.

E30 Those more peripheral to agriculture, such as tourism offices, were aware of no impact on their area of activity. The insurance company said it had lost money on TB underwriting, but that TB had not seriously damaged its wider business. Two farm-based tourist attractions were not seriously damaged, but nevertheless very concerned. One cheesemaker had experienced significant difficulties because of TB.

E31 Individuals providing social support to farmers and their families were concerned by the burden placed on businesses, individuals and families by TB, particularly in the context of a number of other pressures on the farming community.

Broader aspects of the impact of bovine TB

E32 The new research has both corroborated and extended the earlier University of Reading study on the farm level economic impacts of bovine TB. In terms of corroboration, the great variability in the economic results is emphasised and the following specific points can be made:

- Some of the potential economic consequences of a TB breakdown could not be estimated, but are nevertheless widely accepted as genuine.
- There are often significant impacts on people associated with a TB breakdown resulting in additional stress for farming families.

- There is a range of adverse business management issues associated with a TB breakdown including cash flow problems and the loss of control.
- The research found that the actual net economic impacts (after compensation) varied greatly, but were fairly evenly distributed: the number of farms showing a net loss after compensation was similar to the number showing a net profit.
- There were a few very substantial ‘winners’ (typically, pedigree breeders who secured high compensation sums for potentially valuable animals) and a small number of very substantial ‘losers’ (typically, farms which experienced successive movement restrictions over an extended period).

E33 The new study extends the Reading research through its greater focus on the broader economic and social impacts of bovine TB at farm level and more widely. Key findings from this work in relation to farm level effects included:

- Most farmers reported some long-term effects, although the severity of those varied considerably with individual circumstances.
- At best, TB breakdowns cause significant inconvenience and impose additional work on the already hard-stretched farm labour resource (often largely the farmer and the farm family).
- Most of the adverse effects are related to the impact of movement restrictions following a TB breakdown.
- The new research recorded no effects on diversified enterprises, including farm retailing and tourism-related activities.
- Nearly one in five farmers reported negative cash flow effects severe enough to require additional external funding.
- Nearly one in three farmers had cancelled or postponed planned investment in the business – in livestock, premises or equipment.
- Nearly one in three farmers had been forced to cancel or postpone expansion plans as a consequence of a TB breakdown.
- Over time (based on the evidence of the telephone sample), one in six farms had diversified away from cattle breeding and production in order to reduce the potential business risk of further TB incidents.

E34 The impacts of bovine TB across the rural economy are generally modest and predictably mixed. Some business sectors closely associated with agriculture recorded positive economic effects. These include large animal veterinary practices (turnover up 10 to 25 per cent), agricultural valuers and some hauliers. Other business sectors reported some negative effects of TB, principally agricultural engineers. One diversified farm producing unpasteurised cheese had experienced significant problems directly associated with the rising incidence of bovine TB. Beyond these specific areas, respondents were unaware of any significant economic effects and concerns tended to be at the level of possible future developments rather than experience to date.

E35 We conclude that the personal impacts on farmers, their families and farm staff are widespread, though there appears to be a general reluctance to acknowledge this. Such impacts are both more likely, and usually more pronounced, on farms where the effects of the TB breakdown have been moderate or considerable, taking into account both scale and temporal aspects. An important contributory cause has been the increase in uncertainty about the future, both about the longer term implications for the business and its affect on individuals. All of this is compounded by an acute sense of frustration and dismay about an apparent lack of progress in regaining control over a disease that was once thought to have been eliminated as an economic threat in agriculture.

Conclusions

E36 Bovine TB is a serious problem with both economic and social impacts for farmers. They arise principally because of restrictions imposed on the movement of animals, part of the standard procedures for the control of notifiable diseases in livestock. Although the precise estimation of the full economic impact of a bovine TB breakdown is acknowledged to be impossible (University of Reading, 2004; NAO Wales, 2003), there is little disagreement that the total cost of a TB incident generally exceeds payments for the livestock slaughtered. Statutorily, however, compensation values cannot reflect broader, longer term losses, but must be restricted to the market value of the animals taken, given that they were not infected with TB. This study has corroborated the earlier University of Reading findings that while most farms have been adequately compensated in that narrow sense, there are significant economic impacts which typically have to be borne by the farm business concerned.

E37 There are also important social impacts on the farm family and farm staff, a finding which again is consistent with the earlier studies. Our research found that up to one in five of the calls to the Rural Stress Information Network arise from the direct and indirect effects of bovine TB. The personal costs arise from several sources, including emotional responses to the loss of particular animals, concerns about welfare implications of retaining stock, the implications in terms of business uncertainty, the 'hassle factor' involved and sheer frustration at the apparent lack of progress in controlling the disease. Where insurance is available at an economically justifiable cost, it can help with meeting the consequential losses, but costs of such insurance are rising and its availability increasingly restricted because of the rising incidence of the disease.

E38 Calculations presented in this report identify the possible effects of a reduction in the average level of payment under the new compensation regulations and point to the inherent conflict between the industry's view of 'fair compensation' and what may be termed society's view.

E39 The new research points to an unequivocal conclusion. An outbreak of bovine TB can have a serious effect on the farm business concerned and movement restrictions, sometimes for extended periods, can make its impact much worse than that of an outbreak of FMD. It is the longer lasting effects which are the source of most of the damage done to the farming industry by bovine TB. Where they apply – and it is not in every case that such longer-term effects are found – they typically result in significant consequential effects on the economic performance and growth of

the farm business, and not infrequently are associated with serious stress affecting at least some of the farmer, the farm family and the farm staff.

E 40 It is, however, very difficult to generalise at the level of the individual farm, because every bovine TB incident is different and its impact is mediated through the widely differing circumstances of the farm and farming system involved. Nevertheless, the impact of the disease is often very significant at farm level in economic terms, and increased stress in the farming population is widely reported. However, the research found no evidence of measurable adverse economic effects arising from bovine TB within the wider rural economy, and in this respect the consequences of the disease are quite different from those associated with Foot and Mouth Disease.

1 Project background and methodology

Introduction

1.1 Over the last decade the rising incidence of bovine TB has resulted in recognised economic impacts on the agricultural and ancillary industries. Nowhere has the dramatic increase in bovine TB been more evident than in Southwest England, a region which is characterised by smaller, family-run farms often specialising in relatively extensive bovine livestock systems, whether dairying or beef production. The economic impacts result from the nature of the disease, the government's control measures (restrictions on movement of cattle on and off the farm, repeat testing and compulsory cleaning) and the impact of test 'failures' on the normal marketing of livestock and product.

1.2 Moreover, this worsening of the disease situation - and hence increasing economic impact - of bovine TB coincides with a period of considerable economic pressures for the agricultural industry. Principal among these are (a) the recent major changes in the CAP, (b) established long-term changes in the food chain (many of which are detrimental to primary producers), (c) new requirements for an increasingly environmentally-friendly farming systems and (d) increased competitive pressures from the enlargement of the EU and greater exposure to global markets.

1.3 In conjunction with the farming industry, the veterinary profession and other stakeholders, the government is currently developing a new strategy for tackling bovine TB. Bovine TB is acknowledged as one of the most difficult animal health problems facing UK farmers with the incidence now rising at 18 per cent each year. A further factor of particular relevance is the government's recent Animal Health and Welfare Strategy and its implications for affected herds. There is no scientific consensus about why the incidence of bovine TB is rising again (having apparently been brought under reasonable control by the 1970s), although there is increasing scientific evidence of a reservoir of infection in wildlife, particularly in badgers.

1.4 The study was commissioned by the South West Regional Development Agency and a sub-group of the Strategy for Sustainable Food and Farming – Regional Implementation Steering Group.

Study aim and objectives

1.5 The overall aim of this research was (a) to identify the nature and scale of the principal economic impacts in the Southwest arising currently from bovine TB, and (b) to identify possible future impacts in the region in the context of a range of government policies and market factors. The context for the study encompasses the current situation and the likely challenges over the next five to ten years.

1.6 The research brief identified three specific objectives, as follows:

Objective 1

To assess the economic effects of bovine TB on agricultural businesses under TB restrictions, including the effects on output (milk, calves, breeding stock, on-farm processing) and costs (labour, testing, other) under varying restrictions scenarios, and

for various farm sizes. A range of livestock farming systems were surveyed by telephone and personal interview.

Objective 2

To assess the economic impact of bovine TB on the wider rural economy and community, including (a) the general effects on 'upstream' and 'downstream' industries ancillary to agriculture; (b) livestock markets, agricultural shows and livestock sales (breed and dispersal/reduction sales); and (c) the cost to the Exchequer of the testing regime, compensation for farmers, the increased burden on the State Veterinary Service, etc.

Objective 3

To identify the possible future short and medium term impacts of bovine TB, in the light of current trends in agriculture, on the agricultural, food, drink and tourism sectors. The following specific aspects were addressed: the recent major reform of the EU's Common Agricultural Policy (CAP); and the Animal Disease Compensation Review.

Methodology

1.7 The research objectives was pursued through a number of activities of which the principal are as follows:

Farms

- Carry out a new survey of 50 farms to establish the on-farm costs under TB restriction (a) to augment the existing information and (b) to cover if possible deer producers and also diversified farms.
- Identify specific case study farms from the CRR's database, and interview (10 farms).
- Carry out a supplementary telephone survey to clarify the broader farm-level impacts (50 farms).

Other rural businesses

- Undertake a telephone survey of up to 50 stakeholders representing non-agricultural economic interests.
- Carry out 10 stakeholder interviews to further explore the more diffuse economic impacts of bovine TB.

Desk research

- Analyse and interpret the economic data, and re-specify the CRR's CAP model to include the effects of TB restrictions.
- Obtain, analyse and interpret Defra information regarding the regional costs of bovine TB, and subsequently complete a desk estimate of the full Exchequer cost of the disease in Southwest England.
- Model the combined effects of CAP reform on farms under TB restrictions, for various types and sizes of farm and under various restriction scenarios.
- Review the likely implications for the region of relevant government policies including the Animal Disease Compensation Review.
- Complete a comprehensive assessment of the medium to long term implications of bovine TB for the Southwest.

- 1.9 The report provides a comprehensive assessment of the implications of bovine TB for Southwest England, including its possible future impacts, and the research findings are considered in the context of the relevant government policies and market factors. The report is structured as follows:
- Chapter two presents the results of the empirical work carried out through the surveys, including the estimates of the farm-level costs of bovine TB and the research findings of the wider economic costs of the disease in the rural economy.
 - Chapter three presents a discussion of the likely future impacts of the disease for the Southwest region, in the context of agricultural policy and the emerging animal health and welfare policy.
 - Chapter four reviews the research findings as a whole and discusses their implications for the cattle farming industries of the Southwest.

2 Economic impact assessment for the Southwest

The agricultural sector: the farmer interview survey

2.1 An interview survey of 61 farms was undertaken, of which seven were identified as of particular interest as case studies. Case study farms were, however, included in the general analysis too.

2.2 Forty of the farms visited for interview ran dairy herds, 21 did not. In the cases of all but two farms with a dairy herd (beef and sheep) and two beef herds (pigs and sheep), the cattle enterprise used to designate the farm dairy or beef was the principal livestock enterprise on the farm. However, four interviewees rated an essentially non-agricultural diversified activity as the principal enterprise on the farm. All of those were beef producers.

2.3 Twenty-seven farms with a dairy herd also produced beef, of which three had a beef breeding herd in addition to dairy cows. Of the 20 farms where beef was the principal cattle enterprise, 15 ran a beef breeding herd, making a total of 18 beef breeding herds in the farmer interview segment of the study. Three beef breeding herds and nine dairy herds reported pedigree status. One beef breeding herd and two dairy herds had organic status; both organic dairy herds were also beef producers in as much as calves from the dairy herd were reared for beef.

2.4 The farms selected were drawn from those in the South West RDA province known to have suffered a breakdown of bovine TB during the calendar years 2002 and 2003. At the time of interview, the breakdown on the basis of which the farm was selected was still ongoing on one dairy farm and two beef farms, and two dairy farms had suffered a further, still ongoing, breakdown following clear-up of the breakdown for which the farm was selected.

2.5 Farmers approached were under no obligation to provide information, participation in the study being voluntary. In each case an explanatory letter was despatched, followed by a telephone call seeking to arrange an appointment for a field enumerator to visit the farm. The number of positive responses from farmers was rated excellent, with 61 (75 per cent) agreeing to be interviewed of 81 to whom an initial approach was made. Five of the non-cooperators said they were too busy, two not interested, one said he did not wish to relive the memories of a painful experience. The balance were for a miscellany of apparently entirely genuine reasons, including died, a recent bereavement and moved abroad. On a farm of even average complexity the interview took in excess of one hour, but all were completed and in virtually all cases with extreme good will on the part of the respondent.

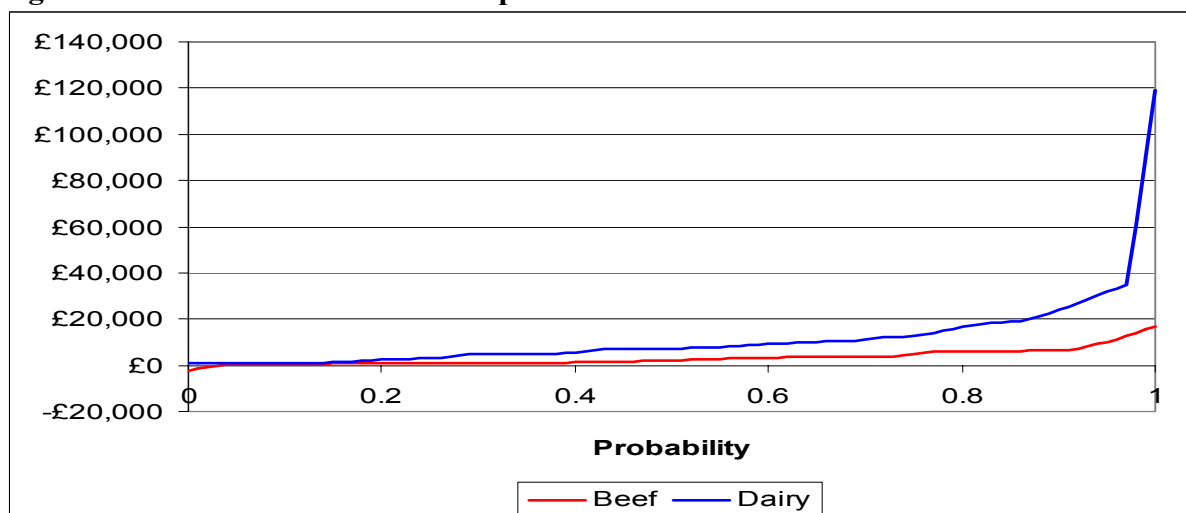
2.6 The questionnaire was based on that used for the 2002 study, *Assessment of the economic impacts of TB and alternative control policies*, undertaken for Defra by the Department of Agricultural and Food Economics at the University of Reading (University of Reading, 2004). Questions were supplemented to some extent, especially in the areas of social implications for the farmer, his or her family, employees and community. A section querying farmers' attitudes to alternative TB control policies – not relevant to the terms of reference of the current study – was dropped. However, to ensure the validity of comparisons with the results of the

Reading study, the essence of the economic investigation was kept the same. To the same end, analysis of the results was sub-contracted to the same Reading team that analysed the results of the 2002 survey, using the same methodology.

2.7 The average number of reactors was 10.8, 5.6 for the beef herds, 13.5 for the dairy herds. Fifty six per cent of respondents had three or less reactors and 21 per cent four to ten reactors. Those figures correspond closely to the 2002 Reading figures of 61 and 21 per cent. The farms with 11 or more reactors included one dairy farm with 200 reactors, one with 50 and two farms with, respectively, 38 and 37. The largest number of reactors on a beef farm was 36.

2.8 Three figures are of prime importance to all in the farming industry concerned with the cost of a TB breakdown, i) the total cost before compensation or insurance, ii) the cost net of Defra compensation and, for those with insurance against TB losses, iii) the cost net of Defra compensation and insurance. Figures 2.1 to 2.3 present these key figures in the same manner as the corresponding costs were presented in the Reading report².

Figure 2.1 Total costs before compensation



2.9 From Figure 2.1 it can be seen that for the great majority of dairy herds represented in the survey and for all beef herds the cost of a TB breakdown was less than £20,000. The value of cattle slaughtered was 66 per cent of the total cost of a breakdown on a beef farm and 65 per cent of that on a dairy farm. On dairy farms the total breakdown cost per animal slaughtered ranged from £279 to £12,120 per animal, whilst the value of animals slaughtered ranged from £233 to £1793. On beef farms the total breakdown cost per animal slaughtered ranged from -£475³ to £2415 per animal, whilst the value of individual animals slaughtered ranged from £45 to £1145. Where, in individual cases, the total breakdown cost per animal was not closely

² The charts are probability distributions generated using percentiles from the sample to create a distribution curve. Reading noted that the method was selected for two reasons: i) high standard deviations for the majority of the data collected and ii) probability distribution charts provide a functional tool to read the probabilities of costs being above or below a certain level.

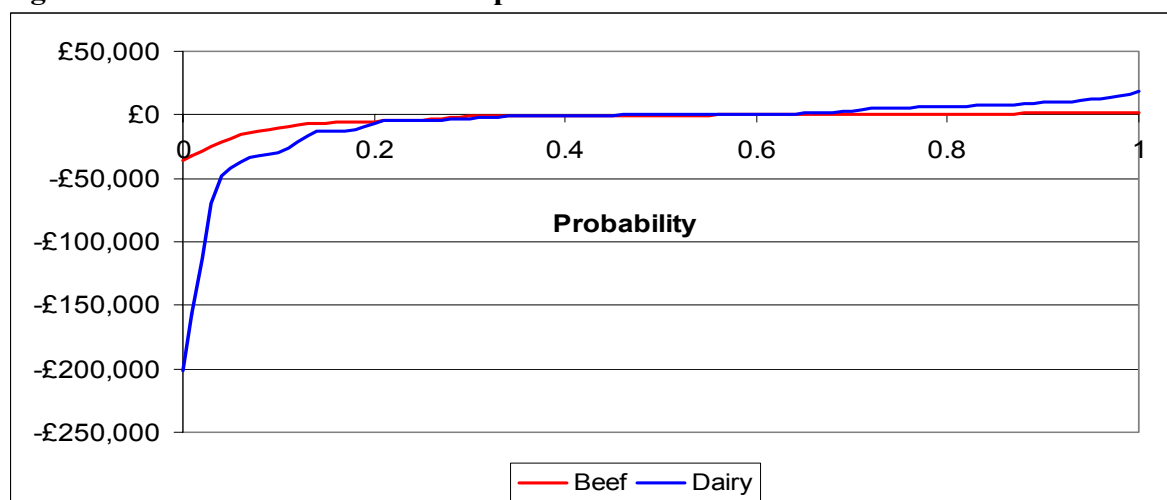
³ The negative value is because, in the special circumstances of one particular farm, one beef producer qualified for and received a higher extensification payment because of losing stock to TB, and the increased payment more than covered the costs of his breakdown.

related to the value per head of animals slaughtered, it was because high testing costs were incurred but the number of animals slaughtered was small. Although the total farm cost of a breakdown was in a few cases rather large (at most, almost £120,000), it was related to large numbers of animals rather than high unit costs or values. Defra compensation, Figure 2.2, reduced the net cost to relatively small proportions for a broad middle band of both dairy and beef producers affected by TB.

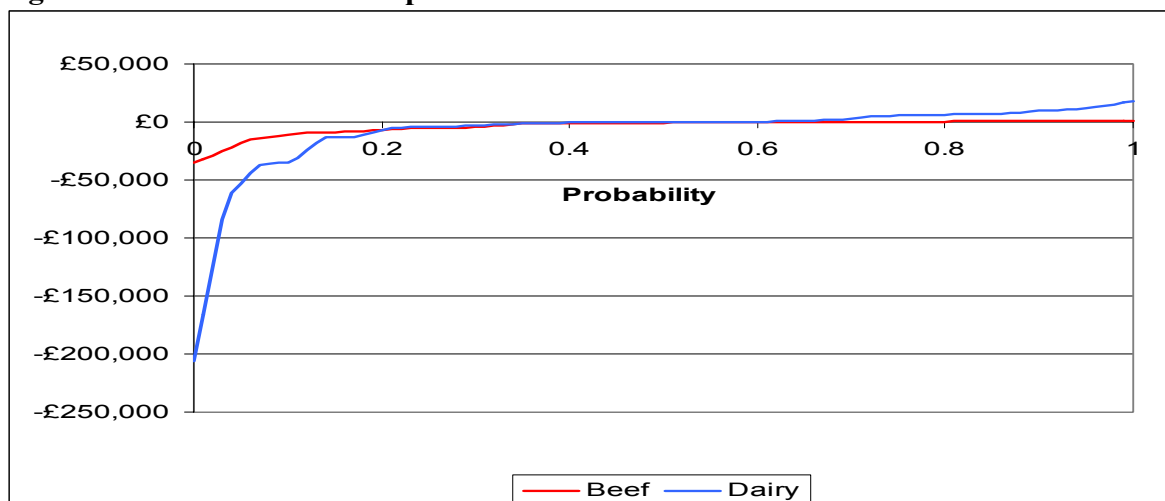
2.10 The scale of Figure 2.2 masks the extent to which some beef producers were worse off after receiving Defra compensation. Those whose Defra compensation exceeded total costs of the breakdown were approximately equal in number to those whose costs exceeded the Defra compensation. However, the maximum total loss per farm was £2953, whilst the maximum total loss per farm amongst the dairy farms was £18,885.

2.11 At the other end of the scale, 18 milk producers and 11 beef producers showed net gains after Defra compensation, with the per farm gains in a few cases, milk producers in particular, running to substantial sums.

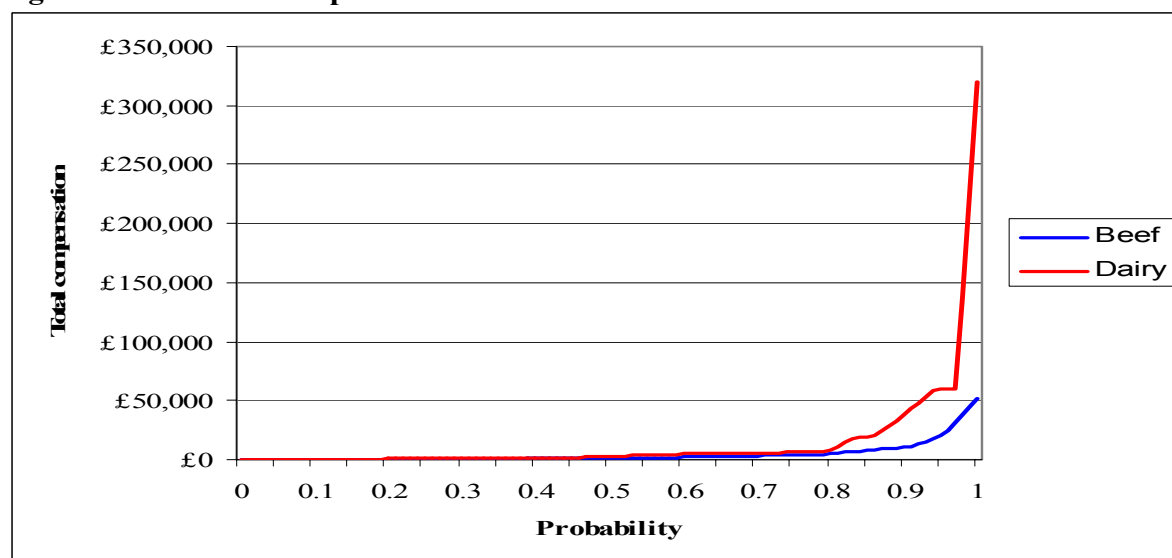
Figure 2.2 Costs after Defra compensation



2.12 Figure 2.3 takes account also of insurance payments received by affected producers. Many respondents were not insured against a TB breakdown and only two beef producers and ten milk producers received insurance payments. In general, sums paid to those who were insured were not great, with only one receipt exceeding £10,000. The differences between Figures 2.2 and 2.3 are therefore rather small.

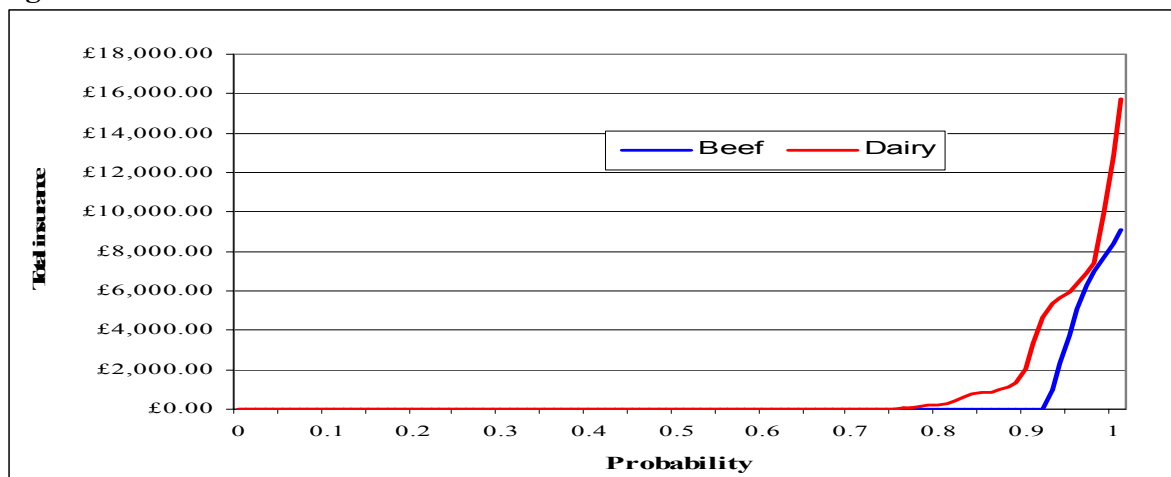
Figure 2.3 Costs after compensation and insurance

2.13 The background to the figures illustrated in Figures 2.2 and 2.3 is readily discerned in Figure 2.4, where it is seen that for 80 per cent of both beef and dairy farms compensation sums were relatively small. Beyond that point, the beef and dairy figures diverge, with both rising, but the dairy figure rises more steeply and, for a small minority, to a much higher total figure. Only five beef producers and eight milk producers received more than £10,000 in Defra compensation.

Figure 2.4 Total compensation received

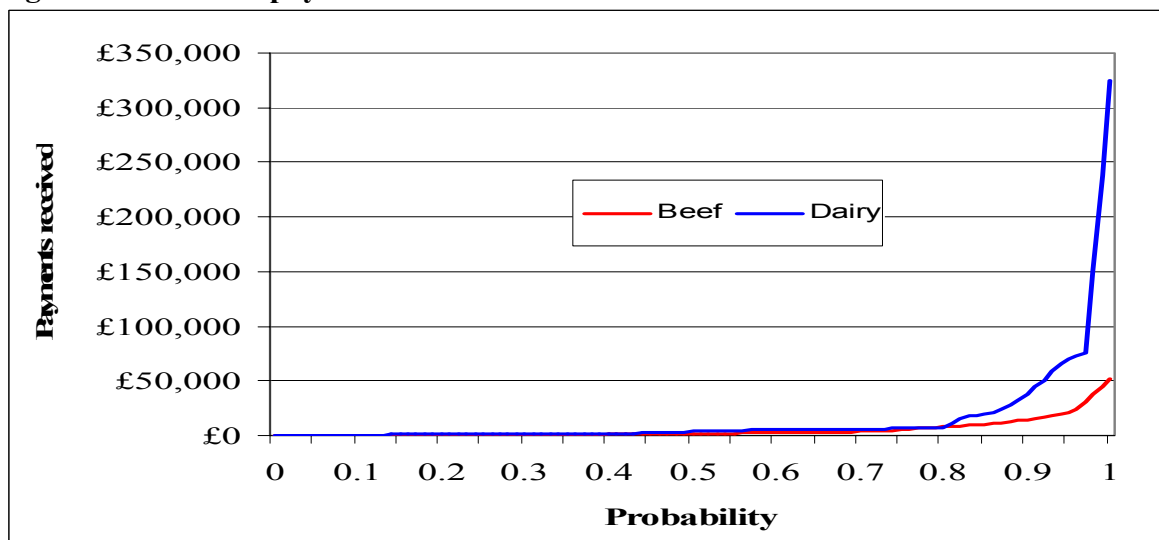
2.14 Insurance payments follow the same pattern (Figure 2.5), though it should be noted that figures on the left hand axis of Figure 2.5 are much smaller than those of Figure 2.4. Because they were not insured, most farms did not receive any insurance payment. Two beef and ten milk producers received a total of £55,280, an addition of not quite six per cent on their Defra compensation payment.

Figure 2.5 Total insurance



2.15 Figure 2.6 puts the two forms of payment together. With Defra payments constituting 95 per cent of all sums received (100 per cent for all but two beef producers and ten dairy farms), but insurance payments in any case following the same pattern, Figure 6 is seen to closely follow the lines of Figure 2.4.

Figure 2.6 Total payments received



2.16 Numbers of farms in the survey that made financial gains or losses as a result of a TB breakdown were rather evenly balanced (Table 2.1).

Table 2.1 Numbers of farms gaining or losing as a result of a TB breakdown

	Beef	Dairy
Gain greater than £1,000	7	11
Gain less than £1,000	4	7
Loss less than £1,000	7	8
Loss greater than £1,000	3	11

2.17 Three dairy farmers answering most other survey questions declined to disclose compensation sums received from Defra. They are therefore not included in compensation and net gain or loss calculations.

2.18 Table 2.2 offers a breakdown of some of the cost, compensation and gain in farm income figures by farm type. Pedigree and non-pedigree dairy farms are shown, as well as dairy farms as a whole. A distinction is made between upland (SDA) and lowland beef farms. For reasons of confidentiality, separate identification of the results of pedigree beef herds is not possible. There were only three pedigree beef herds in the sample (one upland and two lowland).

2.19 All groups of farms show a net gain in farm income after all *identified* costs are deducted from the combined compensation and insurance receipt. Pedigree dairy farms made the greatest net gain, followed by upland beef herds. These are of course average figures, representing no more than the mean of a wide-ranging set of data. Those that gained most tended to be those that had many reactors taken, those who had suffered a long breakdown but had few animals taken incurred breakdown costs in excess of the compensation paid. It should be noted that these figures clearly exclude any allowance for the unquantifiable economic impacts of a TB breakdown.

Table 2.2 Impact on farm income of a TB breakdown

	Breakdown		Net gain	Duration of breakdown
	Costs	Compensation		
	£	£	£	years
Dairy farms (37)	11,603	19,302	7,699	0.7
Non-pedigree dairy farms (28)	6,984	8,506	1,522	0.6
Pedigree dairy farms (8)	28,520	57,884	29,364	1.1
Upland beef farms (8)	8,186	12,778	4,592	0.9
Lowland beef farms (13)	2,757	4,817	2,226	0.7

The farm-level costs of a TB breakdown

2.20 Details of costs are illustrated in a similar manner as Figures A1 to A15 in the Appendix. The survey obtained much detail of testing costs, the costs of isolating reactors and inconclusive reactors, the cost of movement restrictions, disinfecting costs, restocking, and the long term costs associated with TB. The total cost of TB illustrated and discussed above consists of all those items.

Testing costs

2.21 The survey probed in considerable detail the cost to the farmer of TB testing during the course of a breakdown. Information was collected on the numbers of animals tested, numbers of farm workers involved and for how many hours, differentiating between summer and winter tests. Milk production lost because of the test was also included, as were any other test associated costs, most commonly additional mastitis cases and abortions. Appendix Figures A1 to A7 provide much information on the elements of the total testing cost.

2.22 The cost per animal per test ranged from 42 pence to £4.13 for the dairy herds, 69 pence to £3.92 for the beef herds, with a cost per animal per breakdown ranging from 66 pence to £40.88.

2.23 For dairy herds, testing costs constituted 15 per cent of the total costs of a breakdown, 42 per cent of costs not including value of animals slaughtered. For beef

herds, testing costs were 26 per cent of the total costs of a breakdown, 76 per cent of costs not including value of animals slaughtered.

2.24 Many farmers, both beef and dairy, reported inconvenience arising from TB testing, specifically the need to test at a particular time and, in some cases at a particular place. Sometimes cattle had to be returned from off land; other respondents said preparations for the test took as much as one or two days. However, dislocation of other enterprises and activities was apparently not serious.

Cost of isolating reactors and inconclusive reactors

2.25 In a similar way to testing costs, the costs of isolating reactors and inconclusive reactors was investigated and evaluated. Fifteen beef farms isolated reactors before collection for slaughter, of which six considered the cost nil or negligible and six recorded a cost. Total cost, however, amounted to less than one per cent of total costs and only one per cent of costs not including value of animals slaughtered.

2.26 Twenty-six dairy farms isolated reactors before collection for slaughter, of which eighteen considered the cost nil or negligible and eight recorded a cost. As with the beef herds, total cost amounted to less than one per cent of total costs and one per cent of costs not including value of animals slaughtered. The distribution of the costs of isolating reactors is shown in Appendix Figure A8.

2.27 Fewer farms isolated inconclusive reactors (seven beef farms, 11 dairy farms, two and seven recording a cost), but the longer periods of isolation (between tests, rather than merely waiting for collection) meant that the cost assumed greater significance. For the beef farms, the cost of isolating inconclusive reactors amounted to two per cent of total breakdown costs, six per cent of breakdown costs other than the value of animals slaughtered. Dairy farms incurred costs amounting to three per cent of total breakdown costs and eight per cent of costs other than the value of animals slaughtered. Appendix Figure A9 illustrates the distribution of the costs of isolating inconclusive reactors.

Cost of movement restrictions

2.28 Movement restrictions imposed a cost on relatively few farms (six dairy farms and five beef farms), but again they often proved a significant cost for those affected. For dairy farms they averaged six per cent of total breakdown costs, 17 per cent of costs other than the value of animals slaughtered. For beef farms they constituted seven and 21 per cent of the respective total costs.

2.29 Details of the cost of movement restrictions included the purchase of keep to substitute for common grazing, being obliged to keep animals for a period without their gaining any value – or even ultimately being sold for less – and having to sell pedigree stock on to normal commercial markets. Distributions of the cost of movement restrictions can be seen in Appendix Figure A10.

Restocking costs

2.30 Restocking costs were not the costs as such of replacement animals, but the costs in time, transport and other expenses in acquiring those brought in from markets, dispersal and private treaty sales. Most respondents had not purchased replacement

stock, but two beef and 13 dairy farms had done so. For most, the expenses of doing so were not great, the total cost incurred by the two beef herds being just £20. However, nine dairy herds ran up a total cost of £4815, which became one per cent of total breakdown costs, three per cent of costs other than the value of animals slaughtered. Appendix Figure A 17 provides the distribution chart.

2.31 Livestock markets, dispersal sales and private transactions were all well used as sources of replacement stock. Dairy farms tended to favour dispersal sales and privately, beef producers markets. No beef producer reported difficulty in finding satisfactory replacements, but comments from dairy farmers included the relative scarcity of suitable organic stock, that it is not easy to find animals as good as those lost, that it can be difficult to find the right type of cow for the farm, and that it had been necessary to pay dearly for replacements, TB disposals had driven up the cost. One farmer reported that he had inadvertently bought in foot problems and BVD, another that it takes time for cattle to settle in and for dairy cows to reach their yield potential.

Disinfecting costs

2.32 Twenty-five herds incurred a disinfecting cost, but for the most part the cost was not great. For dairy herds the average was less than one per cent of total breakdown costs, one per cent of costs other than the value of animals slaughtered. For beef herds the corresponding figures were one and two per cent. Appendix Figure A12 charts the distribution of disinfecting costs, by herd type.

Quota costs

2.33 Eight dairy farms found themselves significantly under quota as a result of TB cattle losses and were not able to realise the full value of their unused quota by leasing it out. The sum of the allowances made for the balance of the value of unused quota was £45,080, ten per cent of total breakdown costs and 29 per cent of costs other than the value of animals slaughtered. For the group of dairy farms this was the next most important cost after testing costs.

Subsidy costs

2.34 Two dairy farms had their subsidy claims adversely affected, one because bull beef BPS subsidy payments were lost, another because extra stock necessarily maintained during the period of movement restrictions incurred loss of extensification supplements. The cost, £1364, was not great relative to total costs, and the subsidy loss amounted to less than one per cent both of total breakdown costs and of costs other than the value of animals slaughtered.

2.35 Two beef farms made losses amounting to £4510 for the same reasons, but gains made by two others through enhanced extensification payments more than counterbalanced those losses and the group as a whole made a net gain of £1657. In the calculation of TB breakdown costs, that sum was set against other losses. It amounted to minus two per cent of total breakdown costs and minus six per cent of costs other than the value of animals slaughtered.

Biosecurity

2.36 Even before they had experience of TB, many farms had already implemented biosecurity measures such as double fencing, instituting a herd health plan and

isolating incoming livestock. In those cases, the additional cost was not counted as part of the cost of the TB breakdown. Where those or other measures – raising the level of feed and water troughs, proofing silage clamps and farm buildings against wildlife and fencing-off badger latrines were particularly frequently undertaken – the cost was allowed. Two beef farms had spent £890 on such measures, five dairy farms £9900.

The long term costs associated with TB

2.37 The long term costs associated with TB related to time spent on paperwork, telephone calls and on and off farm meetings. All farms surveyed incurred some cost on this score. A distinction was made between time spent on tasks of necessity and those, such as responding to the present survey that were undertaken voluntarily. In the case of both dairy and beef farms the total value of time assigned to these tasks was equivalent to two per cent of total costs, six per cent of beef costs other than the value of animals slaughtered, seven per cent of dairy costs other than the value of animals slaughtered. The voluntary part of this cost was less than one per cent of total costs in the case of both dairy and beef farms and of costs other than the value of animals slaughtered on dairy farms, but on beef farms it amounted to one per cent of costs other than the value of animals slaughtered. Appendix Figures 13, 14 and 15 chart the distributions of these costs.

2.38 Many of the farms approached for the interview study had suffered just one, relatively short TB breakdown. By contrast, those contacted for the telephone survey (see below) all had a history of TB breakdown that extended back to 1998-2000, with a large proportion having suffered at least one further breakdown since. This difference between the two samples presumably explains why interview survey farmers reported notably fewer long-term effects on their business than telephone survey respondents. Two pedigree breeders expressed concerns about the future market for pedigree stock from their area, a couple mentioned damage to the financial structure of the business, and another that his situation in relation to the Single Farm Payment was damaged and that he was appealing. The majority, however, felt that there were no major concerns for the long term.

2.39 Six beef farmers and seven dairy farmers had taken out or extended a loan to cover cash flow implications. Three dairy farms had cancelled or postponed investment and one had cancelled or postponed expansion plans. One beef farm had done both. Changed strategies for the future included an intention on the part of a dairy farmer to shoot all bull calves in the event of another TB breakdown, rather than rear large numbers of cattle for which the farm is not equipped, and a beef farmer who intended to grade up to pedigree status in order to attract higher compensation values for reactors. One beef farmer said he had decided that he would now finish all stock in any case, rather than sell stores, and several beef and dairy farmers spoke of making sure of selling any surplus stock before a TB test in future, so as not to be obliged to keep it for an unintended and extended period. A dairy farmer was erecting a new stock building, so as to be able to house more stock in the event of another breakdown, one had gone out of milk production because of TB and another had remained in milk production because of it.

2.40 All but six beef farmers and 14 dairy farmers said that TB had affected their daily lives. Most spoke of stress, at testing and reading times, or all the time, some of

upset at losing cattle, several of personal injury when testing and one of the loss of family and social life for an extended period because of having to keep many more cattle. Rather fewer (six beef farms and 15 dairy farms) thought that their families had been affected, but those who did cited most of the same reasons, including injury to a farmers' wife. Some recognised the difficulties of living with themselves at testing time and one family was disturbed when all had to themselves be TB tested.

2.41 Two beef producers and nine milk producers reported effects on their employees, ranging from the necessity to work extra hours, through distress at losing animals, to another case of personal injury. Five beef farmers and ten milk producers reported effects on their community. Many thought specifically of their farming neighbours and the worries that they had, either because they had or feared that they might contract TB in their herds. One reported that most of the neighbourhood had had to be tested for human TB following a large breakdown. Three spoke of support received from within the community.

Farm level impacts: the case studies

2.42 Although included in the general analysis above, a number of farms were selected as case studies. These were farms where special characteristics either of the farm or of the nature of the TB breakdown, or the way in which it was handled, made it of even more than general interest. However, many features noted below, particularly those related to the difficulties arising from movement restrictions, were also common on farms not selected for special study.

Case study 1: a large, 'flying herd' dairy farm

2.43 A single business keeps in excess of 1000 dairy cows as a flying herd on three farms. The first of the three farms was placed under movement restrictions because of TB prior to the 2001 Foot and Mouth Disease epidemic, the other two farms followed in June 2002. In total, 200 cows were taken as TB reactors, the outcome of nine tests. The farm(s) underwent 12 tests before restrictions were lifted in April 2004.

2.44 Before the breakdown, the business concentrated entirely on milk production and there was no provision for rearing either dairy or beef cattle. All cows were inseminated with beef semen and all calves sold at ten to 30 days old. More than 100 calves are born on the farm each month, so movement restrictions quickly had a significant impact. Quite early in the outbreak, the decision was taken to shoot all heifer calves at birth, thus halving the numbers to be reared. Nevertheless, a group of 420 steers built up, necessitating the rental of 121 hectares (300 acres) of grass keep and of building space, and the hiring of additional labour. During the period of restrictions, a total of 300 beef animals were finished at approximately 29 months of age and 800 store cattle of various ages were sold when restrictions were finally lifted.

2.45 Because the farm was not equipped to rear beef cattle, the enterprise was not particularly efficient. In addition, the farm manager feels that productivity of the high performance dairy herd suffered because management and staff were distracted by the involuntary beef enterprise. With hindsight, should the farm suffer a further TB breakdown, all calves will be shot, not reared.

2.46 Reactors were quickly replaced from private treaty and dispersal sales. Nevertheless, milk sales suffered both through loss of average numbers and through

high-yielding cows being replaced with newly calved heifers. At one point, the combination of TB losses and routine culling carried herd replacement rate close to 50 per cent (now a more normal 28 per cent). Average milk yield across the whole herd decreased by 500 litres and took 15 months to recover to its previous level. The cost of putting a new replacement through the farm's vaccination programme is estimated at £50. The farmer feels that compensation for animals taken is adequate, being "a bit more than an animal's true value". However, he would prefer that "the compensation was lower and the money spent on sorting out the whole TB problem".

2.47 The farm is one of 30 suppliers to a hard cheese maker. Whilst the TB organism is not a concern for the cheese maker, it was felt that the fact that 20 of the 30 suppliers were at one time under TB restrictions had potential for damaging publicity and consequent loss of sales. Fears are now much ameliorated by the lifting of restrictions on all but eight of the supplying farms.

Case study 2: a medium to large pedigree dairy herd selling bulling heifers

2.48 The cattle are high-yielding pedigree Holsteins and the farm operated a strict biosecurity policy even before the TB breakdown. The breakdown, picked up on a routine test, occurred in March 2002 and continued to June 2003, during which time the herd was tested eight times and a total of 15 reactors were taken.

2.49 The farmer is relatively relaxed about the impact of his own TB outbreak on the business. It was not possible to sell bulling heifers as was the practice before movement restrictions were applied, but in the circumstance of Defra purchasing reactors and the heifers moving into the dairy herd instead of being sold, there were in any case no surplus heifers. Bull calves were shot at birth even before the breakdown, all heifers reared, so total numbers of cattle on the farm did not become excessive.

2.50 The farmer, clearly of a phlegmatic disposition, sees his own TB outbreak as having solved the potential problem of selling dairy heifers out of an area that at the time was afflicted with a concentration of TB cases. He feels that even if he had been in a position to offer heifers for sale, buyers would have been wary.

2.51 With respect to compensation, the farmer feels it is fair in that it allows for some consequential loss (it is recognised that this is unintended). If compensation levels were reduced he would then think them unfair.

2.52 Although most recommended biosecurity measures have been undertaken, the farmer is sceptical of the value of fencing off wildlife habitats, walkways, etc. He reports that badgers do not like long grass; when fenced-off areas grow long grass (through not being grazed), the badgers change their favoured routes, latrines, etc.

2.53 On the subject of disposal of Inconclusive Reactors (IRs), the farmer feels that it would be difficult to justify disposing of Inconclusive Reactors, even if compensation were paid, given that restrictions still could not be lifted before another test proved clear. In that circumstance, he sees little difference between selling an animal to Defra as an inconclusive Reactor and selling it to them some months later as a Reactor.

Case study 3: an organic dairy herd with an ongoing breakdown

2.54 A routine test in December 2002 marked the beginning of the breakdown on this farm. At the time of the interview, the breakdown was in its 25 month and still ongoing. The farm is organic and all calves born to the medium to large dairy herd are reared either as dairy herd replacements or for beef. Beef cattle are customarily sold as 18 month stores.

2.55 A block of away-land has proved invaluable in that store cattle can be moved there and sold after two clear tests. The dairy cows of the farm have been much more affected by TB than the rearing cattle. Approximately 50 cattle have so far been taken as reactors (over 13 tests), most of which were dairy cows.

2.56 The farmer is satisfied with the compensation received from Defra and is fortunate in that he had additional disease breakdown insurance that cannot be withdrawn by the company whilst the one outbreak is still ongoing.

2.57 The chief problem occurred before the arrangement of moving animals for sale to the off-land was fully developed and the farm was overstocked through delayed sales. It became necessary to buy silage for winter feed, but finding organic silage for purchase is not easy, especially within an area from which it would be economic to transport it. With the co-operation of the Soil Association, a solution was found; the organic status of the store cattle was lifted and they were fed non-organic silage.

2.58 Finding suitable replacement cattle with organic status has also proved problematic and the farm has in consequence been operating under quota for two years. Only in one of the two years was it possible to recoup a realistic value for the unused quota.

Case study 4: a large, pedigree Holstein dairy farm

2.59 During the course of a sixteen month breakdown, the farm lost 50 animals, 40 of which were dairy cows. The farm customarily sells all calves other than those thought to have potential as dairy heifer replacements. Following the breakdown, the same broad pattern was adhered to, but there were some difficulties and expense in that selling calves under licence entailed batching the calves, keeping many of them to 30 days instead of 10 days. Enquiries were made about the Mole Valley Farmers calf initiative, but it was felt that MVF were not anxious to take the calves.

2.60 Replacing lost stock proved difficult, though it had in any case been the intention to pursue increased yields per cow, rather than increase cow numbers, so the situation could have been worse.

2.61 The practice of using a beef bull on cows not favoured for breeding dairy replacements has been discontinued. This is with a view to shooting bull calves at birth and selling any accumulated surplus of heifer calves under licence. The farmer is wary of pre-movement testing in that it might reveal reactors or inconclusive reactors that could otherwise have been sold.

2.62 The farmer was even more concerned than most about the effect of the breakdown on himself, his family and his cowman. He feels particularly stressed at testing and reading times and is upset to have lost so many animals. The culling of a

bull he found particularly distressing, feeling that he had a particular relationship of trust with it.

Case study 5: a small to medium, commercial dairy herd

2.63 The farmer was unlucky in that at the time of his breakdown, which was picked up in March 2002 by a contiguous, or neighbourhood, test, he was carrying more cattle than normal in anticipation that selling prices would improve as farms cleared by Foot and Mouth Disease restocked. When movement restrictions were imposed he quickly moved into a situation of serious overstocking and had to take on 20 hectares (50 acres) of grass keep. Fortunately, particularly as he has no winter housing for cattle other than dairy cows, his five test breakdown lasted only seven and a half months in total.

2.64 Only one animal, an in-calf dairy cow, was taken as a reactor, but 36 different animals were inconclusive reactors at various tests, so the farm suffered substantial disruption and he was himself subject to much stress, as well as expense. Receiving £950 for the one cow taken as a reactor, he was dissatisfied with the level of compensation. In addition to the time, trouble and stress of a series of TB tests that threw up proportionally large numbers of inconclusive reactors, greater expenditure on accommodating and feeding increased numbers of animals, a dip in milk yield following each test, and significant additional work and expenditure isolating inconclusive reactors, the farmer lost eligibility for extensification supplements on BPS claims. The loss on the last item alone exceeded the compensation received for the one reactor taken. He did not have insurance cover.

2.65 In addition to the rental payment for the grass keep taken, there was a fencing cost (double fencing) before it could be grazed. When his 30 store animals were finally sold, he felt that it was too late for the best prices and that he had fed them for five months for little return.

Case study 6: a small store finisher

2.66 The farmer customarily buys 50 store cattle in the late summer and early autumn, overwinters them and finishes them the following May. In August 2002 he had bought only six when a contiguous, or neighbourhood, test identified one of the six as an inconclusive reactor. Defra nevertheless took it as a reactor, he believes because of the proximity of an abattoir, a “high risk” situation, and placed the farm under movement restrictions. He was thus unable to purchase the balance of his usual autumn intake of store cattle.

2.67 At a second test in November 2002, the remaining five steers all tested clear and it was by that time known that no TB lesions had been found in the animal taken following the first test. Nevertheless, movement restrictions were still kept in place. In December 2002, a licence to move animals onto the farm was issued, but withdrawn after three days. No animals were moved during the three days. Defra then blood tested the five steers.

2.68 In January 2003, the farmer sold the five animals direct to an abattoir. From that point onwards there were no animals on the farm, but it still remained under movement restrictions. In March 2003, results of the December blood tests were

received – all negative. Movement restrictions were lifted, but with the condition that any animals moved onto the farm should be tested within three months.

2.69 Because of the sharply curtailed livestock throughput of that year, the number of BSPS and Slaughter Premium claims was much reduced and that has caused difficulty regarding the farmer's Single Farm Payment application. Foot and Mouth Disease disrupted another of his reference years. He is currently making a special circumstances application and awaits the outcome.

2.70 Remarkably in the circumstances, the farmer considers the £575 payment received adequate for the one animal taken. He does however record great frustration affecting himself, his family and casual staff and a total of 40 hours spent on paperwork, telephone calls and meetings relating to the "breakdown". In addition to cattle production, the farm has a small arable enterprise, but the farmer rates it secondary to the cattle in terms of value of output.

Case study 7: a pedigree beef suckler herd

2.71 A substantial pedigree beef suckler herd had been bought in its entirety in the second half of 2001. The intention was to retain the most promising animals and dispose of the rest, in so doing reducing herd size to about 50 breeding cows. However a routine test in May 2002 identified a ten month bull as a reactor and the herd was placed under restriction. Three further animals (all cows) were taken over the three subsequent tests and it was July 2003 before the farm was declared clear.

2.72 Calves that had to be prematurely weaned from the cows taken did not do well and, instead of going on to be sold as pedigree stock, were sold as 'runt' stores at a mark-down estimated by the farmer at £500 each. The farmer also reports that calves would 'mysteriously' die following TB tests, a total of eight over eight tests, of which he says that six were the more valuable heifer calves.

2.73 The sale of 60 store cattle and 12 heifers was delayed by five months. The farm ran out of feed and had to buy silage and hay, and use increased quantities of straw. Apart from being disappointed by the value placed on the bull, the farmer remains relatively unruffled by the incident, perhaps because he has substantial off-farm interests. He notes that his employee found the experience stressful, but not himself or his family.

The agricultural sector: the farmer telephone survey

2.74 The telephone survey covered 50 farms in the South West RDA province known to have suffered a TB breakdown in calendar years 1998, 1999 or 2000. Care was taken to ensure that no farm approached for the farmer interview segment of the study (on account of a new breakdown in 2003 or 2004) was also included in the telephone survey. As with the interview survey, participation in the study was voluntary. Calls were made without providing forewarning or background information by letter. The response rate was again excellent, with only two contacts declining to provide information.

2.75 The original intention to update and extend information already held on farms included in the 2002 Reading interview survey had to be modified when it proved

impossible to identify individual farms included in that survey.⁴ Instead a new sample was drawn from the same population of farms as the earlier study. The extent of the overlap between the two samples was not established, but can be assumed to be in accordance with statistical probability as determined by the size of the total population and of the two samples.

2.76 Twenty five of the farms contacted for this segment of the study had dairy herds, of which all but one rated milk production as the principal farm enterprise. The farm that did not placed dairying second to arable farming activities. Eighteen ranked beef production as their principal enterprise, 12 placed beef second to milk production, 6 second to another enterprise (most usually sheep or arable) and one farm each placed beef as the third or fourth most important enterprise on the farm, a total of 38 farms producing beef. The number of farms producing beef as well as milk was 14. One farm, a former beef producer, no longer had a cattle enterprise and reported that the decision to give up cattle production was related to problems with TB.

2.77 Thirty-seven of the newly surveyed farms (74 per cent) had suffered a further TB breakdown in the period between January 2002 and January 2005, with one reporting two new breakdowns in that period. Including the farm that had gone out of cattle production because of TB, eight had changed their cattle enterprise size or farm enterprise mix as a direct result of TB. Two had drastically reduced cattle numbers, one of whom intended shortly to cease cattle production altogether, another had changed the balance on the farm from predominantly beef to predominantly sheep. Three reported a change of approach to cattle production because of TB – selling finished cattle instead of stores, buying stores, keeping them for only one grazing season and re-selling, refraining from buying calves for multiple suckling. One dairy farm had started a beef production enterprise that it did not previously have, one had taken on more land to rear the extra numbers of cattle resulting from movement restrictions, whilst one had started a spring calving section of the dairy herd with heifers that could not be sold.

2.78 Seeking to discover if previous experience of a TB breakdown resulted in testing being absorbed into the routines of the farm, respondents who had suffered a further breakdown in the past three years were asked if the disruption and the cost of testing were now more, less, or much the same as previously. The majority thought the disruption the same, but the cost greater. As with the interview survey, few reported serious ramifications for the timeliness of other farm activities or the management of other farm enterprises, but many commented on the inconvenience of testing to the cattle enterprises themselves and that active measures had been required to avoid serious conflict between TB testing and operations such as harvesting and silage making.

2.79 Fifteen (30 per cent) had restocked with purchased cattle following the most recent breakdown and a further four had bought cattle following an earlier breakdown,

⁴ The University of Reading was asked for information on the identity of South West RDA area farms surveyed, but was unable to supply it. No follow-up or further study was envisaged at the time of the work and information on the identity of farms surveyed was not retained. The University of Exeter Centre for Rural Research was involved in that study as a data collection sub-contractor, but worked only in the four most south western counties and was very properly not provided with identifying characteristics of the complete sample.

making a total of 38 per cent with an experience of re-stocking with purchased animals. However, the majority (62 per cent) had not. Many noted that they had filled gaps with home-bred stock, a few that only very small numbers had been taken, another that a single animal had been purchased (apparently with reluctance) to make up suckler cow numbers for quota purposes. Twelve of 26 that had bred their own replacements had dairy herds.

2.80 Farms using livestock markets, dispersal sales and private transactions as sources of replacement stock were fairly evenly balanced, but dairy farms principally bought from dispersal sales and privately, beef producers from markets. Eleven of the nineteen farms that had purchased stock following either the most recent or an earlier breakdown reported no difficulty in finding satisfactory replacements. Four had experienced difficulty in finding non-mainstream animals – particular breeds or, in one case, organic livestock – and three found that they had bought in disease problems. One respondent reported that he had been dismayed by the cost of the replacements.

2.81 Of those that had bought replacement cattle, most recorded significant cost in terms of time, vehicle mileage and livestock haulage. One respondent commented on the inconvenience and cost of isolating purchased cattle for a period and two on the cost of vaccinating for leptospirosis and BVD and other health measures. Three others reported that various disease problems had been introduced with the incoming cattle and two dairy farmers that the purchased cattle did not adapt well to the established farm system.

2.82 Estimates of the time necessarily taken by paperwork related to TB testing ranged from one to 40 hours per test, with a median value of three. Eight respondents recalled spending time voluntarily on survey work, several of which specifically mentioned Defra and two the University of Reading. The median time recorded as spent on the telephone was one hour per test, with a range from 0.5 to four hours. Most respondents answered a question on time spent on meetings, on and off the farm, in terms of hours per animal taken, the values offered ranging from 0.5 to 16, with a median of two.

2.83 The great majority of farms reported no implications for the farm on the use of agricultural or other contractors, though one reported an initial reluctance to come on to the farm on the part of a contractor, another that livestock hauliers reorganised their route following his TB breakdown, and a third that AI inseminators were unable to visit the farm during the period of restriction⁵, which necessitated the purchase of a bull.

2.84 Most respondents considered that their business had suffered long-term effects as a result of persistent TB breakdowns, though the majority of the effects cited, such as hassle and stress for themselves, even the need to take out loans because of cash flow difficulties, might be seen as hopefully not long term. One felt that his pedigree Channel Island herd had lost genetic quality for the long term (purchased replacements being inferior), and another indicated that ceasing to sell dairy heifer replacements would be a long-term effect.

⁵ The reason for this is not clear; in principle, AI inseminators are able to visit TB breakdown farms.

2.85 The importance attached to problems that might at first sight be only for the duration of the breakdown should not be underestimated. Most effects complained of were because of movement restrictions, consequent overstocking, overwork, pressure on facilities, the necessity to purchase inputs that would normally be home-produced, and resulting cash flow problems. Many of the farms surveyed had been under restriction for an extended period, and the great majority in the telephone survey had suffered at least two breakdowns. Given the general lack of profitability in farming in recent years, financial and other problems that might have been expected to be quickly left behind once movement restrictions were lifted may well persist much longer on a significant proportion of affected farms.

2.86 Eleven farms had diversified enterprises (mainly Bed and Breakfast and Farm Cottages) and another a separate off-farm business, but none reported any effects of TB on those businesses.

2.87 Nine farms said that because of TB difficulties they had taken out or increased a loan to overcome losses or cash flow problems; fifteen had cancelled or postponed investment in stock, premises or equipment; sixteen had cancelled or postponed expansion plans, eight had diversified into other or new lines of business.

2.88 Measures taken to reduce losses caused by TB included establishing a separate, TB free farm and attempting to take out TB insurance, which was refused. Seven had taken bio-security measures, in particular reducing wildlife access to areas used by cattle and cattle access to wildlife areas, so as to reduce any cross-species infection.

2.89 Thirty of the fifty respondents said their farm's TB breakdown had affected their own daily life, 20 that of their family or household, 10 their employees (of 22 with employees), and 27 their community. Stress was by far the most frequently recorded affect, worry, depression and distress on parting with livestock were also common, and the extra workload was again mentioned. Family relationships and marital problems were also cited, and there was some recognition that a discomfited head of the business makes a difficult family member, workmate and employer.

2.90 Many respondents who commented on community effects were in hotspot areas; some spoke of sympathy and concern from the wider community. However, many responses were summed up by two in particular; "Initially, members of the farming community were very secretive if they had TB, now everyone is a lot more open and talk freely" and "The farming community is very tense about the situation, but the general public is not aware of the problem".

Economic impacts on the rural economy: the stakeholder telephone survey

2.91 In addition to farmers, 41 farming, ancillary industry and rural stakeholders were interviewed to discover the impact of TB on their activities. Some have been much affected by TB, and not all negatively, but many have not. The 41 contacts can be categorised as follows:

Veterinary practices	3
Abattoirs	3
Livestock hauliers	4
Cheese makers	3
General agricultural supplier	1
Supplier of animal feed	1
Agricultural engineers	2
Artificial insemination company	2
Milk quota buying, selling and leasing	1
Calf dealer	1
Auctioneers, valuers, chartered surveyors	8
Insurance company	1
Meat and Livestock Commission	1
Women's Farming Union	1
Farm-based tourist attractions	2
District Council Tourism Offices	2
Promotion of B&B and self-catering farm accommodation	1
Royal Agricultural Benevolent Institution	1
Agricultural chaplain	1
Rural Stress Information Network	1
Farm Crisis Network	1

Veterinary practices (3)

2.92 All three practices had substantial farm animal business and all reported an increase in their own business as a result of TB testing, ranging from ten to 25 per cent. All had taken on extra staff to handle the workload and were happy to have done so; also that Defra is passing TB work back to local vets, not re-employing their own temporary vets.

2.93 One vet commented on the positive animal welfare benefits of visiting farms not less than once a year for TB testing and of being on the farm long enough – including over lunchtime – to have some social contact with farmers.

2.94 On the negative side, one vet reported that the work is repetitive and qualified vets don't like to be doing just TB testing, but that they can find themselves doing around 20 tests a week over four working days. The same vet and another also remarked that working to the timetable set by Defra is not always satisfactory, with pressures put on them by the threat that farmers will be placed under restrictions if the test is not carried out by a certain date. One also noted that vets are concerned that cattle numbers increase when farms are put under restrictions, which has animal welfare implications, and that testing at 60 day intervals stresses animals, vets and farmers.

Abattoirs (3)

2.95 The three abattoirs were widely distributed and were each very different in the scale and nature of the business. However, none felt that TB had exerted any impact on their own businesses.

2.96 The most expansive respondent of the three commented that his company had dealt with a number of farmers under TB restrictions, but that had not resulted in a

problem of condemned carcasses, so it was not a problem for themselves. That being said, he had observed the strain placed on some farmers by a TB breakdown. Another confirmed that whilst farmers under restrictions have to bring a movement licence with the animals, that does not result in additional work for the abattoir.

Livestock hauliers (4)

2.97 Two of the livestock hauliers contacted were not involved in transporting TB reactors and felt that the growth in the prevalence of bovine TB had not so far exerted any impact on their business, positive or negative. Haulage of TB reactors is not organised by the farmer, so even regular farmer customers could not use them for that. Neither had any present intention of seeking such business, but one offered the view that if the incidence of TB continues to rise, most hauliers, including himself, would probably become involved.

2.98 Two other hauliers were both involved in transporting TB reactors, one to the extent that he assessed the resulting increase in turnover of his business at 20 per cent, the other more cautiously suggested that TB reactor haulage had compensated for the loss of business transporting stores and other animals from TB restricted herds. The same haulier said he found the requirements of the contract exacting and he was critical of the efficiency of the way in which pick-ups are organised, but he was content with the remuneration.

Cheese makers (3)

2.99 Two of the three cheese makers, both large scale, made cheese from pasteurised milk and stated that TB had not so far had any impact on their businesses. Their only concerns were that there might be a food scare based on the misconception that it is possible to catch TB from their product, and that a widening incidence of TB might restrict milk supplies. However, they saw no sign of the latter at the present time.

2.100 A third cheese maker was smaller scale and, because the business did not pasteurise milk was in a very different position. Its supply of milk had in fact been sharply curtailed by a TB outbreak and it had been necessary for them to pasteurise milk for a time, which they found time-consuming and stressful on their scale, and the capital cost of the additional plant was a financial burden at a time when it was particularly unwelcome. At one time, every batch of cheese had to be identified with individual cows, which was also time-consuming and limited production. The reduction in turnover of the business was estimated at 40 per cent.

General agricultural supplier (1)

2.101 General agricultural supplier is the business's own description of itself; its operation is widely spread across south west England. With some of its customers keeping larger numbers of cattle because of TB restrictions, others less, its spokesman found it impossible to quantify either a positive or negative effect on the business.

Supplier of animal feed (1)

2.102 A business specialising in the supply of animal feed expressed similar thoughts to the General Agricultural Supplier. The spokesman went on, however, to mention the difficulties for company representatives, who are unable to visit farms on TB testing days. Curiously, he listed this as a "Social impact".

Agricultural engineers (2)

2.103 Both agricultural engineers contacted sell new agricultural tractors and machinery as well as servicing and repairing them. Both felt that TB had exerted a negative effect on their business, one very severe, the other moderate with significant negative impacts. Their farmer customers were said to have been affected by negative cash flow and depression, the optimistic attitude associated with buying decisions was not there. The disinclination of farmers to buy new tractors was a particular problem, and one of the businesses had seen fit to diversity into other areas of activity.

Artificial insemination company (2)

2.104 One contact provided the point of view of the national company, the other that of the regional manager. Nationally, it was thought TB had cut semen sales by two per cent, regionally by five to ten per cent. That was primarily because of farmers using a bull of their own when placed under TB restrictions, rather than AI.

2.105 Major precautions were taken to prevent stud farms from contracting TB. Wildlife fencing is provided around bull housing and bulls are never let out to graze. Bulls are very carefully sourced and all are tested regularly. If bulls in the UK went down with TB, the company would probably source semen purely from abroad. The regional manager reported dairy herds being sold out because of TB, whilst others are grading-up to pedigree status in pursuit of higher valuations for those culled as reactors.

Milk quota buying, selling and leasing (1)

2.106 One company contacted specialises in buying and selling milk quota, and facilitating leasing-in and leasing-out arrangements. Surprisingly, in view of the finding of the interview survey that some farmers have bought, leased-in or out quota, or gone out of milk production altogether as a direct result of TB, the company spokesman said he was unaware that TB had affected their volume of turnover. He did add, however, that they had no way of measuring it.

Calf dealer (1)

2.107 This one-man business reported that TB in south west England had negatively affected his business in that reduced numbers of calves were available for open market trading and he had been obliged to travel more widely to source the calves his customers required. He was aware of great frustration amongst farmers subject to TB restrictions.

Auctioneers, valuers, chartered surveyors (8)

2.108 We spoke to eight representatives of businesses involved in selling and valuing livestock and farm properties and chattels. Each was different in its own way and the distribution across the region was wide.

2.109 Most of those valuing cattle for compensation purposes thought the payment for doing so inadequate, describing it as uneconomic or a loss leader. The payment for valuation work was stated to be £80 for the first farm on any one day, £60 for additional farms completed on the same day. As a service to their auction market, land agency, or other customers, they were content with the loss leader approach, but were less happy with the 'taxi rank' system.

2.110 It was remarked that valuation guidelines issued by Defra are clear, but inappropriate and out of date. Auctioneers are happy to see compensation monies paid to farmers reinvested at farm sales.

2.111 One valuer was notably upbeat, however. He said that valuing TB cattle is profitable for the business and has increased the amount of work for them to do. It helps auctioneers to keep in contact with their customers whilst they are under restrictions and cannot sell through auction markets and the respondent's business has also acted as agent for TB restricted farms to sell privately to other TB restricted farms.

2.112 Farmers under TB restrictions have been obliged to withdraw from using auction markets and in many cases it has been difficult to win back their business. Reduction in turnover was estimated as being as high as 20 to 30 per cent, with substantial losses resulting. Labour had been shed and workers in the livestock markets were said to be feeling demotivated.

2.113 Several noted the depressing effect on the agricultural community and one reported that his own role on occasion had been as 'a shoulder to cry on'.

2.114 A business primarily engaged in selling agricultural properties reported that TB had locked-up farms and land, with farmers on occasion unable to sell their farms when they wished to do so. The reduction in turnover of the business was estimated at 5-10 per cent. Imaginative solutions to the problem had sometimes been found; last year a farm was sold to someone who was not a farmer with a clause to the effect that the existing cattle would remain on the farm until such time as they tested clear.

Insurance company (1)

2.115 A livestock underwriter in the company assessed the impact of TB as slightly negative to the business as a whole, but significantly more serious to the TB division. The company had lost money insuring against TB, was having to increase premiums for renewals and turn away new business.

2.116 The company takes a pragmatic approach to increase in renewal premiums, looking at the full insurance and claims history of the client. A farmer who has been consistently insured against TB losses would not be refused further cover following a claim; much more usually the farmer declines to pay an increased premium. New business would probably be refused in TB hotspot areas. Before undertaking any new TB cover the test history of the farm is checked with Defra.

Meat and Livestock Commission – English Beef and Lamb Executive (1)

2.117 A Regional Manager commented that it is difficult to measure the impact of TB on MLC, but that it would definitely be negative in terms of both costs and revenue. Employing an in-house veterinary adviser, they are monitoring TB. Levy income is restricted by reduced numbers of animals coming forward for slaughter. If TB continues to rise, there will be a loss of breeding stock in the region, which in time will result in reduced total livestock numbers. That in turn will reduce the levy income of the MLC available for employing advisors and for contact point and promotional work.

Women's Farming Union (1)

2.118 A spokesperson for the Women's Farming Union felt that the awareness of TB as a possible threat to the human population is present amongst farming families, but not in the wider community. She was also concerned that communication between the brucellosis and TB departments of the local State Veterinary Service outpost seemed to be lacking.

2.119 She reported that the Women's Farming Union is represented on several relevant committees. She believes that the woman's point of view is more thinking about how decisions will affect the next generation, whereas men tend to be more financially based.

Farm-based tourist attractions (2)

2.120 Both farm attractions feel threatened by TB, the one that has not so far been placed under restriction more so than the one that has.

2.121 The attraction never yet restricted was very concerned about the loss of business, particularly school visits, if there was any kind of scare – TB, swine fever, BSE, Foot and Mouth Disease, Salmonella, coccidiosis, etc. He feels very vulnerable to the general public's ill-informed over-reaction to such issues. His public liability insurance increased four-fold last year, and with so many external factors that could knock the business he is now disinclined to invest in it further.

2.122 Perhaps because they have experienced restrictions in the past, but not had an actual case of TB, the other attraction viewed the problem with greater *sang froid*. They specialise in rare breeds, but keep at least two examples of each breed, which they hope will help to prevent the complete loss of any one breed. When they were placed under restrictions, they had to sell potential breeding stock into the food chain at half the price and they were obliged to use AI instead of bringing rare breed bulls onto the farm. They found it more difficult to get cows in calf. Defra obliged them by granting an exceptional licence to bring in rare breed bulls, but they feel frustrated that 'nothing' is being done about the TB problem.

District Council Tourism Offices (2)

2.123 We spoke to two District Council Tourism Officers. Both saw their job in similar terms, as promoting tourism and tourism businesses in their districts and neither saw TB as an issue in the tourism sector. It was recognised that some tourism providers in their respective areas were farmers, and that some might have experienced TB, but neither officer was aware of any impact on the tourism part of the farm businesses.

Promotion of B&B and self-catering farm accommodation (1)

2.124 A spokesman for a non-governmental non-profit organisation for the promotion of B&B and self-catering farm accommodation took a similar view to the tourism officers. However, he added the view that if bovine TB became widespread and widely known, the public would be frightened. He believes there is currently a degree of ignorance about the subject on the part of the general public.

Royal Agricultural Benevolent Institution (1)

2.125 The Royal Agricultural Benevolent Institution is a registered charity providing financial assistance to farmers, retired farmers and others who have been linked to agriculture for at least ten years. It can help farming families but not farming businesses; a spokesman therefore felt that TB would have little impact on his organisation, especially as farmers are compensated for cattle destroyed and the means test for financial assistance has a cut-off point of £8000 of savings.

Agricultural chaplain (1)

2.126 An agricultural chaplain we spoke to was aware of stress in the farming community arising from TB, not least because of the unreliability of the test resulting in animals being taken as reactors that were not in fact infected. He points out that TB is part of a chain of issues for the farming community, that frustration arises from the impression that nothing is being done, that people making decisions seem to lack an understanding of farming, and that farming and food are accorded low priority.

Rural Stress Information Network (1)

2.127 The Rural Stress Information Network (RSIN) is a helpline and signposting service aiming to produce a better quality of life for rural people and reduce stress levels such that people running businesses can have more opportunity to concentrate on what they are doing. The Network is commissioned by government, but relies on voluntary funding.

2.128 The spokesman, a regional Development Officer, said that TB has contributed to stress, upset and the economic demise of small and medium sized farms. At present five to ten per cent of Network calls are directly related to TB; a further ten per cent are from people who have been affected indirectly through loss of earnings, jobs lost in livestock markets, etc.

2.129 Testing cattle and waiting for the results can be stressful for the whole family. The spokesman feels the impact is greatest on the farmer's wife. In many cases they come from the rural community but are new to farming. The social isolation and financial stress has led to many relationship breakdowns. The farmers themselves feel strong social pressures not to sell farms that have been passed on to them by preceding generations, but to continue farming.

2.130 He is also of the belief that the practice of shooting dairy-type bull calves, rather than incur the uneconomic expenses associated with selling them, on the one hand has a negative effect on farmers' morale, and on the other is resulting in calves being reared uneconomically.

Farm Crisis Network (1)

2.131 The Farm Crisis Network (FCN) is another support agency for the farming community, with part-funding from a variety of sources, including Defra and the Anglican Diocese of Exeter, but heavily reliant on volunteers. The Network aims to leave farmers in a safer position than before. It is a Christian organisation that sees its role as "to walk with the farmer in whichever direction he wants to go", e.g. to a solicitor, accountant, doctor, etc. so providing moral and practical support.

2.132 A County Co-ordinator said that he finds farmers more stressed through the hassle of TB testing, and waiting for the results presents an emotional roller-coaster. That being said, he foresees that the Single Farm Payment paperwork and criteria will increase the number of calls received even more than TB.

2.133 He believes the TB problem is getting worse, with nothing apparently being done about it. The Network has set up local farmer groups called Farm Assets and Resource Management Study Groups (FARMS) to help bring farmers together socially and alleviate stress and isolation.

3 Likely future impacts and trends

Background

3.1 The drivers of change in the agricultural sector over the next few years are well recognised (Curry Commission, 2002; Defra, 2002a) and need no restatement here. However, in any comprehensive assessment of the impacts of bovine TB in the Southwest it is important to consider our findings in the context of known changes in the policy framework within which the industry will be operating. The principal policies of specific relevance here have been identified as the Common Agricultural Policy (CAP), Defra's Animal Disease Compensation Review (ADCR) and the Government's new Animal Health and Welfare Strategy (AHWS) launched in 2004. This section also presents our findings regarding the Exchequer costs of bovine TB in the region.

Agricultural policy under the reformed CAP

3.2 In general terms, the Government's policy is focussed on establishing a business environment in which a competitive and sustainable farming industry, which is market-led, can flourish. The radical reform of the Common Agricultural Policy (CAP) throughout the Agenda 2000 negotiations was informed by this approach to policy and, for the UK, the outcome represented an important step forward for the CAP, particularly through:

- a significant shift in the policy mechanism from price support to direct payments, so helping to reduce the economic distortions of the CAP; and
- the creation of an integrated Rural Development policy for the EU, which provides the basis for the shift of emphasis from production support towards environmental and rural development measures.

3.3 Alongside these domestic objectives, it was evident that changes to the CAP were required to help agriculture meet the challenges of the further liberalisation of trade, including the World Trade Organisation (WTO) Agreement on Agriculture. Moreover, the continuing eastwards enlargement of the EU, actual and prospective, provided a further acute driver of CAP reform under the so-called Mid-Term Review negotiations.

3.4 A detailed assessment of the likely effect of the reformed CAP on the agricultural sector of the Southwest was undertaken for Devon County Council (Lobley and Butler, 2004). The basic research used data drawn from the CRR's Farm Business Survey in an economic modelling exercise and we have used this model, updated as appropriate to 2003/04 prices and income levels, to explore the farm-level implications of bovine TB in the region. The baseline position is that the impact of the CAP reform will be complex, affecting different types and sizes of farms in a very varied fashion. Overall, the earlier research concluded that the impact on farm incomes was likely to be largely neutral or marginally positive.

3.5 For present purposes the farm-level impact of bovine TB has been examined through producing two sets of analyses: the 'without TB' situation and the 'with TB' situation, each projected forward over the period to 2013. **It is important to note that these results have to be seen in the context of the research parameters set for**

the earlier work, since the results are sensitive to the assumptions made at that time. These assumptions are set out in Appendix 1 of Lobley and Butler (*op cit*). The model makes no allowance for income gained under the newly launched Environmental Stewardship Scheme, but in this context this omission is not critical since the primary aim here is to identify the likely scale of the farm-level income losses by comparison with the hypothetical ‘no TB’ situation.

3.6 In Table 3.1 we show the results of the modelling of the impact of Bovine TB on NFI levels over the coming years. The assumptions used regarding modulation rates are as currently given by Defra, namely:

- For 2005, an EU rate of 3 per cent, an additional national rate of 2 per cent and an overall rate of 5 per cent.
- For 2006, an EU rate of 3 per cent, an additional national rate of 2 per cent and an overall rate of 5 per cent.

3.7 Given the overall impacts of compensation payments for Bovine TB identified earlier (see Table 2.2), it is not surprising that the general picture is that the apparent over-compensation in the first year, 2005, tends to be carried through the period as a whole. The notable exception to this is the Lowland cattle and sheep group, which shows the ‘after TB’ level of NFI falling below the baseline position from 2010 onwards. On dairy farms, the gap between the projected ‘with TB’ and the baseline level tends to narrow over time, on SDA cattle and sheep systems it tends to widen.

The Animal Disease Compensation Review

3.8 Defra initiated a consultation in October 2003 to rationalise compensation procedures for animals compulsorily slaughtered in order to control notifiable animal diseases. Under the regulations, animals which test positively for bovine TB are removed from the farm and slaughtered. Since 1998 the farm business has received compensation based on the full market value of the animal on the day of valuation, assuming full health. Until the recent changes, the valuation was based on the assessment of one valuer nominated by the farmer, or two valuers, one of which was nominated by the SVS; very occasionally, state veterinary officers value small numbers of animals.

3.9 A number of factors contributed to Defra’s review of compensation procedures, of which three will be noted here. First, the 2001 FMD epidemic raised the profile of the execution of the policy of compensating farmers for animals slaughtered under notifiable disease regulations. The rapid escalation in payments (average values rose by a factor of three during the crisis) led to concerns about valuation procedures and the adequacy of Defra’s controls. Secondly the Welsh Assembly, facing a sharp increase in the payments for bovine TB compensation, commissioned an independent examination of the whole compensation process in Wales (NAO Wales, 2003). It concluded that, in 2002, compensation was at least 50 per cent higher, and in some cases 100 per cent higher, than the underlying market prices for both commercial and pedigree herds; and that the scale of the differential had widened over the preceding two years. Thirdly, the University of Reading study (2004) concluded that ‘some producers appeared to be getting a net gain from compensation’ and that this ‘confirms the government’s concern over these payments and the need to revise the system for compensation payments especially with regards to the valuation of slaughtered *pedigree* cattle’.

Table 3.1 Comparison of the farm-level income effects of bovine TB, by farm type, 2005 to 2013, using the CAP model developed for the 2004 Devon study⁶

	£ per hectare									
	Base	2005	2006	2007	2008	2009	2010	2011	2012	2013
Dairy farms, with TB compensation	309	246	205	211	215	217	219	221	223	222
Dairy farms, baseline	255	203	169	177	184	189	193	199	202	201
	Base	2005	2006	2007	2008	2009	2010	2011	2012	2013
SDA cattle and sheep, with TB compensation	111	137	129	120	110	104	99	93	90	90
SDA cattle and sheep, baseline	113	108	100	93	86	81	77	74	71	71
	Base	2005	2006	2007	2008	2009	2010	2011	2012	2013
Lowland cattle and sheep, with TB compensation	56	64	56	55	51	53	55	57	59	58
Lowland cattle and sheep, baseline	33	35	35	39	43	50	56	64	69	68

Note: Direct comparison between the TB sample and the sample used for the Devon study is not advised because of the use of different sampling frames.
Source: Calculated using empirical information from the present research, the University of Exeter's CAP model and data from the Farm Business Survey.

⁶ Lobley and Butler, 2004.

3.10 A further driver of change is the reliance of the present system on the on-site valuation of cattle where delays, such as may be caused by waiting for a specific valuer to attend, adversely affects the efficiency of disease control measures. It is widely recognised that increasing the efficiency of the valuation and removal process, thus reducing the time infected animals remain on the farm, will help to reduce the spread of disease. While Defra's original aim, to rationalise compensation payments for *all* notifiable animal diseases, remains a longer term objective, it became clear that its initial proposals (including those for bovine TB) were inadequate and a more focussed consultation was launched in October 2004 (Defra, 2004b). Following the consultation, which closed in December 2004, it is expected that a 'table valuation' system will be introduced in the near future.

3.11 The relevance of these changes to the present assessment of the economic impacts of bovine TB arise from the likelihood that, in future, valuations for cattle compulsorily slaughtered under the notifiable disease regulations, in this case as they apply for bovine TB, will be lower than over recent years (NAO Wales 2003; Defra, 2004b). Using informed assumptions about the possible scale of the reduced compensation, we have estimated the farm-level impacts using the empirical results of the farmer interview survey.

3.12 In Table 3.2 we present the results of this modelling exercise, showing the estimated impacts on NFI of reductions of 20 per cent and 40 per cent in the average level of compensation received. It should be noted that these levels of reduction in compensation are not based on empirical evidence, nor on any official guidance from Defra, but are simply the authors' estimates of the likely range of reduced compensation following the introduction of the revised procedures. They should therefore be taken as bracketing the possible eventual outcome. The main findings of the modelling are as follows:

- At a reduction of 20 per cent in compensation, NFI on SDA cattle and sheep farms would be returned to the 'baseline' position (i.e. without Bovine TB). Any greater cut would imply reduced income levels as a result of a TB breakdown.
- For dairy farms, the reduction in compensation would need to be of the order of 30 per cent in order to maintain the 'baseline' level of NFI; again, any greater cut would result in a loss of income.
- On lowland cattle and sheep farms, even with a 40 per cent reduction in compensation NFI would be marginally higher than for the 'baseline' situation in the absence of Bovine TB.

3.13 However, these findings must be read in the context of the broader economic impacts of bovine TB at farm-level: it is not possible to impute a value to the multiple impacts arising from the implications of a TB 'shutdown' on the management efficiency with which the farm business operates, nor its impacts on day-to-day farm organisation. Significant though these 'hidden' costs are, it is evident that bovine TB also impacts on the long term development of the farm business, in ways which can be described on a case by case basis but which it is impossible to value without resorting to the hypothetical. Indeed, there is widespread acceptance that these effects are nevertheless real and are manifested in ways which adversely affect the economic

performance of the farm (see NAO Wales, 2003; University of Reading, 2004; Temple and Tuer, 2000; also the research findings presented in Chapter 2).

Table 3.2 Exploring the effects of reduced levels of compensation for bovine TB, by farm type, 2003/04

<i>Dairy farms</i>			
	NFI under previous regime	NFI with 20% reduction in compensation	NFI with 40% reduction in compensation
Baseline	£284 per ha	£284 per ha	£284 per ha
With TB breakdown	£309 per ha	£293 per ha	£276 per ha
<i>SDA cattle and sheep farms</i>			
	NFI under previous regime	NFI with 20% reduction in compensation	NFI with 40% reduction in compensation
Baseline	£99 per ha	£99 per ha	£99 per ha
With TB breakdown	£111 per ha	£100 per ha	£88 per ha
<i>Lowland cattle and sheep farms</i>			
	NFI under previous regime	NFI with 20% reduction in compensation	NFI with 40% reduction in compensation
Baseline	£40 per ha	£40 per ha	£40 per ha
With TB breakdown	£56 per ha	£50 per ha	£43 per ha

Source: Calculated using empirical information from the present research, the University of Exeter's CAP model and data from the Farm Business Survey.

The Exchequer costs of bovine TB in the region

3.14 We used information from Defra to estimate the total costs of bovine TB in the GOSW region, principally (a) published statistics on the annual totals of TB incidents at GB level, which are also broken down to county level; and (b) detailed statistics on the costs of bovine TB supplied by Defra following personal communication, with some further checks using other published sources. Unfortunately the information on expenditures is currently available only at GB level, so in the two following tables we have made broad estimates which are based on the proportion of bovine TB incidents in the GOSW region. Table 3.3 suggests that the total costs to the Exchequer of bovine TB in the Southwest were in the region of £42 million in 2003/04, the latest year for which data is available, which represents nearly half of the GB total. Secondly, there has been a quite dramatic increase in the costs over the last few years: there was an increase of eighteen per cent between 2002/03 and 2003/04, but in fact the four year average GB expenditure from 1998/99 was £30.7 million.

3.15 These expenditures can be broken down into broad cost categories and these are shown for 2003/04 in Table 3.4. The data show that while compensation costs account for the largest single cost category, representing 39 per cent of the GB total, staff costs, principally for the SVS, represent a quarter of the total while testing costs contribute about an eighth of the total. At nearly £14.3 million in 2003/04 total expenditure on research amounted to some 16.2 per cent of the Exchequer cost of

bovine TB, split broadly equally between the badger trial and other research; VLA contracts, which include further research components, totalled £5.3 million. It is impossible to make reliable estimates of the Southwest's regional share of the individual cost categories in the same way as for the total, but a strictly proportional allocation is suggested for illustrative purposes.

Table 3.3 Total public expenditure on bovine TB, 2002/03 and 2003/04

	GB	Estimated GOSW	GOSW as % of GB total
2002/03 (£ '000)	74,567	35,792	48%
2003/04 (£ '000)	88,157	42,315	48%

Source: Defra – GB expenditure totals (pers. comm.); GOSW authors' estimates using published Defra statistics on the proportion of animals slaughtered (reactors, IRs and DCs) in the GOSW region.

3.16 This section demonstrates above all the economic significance of bovine TB in the GOSW region from the perspective of the national accounts: the region accounted for nearly half of all TB incidents and the Exchequer cost of these was in the order of £42 million in 2003/04. These costs have escalated significantly over the past few years, driven by the rising incidence of the disease: the two cost categories which have grown most notably are (a) compensation costs for animals slaughtered and (b) Defra's own staff costs.

Table 3.4 Public expenditure on bovine TB by cost category, 2003/04

	GB totals (£ '000)	Proportional share (%)	Possible allocation to GOSW (£ '000)
Compensation	34,351	39.0	16,488
Testing	33,180	37.6	15,926
Badger trial	7,253	8.2	3,481
Other research	7,025	8.0	3,372
VLA contracts	5,308	6.0	2,548
Staff costs	1,040	1.2	499
Total expenditure	88,157	100	42,315

Sources: Defra and authors' estimates. GB expenditure totals from Defra (pers. comm.); GOSW authors' estimates using published Defra statistics on the proportion of animals slaughtered (reactors, IRs and DCs) in the GOSW region as the basis for compiling the regional data. Note that this table is intended to illustrate the *relative scale* of the cost categories and the final column should not be taken as providing reliable estimates for the GOSW region.

4 Perspectives

The farm level economic and social impacts of bovine TB

4.1 Although this report is principally concerned with the empirical research commissioned by SWRDA, we were asked to set the findings in the context of the earlier national study (University of Reading, 2004). That work has been the yardstick empirical study on bovine TB since its publication, and the present study explicitly adopted the Reading methodology and analytical structure, albeit with some modification to suit the specific brief of the present research. The research involved 151 farms which had suffered a TB breakdown before 2001, and represented all the TB hotspot areas in England. The principal findings of the Reading study of relevance here were:

- The great variation in farming systems and TB breakdowns make generalisation very difficult, hence the results were presented graphically rather than as quotable averages.
- Some of the potential economic consequences of a TB breakdown could not be estimated: examples include longer-term costs (such as the loss of bloodlines); loss of reputation within the industry (of particular importance for pedigree stock producers); and significant business restructuring (typically, reducing the business's reliance on the cattle enterprise).
- The study noted the often serious social impacts associated with a TB breakdown including a loss of morale, staff recruitment difficulties and the consequences of abnormal stress loads for farming families.
- Business management issues associated with a TB breakdown included cash flow problems and loss of control over the business (for example, the 'unknowns' where cattle could be sold as stores, with lower margins, or finished, risking a further breakdown). The economic impacts were not quantified, but nevertheless accepted as real issues.
- The research found that the actual net economic impacts (after compensation) varied greatly, but that most farms suffered a net loss (79 per cent of dairy farms and 65 per cent of beef farms). Of the relatively small proportions recording a net profit following a TB breakdown, there were a few very substantial 'winners', typically pedigree breeders who secured high compensation sums for potentially valuable animals. Similarly, there was a small number of very substantial 'losers', mainly dairy farms.

4.2 To a large degree, the new research undertaken for the present study both corroborated and extended the Reading findings, albeit using a temporally and spatially distinct sample - it was based on a smaller sample of farms (61 against 151 farms), located exclusively in the Southwest (compared with Reading's 'national' sample), all of which had had a TB breakdown in 2002 or 2003 (Reading's work was based on pre-2001 TB incidents). The telephone survey of 50 farms which suffered a first TB breakdown before 2001 added a longer term perspective, which proved valuable in assessing the overall impacts of TB at farm business level. In that sense,

this study adds considerably to the evidence base of the farm-level impacts of bovine TB.

4.3 Our *corroboration* of the Reading findings arises from our estimates of the identifiable on-farm economic impacts of bovine TB, with our finding that the distributions of net costs broadly map the Reading results, and that the numbers of farms in our survey that made financial gains or losses as a result of a TB breakdown were rather evenly balanced. Moreover, the summary of key Reading findings listed in paragraph 3.1 above could also serve as a summary of findings of the present study.

4.4 However, the present study *extends* the Reading research through its greater focus on the broader economic and social impacts of bovine TB, both at farm level and throughout the rural economy, and this aspect deserves close attention. Some key findings from this area of the new research are as follows:

- Most farmers reported some long-term effects, although the severity of these varied considerably, depending on individual circumstances.
- At best, TB breakdowns cause significant inconvenience and impose additional work on an already hard-stretched labour resource (often largely the farmer and the farm family).
- Most of the adverse effects are related to the impact of movement restrictions following a TB breakdown.
- We found no recorded effects on diversified enterprises, including farm retailing and tourism-related activities.
- Nearly one in five farmers reported negative cash flow effects severe enough to require additional external funding.
- Nearly one in three farmers had cancelled or postponed planned investment in the business – in livestock, premises or equipment.
- Again, nearly one in three farmers had been forced to cancel or postpone expansion plans as a consequence of a TB breakdown.
- Over time (a finding of the telephone sample), one in six farms had diversified away from cattle breeding and production in order to reduce the potential business risk of further TB incidents.

4.5 The extended interviews which formed the basis of the case studies provided further insights into the farm-level effects of bovine TB, of which the following is a case-by-case summary:

- The significant effect of movement restrictions, the impact in terms of change of farming systems and the concern about possible market factors associated with the TB breakdown.
- The loss of markets for pedigree dairy heifers was effectively compensated by the slaughter values received.
- With ongoing movement restrictions for more than two years on an organic farm, the availability of some off-lying land proved to be a very useful asset.

- The TB breakdown raised great concerns about the effects of stress and uncertainty on the farmer, the farm family and on farm staff.
- The breakdown resulted in substantial disruption, with large numbers of Inconclusive Reactors, loss of entitlement to the Extensification supplement and substantial costs.
- Fears that the reduction in livestock numbers for a store producer would adversely affect the farm's SPS entitlement (when interviewed, the farmer was awaiting the outcome of his appeal).
- The economic effects were fairly muted for a pedigree suckler producer, but a farm employee experienced severe stress.

4.6 It is clear from these findings that the personal impacts on farmers, their families and farm staff are widespread, though there appears to be a general reluctance to highlight this. Not surprisingly, such impacts are both more likely, and usually more pronounced, on farms where the effects of the TB breakdown have been moderate or considerable, taking into account both scale and temporal aspects. We have found evidence of serious emotional impacts, with higher levels of stress and anxiety typically being experienced. An important contributory cause has been the increase in uncertainty about the future, both about the longer term implications for the business and its personal effects on individuals. All of this is compounded by an acute sense of frustration and dismay about an apparent lack of progress in regaining control over a disease that was once thought to have been eliminated as an economic threat to agriculture.

4.7 Overall, this study confirms earlier findings of a significant impact at farm level from the movement restrictions imposed after a TB breakdown. In the great majority of cases, the total cost of a breakdown exceeds the total value of payments made for slaughtered stock, even in the (relatively few) instances where those payments are supplemented by (usually modest) receipts from the farmer's insurer. Although problems with livestock accommodation and over-stocking can sometimes be alleviated by early disposal, adverse animal health, welfare and economic impacts frequently occur. Insurance against the impact of bovine TB is now difficult, if not impossible, to obtain for farms in areas considered to be higher risk; even for farms already insured, the level of premiums has risen considerably to reflect the greater insurance risk. The most severe effects of a TB breakdown are seen where farms are under more-or-less continuous movement restrictions for months at a time, even years, as a result of successive breakdowns or incidents.

The impacts of bovine TB across the rural economy

4.8 The broader effects of bovine TB on the rural economy are mixed and, for the most part, fairly modest. A number of business sectors have experienced positive effects as a direct result of the disease, with veterinary practices in particular having gained work; respondents estimates ranged between 10 and 25 per cent increase in their turnover. However, the work is not without its frustrations and there is evidence that it is not highly regarded within the profession. Many agricultural valuers have also benefited from the extra work associated with the disease, but some regard it as not particularly profitable work. One described it as a loss leader, another as a service to customers, although others saw its wider potential in keeping in touch with farmers

under movement restrictions. Some agricultural hauliers, too, reported some benefit from increased business, although the evidence there was patchy.

4.9 Other business sectors reported negative effects arising from bovine TB. Agricultural engineers reported clear depressive effects on machinery sales from bovine TB in their area. Their farmer customers were said to have been affected by negative cash flow problems and depression, with an absence of the optimistic attitude associated with buying decisions. The disinclination of farmers to buy new tractors was a particular problem, and one of the businesses had seen fit to diversify into other areas of business activity. One diversified farm, a unpasteurised cheesemaker, had experienced significant difficulties and a reduced turnover and expressed concerns about the future pattern of the disease.

4.10 Beyond these specific areas, and more generally, respondents were unaware of any significant effects from bovine TB. Agricultural suppliers saw a broad balance between those farmers spending more through keeping more stock because of movement restrictions and those spending less because of reduced cash flows. An insurance company had lost money on TB underwriting, but TB had not seriously damaged its business overall. Beyond the agricultural ancillary industries, those more peripheral to agriculture such as those providing services to tourists were generally not aware of any impacts from TB. Two farm-based tourist attractions had not been seriously affected, but were concerned about its possible future impacts. The research findings from the farmer surveys regarding the rise in stress levels associated with the rising incidence of TB was supported by respondents working with agricultural support agencies, who generally expressed concern over the burden placed on businesses, individuals and families by the disease.

Concluding discussion

4.11 Bovine TB is a serious problem with both economic and social impacts for farmers. They arise principally because of restrictions imposed on the movement of animals, part of the standard procedures for the control of notifiable diseases in livestock. Although the precise estimation of the full economic impact of a bovine TB breakdown is acknowledged to be impossible (University of Reading, 2004; NAO Wales, 2003), there is little disagreement that the total cost of a TB incident generally exceeds payments for the livestock slaughtered. Statutorily, however, compensation values cannot reflect broader, longer term losses, but must be restricted to the market value of the animals taken, given that they were not infected with TB. This study has corroborated the earlier University of Reading findings that while most farms have been adequately compensated in that narrow sense, there are significant economic impacts which typically have to be borne by the farm business concerned.

4.12 There are also important social impacts on the farm family and farm staff, a finding which again is consistent with earlier studies. The personal costs arise from several sources, including emotional responses to the loss of particular animals or bloodlines, concerns about the animal welfare implications of retaining stock for longer than planned, the implications of a TB incident in terms of business uncertainty and forward planning, the 'hassle factor' associated with additional tasks (such as the testing and isolation of animals) and sheer frustration at the apparent lack of progress in controlling the disease. Where insurance is available at an economically justifiable cost, it can help with meeting the consequential losses, but costs of such insurance are

rising and its availability increasingly restricted because of the rising incidence of the disease (NAO Wales, 2003).

4.13 The contribution of the present study to the debate about the level of compensation for bovine TB is to identify the possible effects of a reduction in the average level of payment under the new regulations. Since Defra has a statutory duty to compensate only for the market value of the animal(s) taken, there is an inherent dissonance between the industry's view of 'fair compensation' and what may be termed society's view. Not only does the compensation regime seek to offer fair compensation only for individual animals, rather than for the effects on the business as a whole, but it cannot meet the additional, consequential losses usually arising from a TB incident. This goes a long way to explain the conflicting assessments of the adequacy of the system. Moreover, the livestock industry went through an economic recession for several years from the late 1990s. Thus, farms were not in a robust financial situation and may have felt the adverse impacts of a TB breakdown more strongly and recovered from them less rapidly. Furthermore, where compensation resulted in a net contribution to farm profit (albeit in most cases small), its impact was masked by the overall situation. Finally, even where the result of the breakdown was a net profit, the negative cash flow effects could still cause financial problems.

4.14 The new research points to an unequivocal conclusion. An outbreak of bovine TB can have a serious, or worse, effect on the farm business concerned, and movement restrictions - sometimes for extended periods - can make its impact worse than that of an outbreak of Foot and Mouth Disease. It is the longer-lasting effects that are the source of most of the damage done to the farming industry by bovine TB. Where they apply - and it is not in every case that longer-term effects are found - they typically result in significant consequential effects on the economic performance and growth of the farm business, and not infrequently are associated with serious stress affecting at least some of the farmer, the farm family and the farm staff. Our research found, for example, that up to one in five of calls made to the Rural Stress Information Network arise from the direct and indirect effects of bovine TB. Given the essentially regional location of the main TB hotspots, and the national role of the RSIN, this is a significant finding which points to the reality of increased social and personal pressures arising from bovine TB.

4.15 It is very difficult, however, to generalise at the level of the individual farm, because every bovine TB incident is different and its impact is mediated through the widely differing circumstances of the farms and farming systems involved. Nevertheless, the impacts of the disease are often very significant at farm level in economic terms, and some level of increased stress in the farming population is widely reported. However, the new research found little evidence of measurable adverse economic effects arising from bovine TB within the wider rural economy, and in this respect the consequences of the disease are different from those associated with FMD. Concerns for the future were frequently expressed, and this aspect remains the crucial element in assessing the present position. Although there is little evidence so far of any widespread knock-on effects, such as increased consumer concerns about the rising incidence of bovine TB, the operators of many businesses fear that this may become a reality over the coming years unless the tide can be turned in the control of the disease. If the disease is not rolled-back, there could be dire and widespread consequences for the agricultural and rural business sectors of the Southwest.

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APPENDIX A1**Probability distributions of costs of TB****Figure**

- A1 Total testing costs per breakdown
- A2 Cost per animal tested
- A3 Testing costs per summer test (whole farm)
- A4 Testing costs per winter test (whole farm)
- A5 Mean value of tests
- A6 Total costs of breakdown
- A7 Testing costs per animal tested
- A8 Cost of isolating reactors
- A9 Total costs associated with isolating Inconclusive Reactors
- A10 Cost of movement restriction
- A11 Restocking costs
- A12 Cost of disinfecting premises
- A13 Long term costs associated with TB – Necessity
- A14 Long term costs associated with TB – Voluntary
- A15 Total long term costs associated with TB

Figure A1 Total testing costs per breakdown

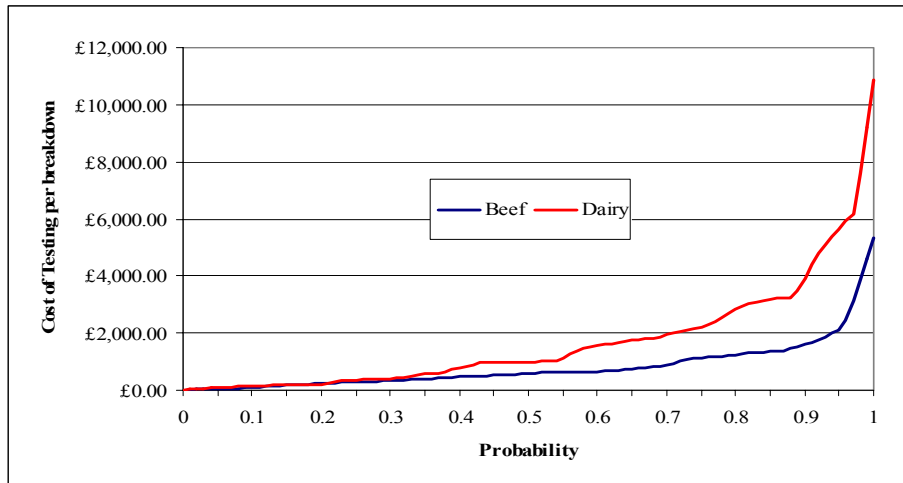


Figure A2 Cost per animal tested

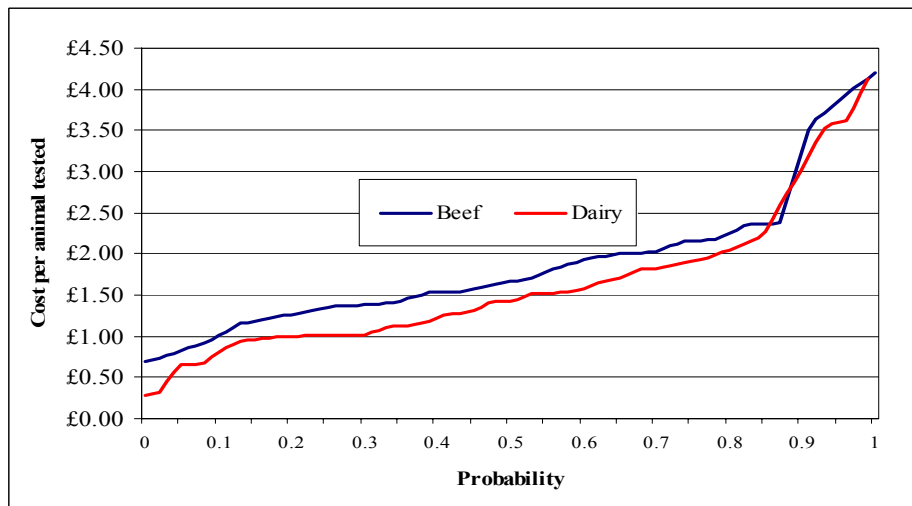


Figure A3 Testing costs per summer test (whole farm)

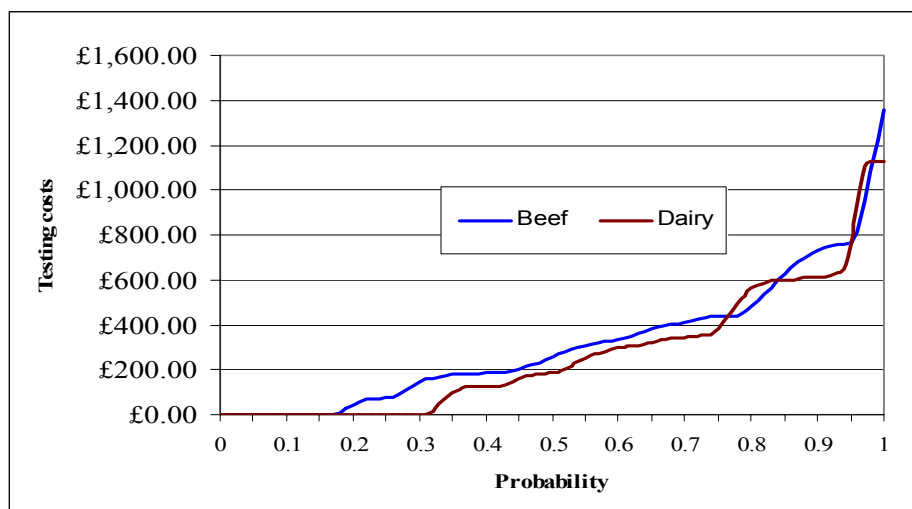


Figure A4 Testing costs per winter test (whole farm)

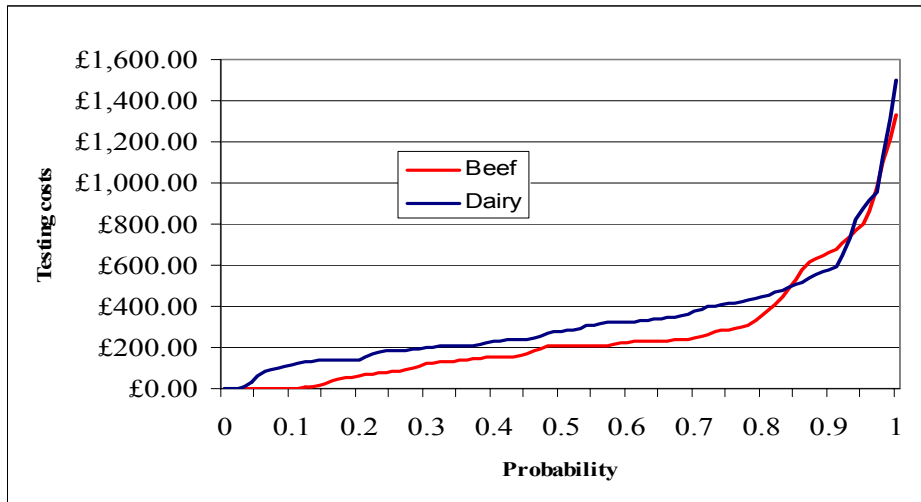


Figure A5 Mean cost of tests

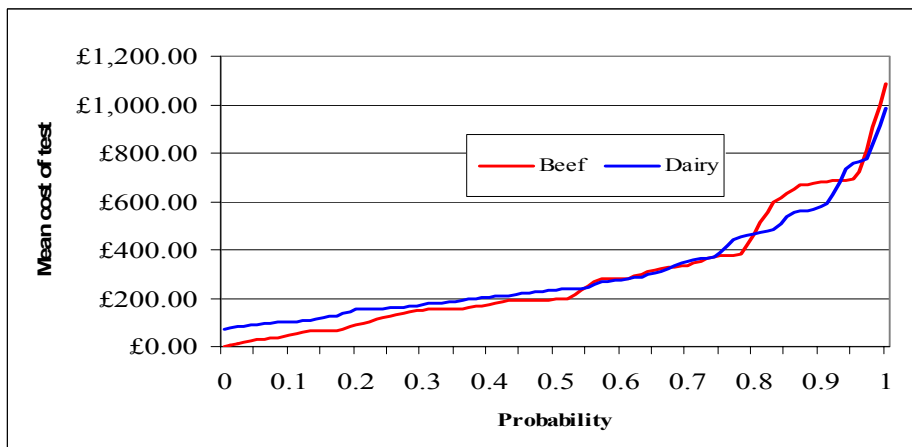


Figure A6 Total costs of breakdown

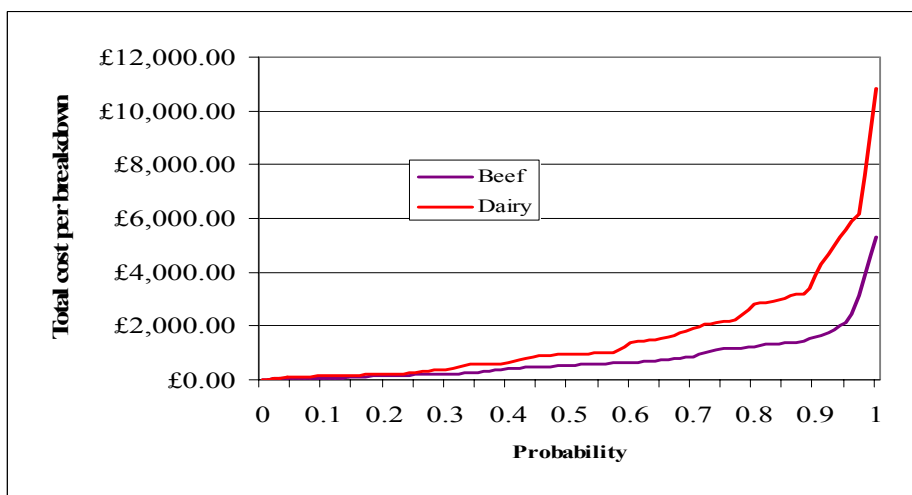


Figure A7 Testing costs per animal tested

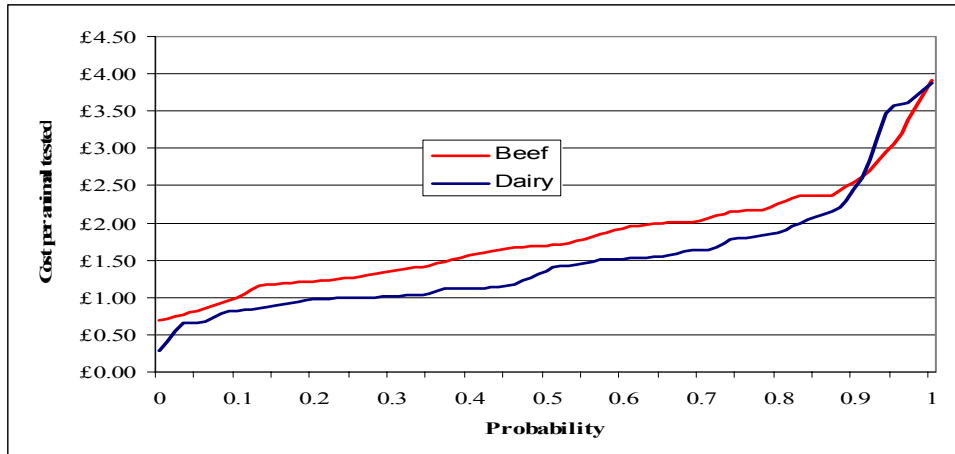


Figure A8 Cost of isolating reactors

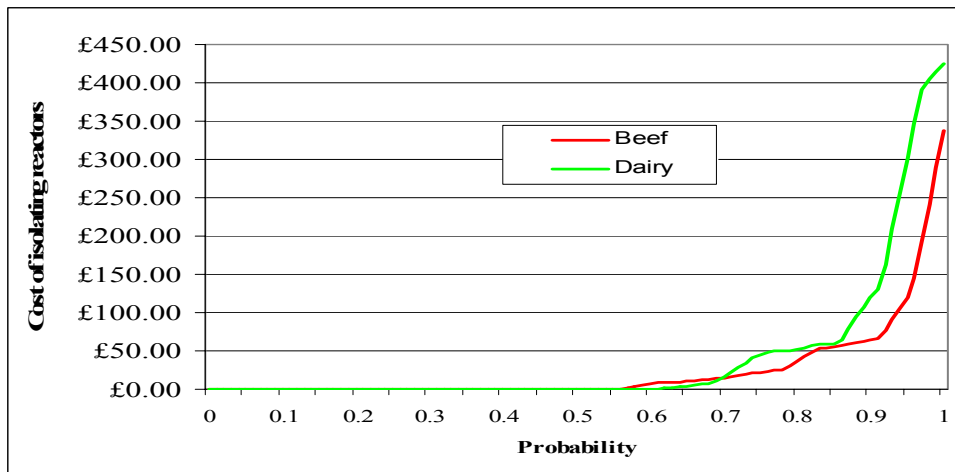


Figure A9 Total costs associated with isolating Inconclusive Reactors

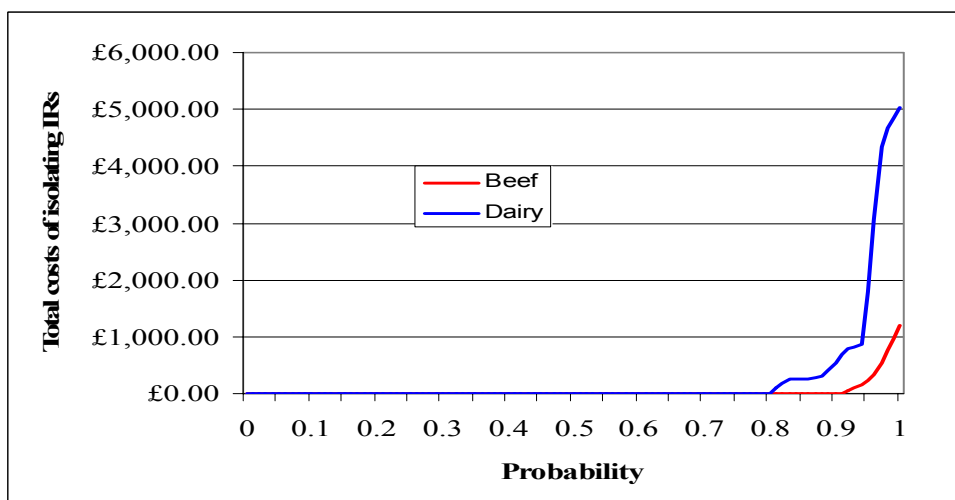


Figure A10 Cost of movement restriction

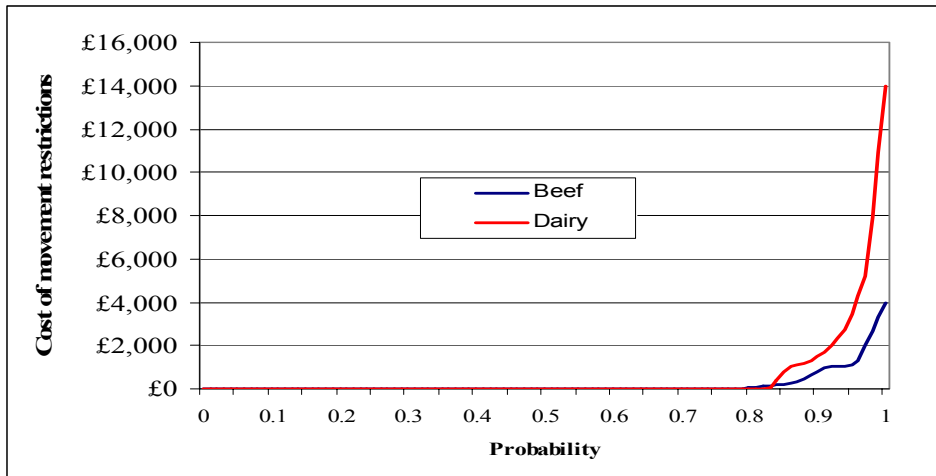


Figure A11 Restocking costs

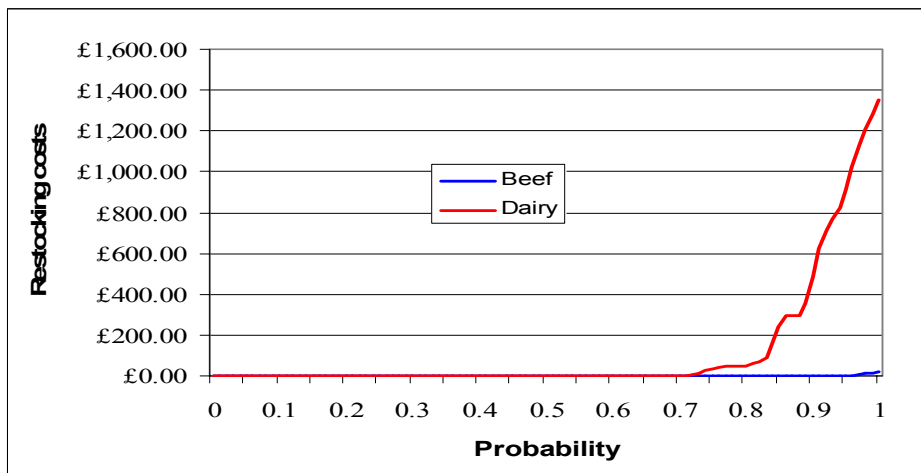


Figure A12 Cost of disinfecting premises

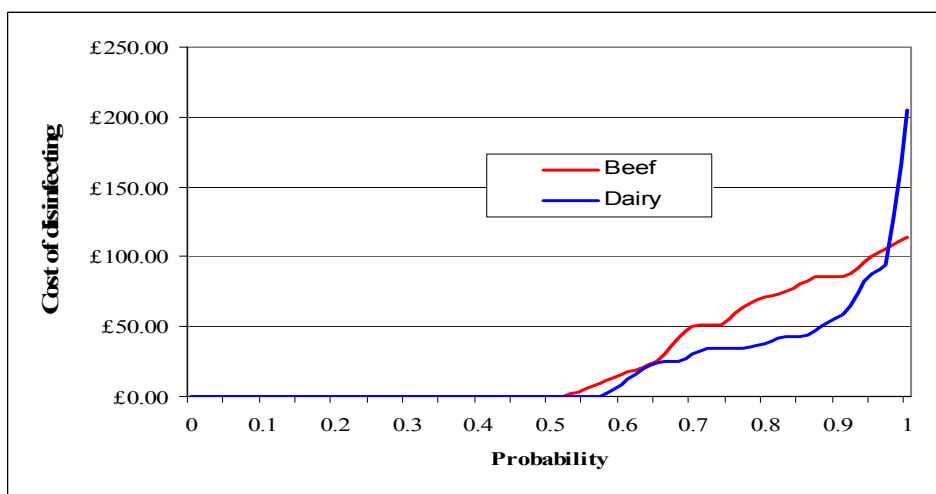


Figure A13 Long term costs associated with TB – Necessity

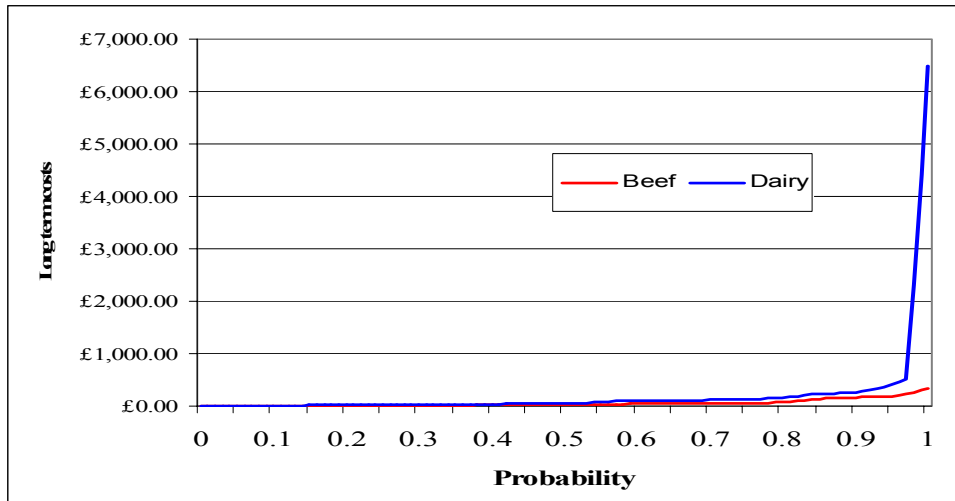


Figure A14 Long term costs associated with TB – Voluntary

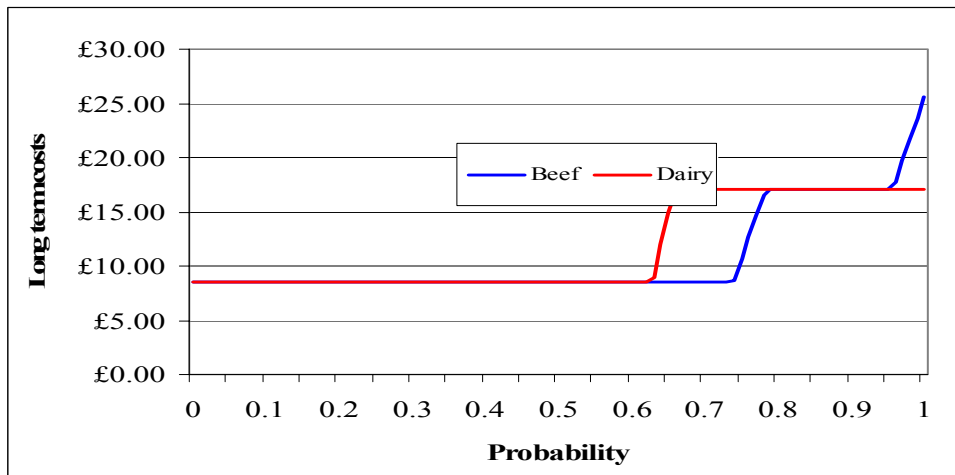
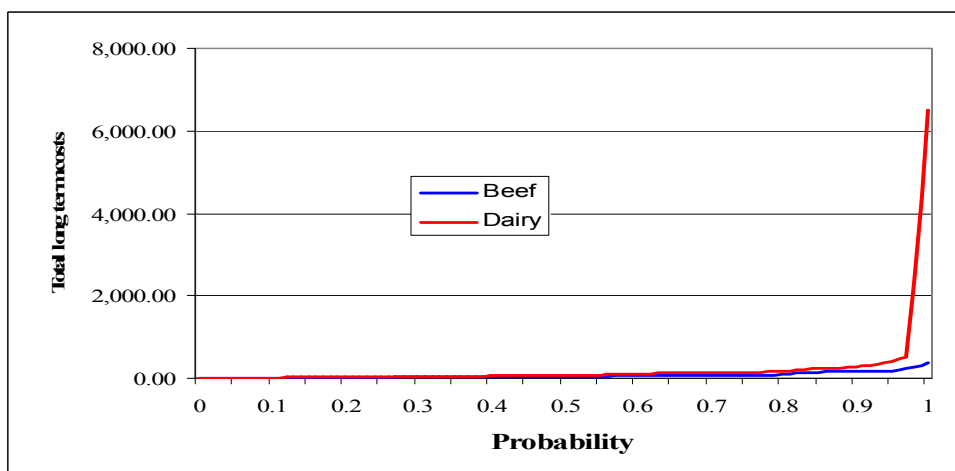


Figure A15 Total long term costs associated with TB



APPENDIX A2

Questionnaire used in the farmer interview survey

University of Exeter

Centre for Rural Research

FARMER INTERVIEW SURVEY

PART OF THE ECONOMIC IMPACT ASSESSMENT OF BOVINE TUBERCULOSIS IN THE SOUTH WEST

Farm code Interviewer

SECTION A INTERVIEWEE, LABOUR AND FARM DETAILS

QUESTION 1 PERSONAL AND BUSINESS DETAILS

Please tick box below relevant item

	Sole trader	Partner	Manager	Tenant	Other
Interviewee					
	Sole proprietor	Company	Family partnership	Other partnership	Other
Business					
	Up to 30	31 – 40	41 – 50	51 - 60	Over 60
Age group					

QUESTION 2 FARM LABOUR

Please write relevant numbers of each type in boxes below item

	Full time	Part time	Casuals	Of which:	
				Contact with cattle	Drink raw milk
Family (paid)					
Family (unpaid)					
Employed					

QUESTION 3 LAND USE

Please fill in the relevant land areas in the table below

Answer given in (circle) ha / acres

Total Home Farm area		Grassland	
Arable area (not including forage crops)		Grazing land away from main farmstead	
Forage maize		Common grazing – summer only – all year – other (specify)	
Fodder crops			

QUESTION 4 FARM ENTERPRISES

a) Rank farm enterprises in value of output order and identify organic or pedigree status

Enterprise	Rank	Organic (tick)	Pedigree (tick)
Dairy			
Beef			
Sheep			
Pigs			
Poultry			
Arable			
Other non agricultural enterprises (specify)			

b. Pedigree livestock details.

c) Any other comments relevant to Section A.

QUESTION 5 DATE OF MOST RECENT TB BREAKDOWN

a) Date of most recent TB Breakdown ____/____ 200

SECTION B CATTLE ENTERPRISE DETAILS**QUESTION 6 CATTLE NUMBERS**

a) Please enter an average number of each type of cattle usually carried by the farm

	Average		Average
Dairy cows		Suckler cows	
Breeding dairy bulls (owned)		Breeding beef bulls (owned)	
Hired dairy bulls		Hired beef bulls	
Unweaned dairy calves		Unweaned beef calves	
Dairy replacements		All other beef cattle	

Other (specify)

b) Comments regarding cattle numbers

QUESTION 7 DAIRY ENTERPRISE

a) Annual average yield/cow _____ litres

b) Do you operate a 'closed herd' policy? Yes / No
 If yes, please provide details

c) What is your current dairy cow replacement rate? _____%

Is that rate higher than before you experienced TB? Yes / No

Is any increase deliberate Yes / No

What are the reasons for any increase?

d) Calving pattern (tick box)

All year round	Mainly autumn	Mainly winter	Mainly spring	Mainly summer

e) Cattle sales. Please provide average number of sales each year for each type of cattle

Cattle type	Number
Surplus calves	
Cull cows	
Milking cows	
Calved heifers	
Bulling heifers	

f) Cattle purchases. Please provide average number of yearly purchases for each cattle type

Cattle type	Number
Bulling heifers	
In-calf heifers	
Newly calved cows	
In-calf cows	
Heifer calves	
Other (please specify)	

QUESTION 8 BEEF ENTERPRISE

- a) Beef system. Please indicate the type of system(s) operated by ticking all that apply and indicate percentage of time housed and at grazing (i.e. taking substantial amounts of fodder from grazing)

	System	Housed	Grazing
	Single/multiple suckled beef breeding herd		
	Purchased calves/calves transferred from own dairy herd		
	Buying weaned calves or stores		
	Selling stores		
	Selling finished		
	Cereal beef		
	Bull beef		

- b) Do you operate a 'closed herd' policy? Yes / No
 If yes, please provide details
- c) If you have suckler cows, what is your current replacement rate? _____ %
 Is that rate higher than before you experienced TB? Yes / No
 Is any increase deliberate – e.g. to give relief from the effects of TB? Yes / No
- d) Cattle purchases and sales. Provide average number of yearly purchases and sales and for sales other than culls please indicate age at sale in months

Purchases	Number	Age
Suckler cows		
Stores		
Unweaned calves		
Weaned calves		
Other (specify)		
Sales		
Cull suckler cows and bulls		
Finished cattle (housed)		
Finished cattle (off grass)		
Store cattle		
Breeding stock		

Comments:-

SECTION C. COSTS OF A TB TEST**QUESTION 9**

a) Routine testing frequency pre-breakdown (tick box)

Yearly		Every 3 years	
Every 2 years		Every 4 years	

QUESTION 10 TESTING

a) Skin test. Please indicate the number of man-hours spent on skin test

Season of test	Number tested	Number of people	Hours per person
Summer			
Winter			

b) Reading results. Please indicate the number of man-hours spent on reading skin test results

Season of test	Number tested	Number of people	Hours per person
Summer			
Winter			

c. Do you employ additional staff on TB testing days? Yes / No

If yes, how many? (these should have been included in the table at a) above)

d. Does TB testing disrupt other farm activities/enterprises? _____ Yes / No

If yes, please provide details

QUESTION 11 PRODUCTION LOSSES.

a) Milk production losses associated with skin test

Comments:

b) Milk production losses associated with reading

Comments:

c) What do you think are the main causes of these losses?

d) Production losses to the beef enterprise. Provide details if any

QUESTION 12 FURTHER COSTS AND IMPLICATIONS OF TB TESTING

Please list and provide details of any costs and further implications to the farm business from TB testing e.g. livestock stress, fertility reduction, abortions, etc.

SECTION D COSTS ASSOCIATED WITH TB BREAKDOWN(S)

QUESTION 13 NUMBER OF BREAKDOWNS IN THE LAST 10 YEARS.

	Confirmed	Unconfirmed
Number		

a) For how long did the longest outbreak last? _____ months

b) For how long did the shortest outbreak last? _____ months

QUESTION 14 DETAILS OF MOST RECENT BREAKDOWN

a) Information regarding most recent breakdown

Start date _____

Clear date _____

Number of tests carried out during last breakdown* _____

Where was the TB first detected? (tick box)	Routine test	Abattoir	Post-IR test	Contiguous (or neighbourhood) test	Other (please state)

* The initial test and reading, 72 hours later, count as one test

b) Cattle not subject to repeat testing and movement restrictions, give details

Number	Time away (from month to month)	Cattle type

QUESTION 15 DETAILS OF REACTORS

- a) Enter number of Reactors at each test (commencing with the test (test 1) at which the most recent breakdown was identified and following which movement restrictions were first applied)

Test number	1	2	3	4	5	6	7
Number of reactors at each test							
Number in calf							
Cattle type (see notes for Fieldworkers for cattle codes)							

- b) Were Reactors usually isolated (circle) **Inside** **Outside** **Neither**

- c) Amount of time Reactors were in isolation _____ days

QUESTION 16 COSTS ASSOCIATED WITH ISOLATION OF REACTORS

- a) Extra man-hours. Details of extra man-hours associated with isolation of Reactors.

- b) Extra bedding. Details of extra bedding used with isolation of Reactors

- c) Extra equipment. Give details. *(NB. Be sure this really was for isolation of reactors)*

- d) Production losses concerned with isolation of reactors. Give details

- e) Other losses concerned with isolation of reactors. Give details

- f) During calendar years 2003 and 2004, how long have reactors typically been left on your farm before collection?

Less than 10 days	10–19 days	20-29 days	30 or more days

Shortest time? _____ days

Longest time? _____ days

QUESTION 17 DETAILS OF INCONCLUSIVE REACTORS (IR's)

- a) Number of Inconclusive Reactors at each test (commencing with the test (test 1) at which the most recent breakdown was identified and following which movement restrictions were first applied)

Test number	1	2	3	4	5	6	7
Number of new IR's at each test							
IR's clear at subsequent tests							
IR's becoming reactors at subsequent tests							
Cattle type (see instructions)							

- b) Are IR's usually isolated (circle) **Inside** **Outside** **Neither**

If there is more than one IR, are they usually isolated?

(circle) **Individually** **In a group or groups**

- c) Details of any Direct Contacts (DC's) slaughtered

QUESTION 18 COSTS ASSOCIATED WITH ISOLATION OF IR'S

- a) Extra man-hours. Details of extra man-hours associated with isolation of IR's.

- b) Extra bedding. Details of extra bedding used with isolation of IRs.

- c) Extra equipment. Give details. *(NB. Be sure this really was for isolation of reactors)*

d) Production losses associated with isolation of IRs. Give details.

e) Other losses concerned with isolation of IRs. Give details.

f) Do you routinely dispose of Inconclusive Reactors? Yes / No

If no, would you do so if compensation was offered? Yes / No

If yes, what would you estimate the cost of disposal to be? £ _____

QUESTION 19 COMPENSATION AND INSURANCE

a) Do you insure against a TB breakdown (please circle)? Yes / No

b) Total sum covered £ _____ (*could be expressed as % of value*)

c) What is your annual premium? £ _____ Excess? £ _____

d) By how much has the premium (the TB element alone) increased since before you had TB?

e) Total compensation received and dates- *Defra compensation, insurance on culled stock, etc., consequential loss* £ _____

date	Type of compensation	£

f) Details of any arbitration or valuation disputes concerning cattle slaughtered

g) Length of time between testing and receiving compensation payment.

h) Length of time between testing and receiving insurance payment

i) Do you think the current levels of compensation are adequate? Yes / No

j) Reasons for your answer

SECTION F MOVEMENT RESTRICTIONS**QUESTION 20 ANIMALS AFFECTED BY MOVEMENT RESTRICTIONS**

a) How many animals of the following types were subject to restrictions on movements *that you would otherwise have made*?

	Dairy cows (culls)	Suckler cows (culls)	Finished cattle	Beef calves	Others (specify)
Number					
Length of time					

b) What were the consequences of this?

c) Have you sent any cattle directly to the abattoir? Give details.

d) Costs and losses associated with sending cattle to market under special licence

e) Have you lost specific sales contracts (such as M&S or Waitrose)? Yes / No

QUESTION 21 THE MOLE VALLEY FARMERS CALF INITIATIVE

a) Have you made use of the Mole Valley Farmers (or similar) calf initiative as a way of marketing calves? Yes / No

b) If Yes, do you have any comments on how it worked and the advantages/disadvantages?

**SECTION G OTHER COSTS ASSOCIATED WITH TB
BREAKDOWN****QUESTION 22 RESTOCKING**

a) Have you restocked with purchased cattle following the most recent breakdown? Yes / No

b) If NO, have you ever bought cattle to replace those lost to TB? Yes / No
If yes, please provide details

c) Have you had restrictions imposed on you regarding restocking? Yes / No

If Yes and re-stocking was delayed, what were the financial and other effects?

d) (Pedigree breeders) Have you lost whole blood lines? Yes / No

e) If you have bought cattle to replace losses, where were they purchased?

f) Did you encounter any problems in finding the right cattle to replace those lost?

Yes / No

If yes, please provide details

g) Apart from the cost of the cattle, what were the costs of replacement in terms of time, travel, haulage etc.?

Man hours	hours	
Vehicle mileage	miles	
Haulage	£	
Other	£	

h) If you have bought stock to replace TB losses, have there been any wider implications of introducing the purchased replacements into the herd (e.g. effects on seasonality of production)?

i) Have you placed new stock in separate isolation facilities? Yes / No

j) Have you ever been short of stock as a result of TB losses and re-stocking restrictions/difficulties in sourcing new stock? Yes / No

QUESTION 23 FURTHER COSTS ASSOCIATED WITH MOST TB RECENT BREAKDOWN

Ask the Interviewee to list any other areas where he/she feels that costs have been incurred owing to the TB breakdown. Record any relevant details.

QUESTION 24 (21) EFFECTS ON MILK QUOTA

What have been the effects on your milk quota?

Litres under quota due to removal of reactors		Litres over quota due to movement restrictions	
Amount leased out – litres Cost £		Amount leased in – litres Cost £	
Amount sold – litres Cost £		Amount purchased – litres Cost £	

QUESTION 25 EFFECTS ON MILK PAYMENTS AND SALES

Provide details of any effects TB had on milk payments (price or premium) or sales

QUESTION 26 EFFECTS ON SUBSIDIES

a) Please indicate which subsidies are claimed and how TB breakdown has affected them

	Claimed	Affected
Suckler Cow Premium		
Suckler Cow Extensification suppl.		
BSPS (10 month)		
BSPS (10 month) Extensification supplement.		
BSPS (bull premium)		
BSPS (22 month)		
BSPS (22 month) Extensification supplement.		
Countryside Stewardship		
Other		

b) Was the level at which you were eligible to claim the Extensification Supplement affected? (circle as appropriate)

NOT AFFECTED / AFFECTED - Higher/Lower/Became eligible/Became Ineligible

c) For those subsidy claims that were affected, how and what was the approximate cost to you?

QUESTION 27 DISINFECTATION OF PREMISES

Number of times premises have been disinfected	Man hours for each	Chemicals Purchased (cost)	Pressure washer hire (cost)

QUESTION 28 DETAILS OF OTHER COSTS LISTED ASSOCIATED WITH THE MOST RECENT BREAKDOWN

List any relevant details associated with costs incurred listed in question 19.

SECTION H LONG TERM EFFECTS OF TB

QUESTION 29 LONG TERM COSTS ASSOCIATED WITH TB

a) Detail of time spent dealing with paperwork and interviews following a breakdown – *be careful not to double count*

Additional time cost	Directly & necessarily because of TB breakdown	Research interviews and questionnaires etc. completed voluntarily
Paperwork		
Telephone calls		
On and off farm meetings (including travel time)		
Other		

b) Has TB had implications for your use of agricultural or other contractors, including relief milkers? Yes / No

If Yes, give details (E.g. Have contractors shown reluctance to work on your farm; scheduled work on your farm differently from if you had not had a TB breakdown; do they take special cleaning and disinfecting precautions after working on your farm; have you been charged extra for this. Have you yourself decided against the use of contractors at any particular time?)

c. Details of any other long-term effects of persistent TB breakdowns to the business

QUESTION 30 EFFECTS OF TB ON NON AGRICULTURAL ENTERPRISES

Enterprise **Effect**

QUESTION 31 IMPACT OF TB ON BUSINESS DECISIONS

a) Have you already or are you considering, any of the following in response to difficulties caused by TB?

Take out a loan or increase the overdraft to overcome losses/cash flow difficulties
Yes / No

Cancel or postpone investment in stock, premises or equipment
Yes / No

Cancel or postpone expansion plans for the business
Yes / No

Diversify into other or new lines of business
Yes / No

b. Is there any other business tactic or strategy you have used or are considering using to reduce losses caused by TB?
Yes / No

If yes, please provide details

SECTION I CONTROL STRATEGIES

QUESTION 32 PREFERRED STRATEGY

a) Are you in a Krebs Trial area
Yes / No

If Yes, which part?

QUESTION 33 BIOSECURITY

a) For the future, which of the following biosecurity measures might you consider? (tick relevant boxes)

Biosecurity measure	Only if grant aided	Even if no grant aid	Already done	Cost (<i>quantify with details of metres of fencing, days' labour, etc.</i>)
Fence off identified wildlife habitats, walkways, etc.				
Proof buildings, silage clamps, etc. against wildlife				
Raise height of feed and water troughs				
Use strip grazing with backing fence				
Reduce stocking rate				
Double fence farm boundaries				
Isolation of Reactors & IRs				
Isolation of incoming cattle				
Stop spreading slurry on grazing land				
Pre-movement testing				
Herd health plan (to include sourcing of cattle)				
Separate personnel for separate units				
Other				

b) Any comments

QUESTION 34 OTHER FARM LEVEL CONTROL STRATEGIES

If TB eradication measures were decentralised, are there any other control strategies you would adopt or have adopted on your farm, please list.

QUESTION 35 ADDITIONAL INFORMATION OR SPECIAL CASES

For example, if TB is severe enough, DEFRA sometimes agrees with farmers to slaughter the whole herd, with compensation. Do you believe you would have benefited from that in your last breakdown? Why?

SECTION J SOCIAL & PERSONAL HEALTH IMPACT OF TB**QUESTION 36 SOCIAL & PERSONAL HEALTH IMPACT OF TB**

(Include personal injury as well as social aspects, family & community relations, etc.)

a) Has TB affected your daily life in any way? Yes / No

If yes, how?

b) Has TB affected your family or household in any way? Yes / No

If yes, how?

c) Has TB affected your employees in any way? Yes / No / No employees

If yes, how?

d) Has TB affected your community in any way? Yes / No

If yes, how?

Would you be willing to allow us to access your TB99 data if necessary? Yes / No

Would you like to receive a summary of the findings of this study? Yes / No

Thank you very much for your time and co-operation

APPENDIX A3

Questionnaire used in the farmer telephone survey

University of Exeter

Centre for Rural Research

FARMER TELEPHONE SURVEY

PART OF THE ECONOMIC IMPACT ASSESSMENT OF BOVINE TUBERCULOSIS IN THE SOUTH WEST

Interviewer:

Interviewee: Position: (Farmer/ Manager/ Other (specify))
.....

Telephone No.

Postcode

1. FARM ENTERPRISES

a. Farm enterprises in order of importance

Enterprises	Rank
Dairy	
Beef	
Sheep	
Pigs	
Poultry	
Arable	
Other non agricultural enterprises (specify below)	

b) Has there been a further TB breakdown on your farm in the past three years?
Yes / No

If so, date?

c) Has there been a change in enterprise or enterprise mix on the farm in the past three years as a direct result of bovine TB?
Yes / No

If yes, please provide detail

2. COSTS OF A TB TEST

a. Is your experience of TB testing that it is now more or less disruptive or expensive than it was in 2002?

	More	Less	The same
Disruption			
Cost			

b. Do you employ additional staff on TB testing days? Yes / No

If yes, how many additional man hours?

c. Has TB testing made important differences to the timeliness of other farm activities or the management of other farm enterprises?

Yes / No

If yes, please provide detail

d. Have there been any other changes to the way in which TB testing affects your business?

Yes / No

If yes, please provide detail

3. COSTS ASSOCIATED WITH TB BREAKDOWN(S)

a. Do you feel differently now, two years on/following your experience of a further breakdown about the costs associated with a TB breakdown?

Yes / No

If yes, please provide detail

b. Have there been associated or ongoing costs impacting on the other areas of your farm business?

Yes / No

If yes, please provide detail

c) Do you have diversified farm activities, such as Farm Contracting, B&B, Farm Shop, fishing lakes, etc.?

Yes / No

Has TB had an impact on the financial or other success of those activities?

4. RESTOCKING

a. Have you restocked with purchased cattle following the most recent breakdown?

Yes / No

b. If NO, have you ever bought cattle to replace those lost to TB?

Please provide detail

c. If you have bought cattle to replace losses, where were they purchased?

d. Did you encounter any problems in finding the right cattle to replace those lost?

Yes / No

If yes, please provide detail.

e. Apart from the cost of the cattle, what were the costs of replacement in terms of time, travel, haulage etc.?

Man hours	hours	
Vehicle mileage	miles	
Haulage	£	
Other	£	

f. If you have bought stock to replace TB losses, have there been any wider implications of introducing the purchased replacements into the herd (e.g. effects on seasonality of production)?

5. LONG TERM EFFECTS ASSOCIATED WITH TB

a. Detail of time spent dealing with paperwork and interviews following a breakdown

Additional time cost	Directly necessary because of breakdown	Research interviews and questionnaires etc. (completed voluntarily)
Paperwork		
Telephone calls		
On and off farm meetings (including travel time)		
Other		

b. Has TB had implications on your use of agricultural or other contractors?

Yes / No

If yes, please give detail (E.g. Have contractors shown reluctance to work on your farm; scheduled work on your farm differently from if you had not had a TB

breakdown; do they take special cleaning and disinfecting precautions after working on your farm; have you been charged extra for this. Have you yourself decided against the use of contractors at any particular time?)

c. Details of any other long-term effects on the business of persistent TB breakdowns

6. EFFECTS OF TB ON NON AGRICULTURAL ENTERPRISES

a. Has TB had an impact on any diversified or non agricultural enterprises?

Enterprise	Effects of TB

7. IMPACT OF TB ON BUSINESS DECISIONS

a. Have you already or are you considering, any of the following in response to difficulties caused by TB?

Take out a loan or increase the overdraft to overcome losses / cash flow difficulties

Yes / No

Cancel or postpone investment in stock, premises or equipment

Yes / No

Cancel or postpone expansion plans for the business

Yes / No

Diversify into other or new lines of business Yes / No

b. Is there any other business tactic or strategy you have used or are considering using to reduce losses caused by TB? Yes / No

If yes, please provide details

b. Any other comments of the impact of TB on business decisions. Give detail

SECTION 7. SOCIAL IMPACT OF TB

a. Has TB affected your daily life in any way? Yes / No

If yes, how?

b. Has TB affected your family or household in any way? Yes / No

If yes, how?

c. Has TB affected your employees in any way? Yes / No / No employees

If yes, how?

d. Has TB affected your community in any way? Yes / No

If yes, how?

Thank you for your time and co-operation with our study.

APPENDIX A4

Questionnaire used in the stakeholder telephone survey

University of Exeter

Centre for Rural Research

STAKEHOLDER TELEPHONE SURVEY

PART OF THE ECONOMIC IMPACT ASSESSMENT OF BOVINE TUBERCULOSIS IN THE SOUTH WEST

1. BUSINESS/ORGANISATION DETAILS

Name of business/organisation

.....

Address:

.....

.....

.....

Postcode:

Interviewee: Position:

.....

2. Please describe the nature of all the business/organisation activities

3. Is the establishment a non profit or public service organisation? Yes / No

If yes, proceed to question 23

4. How many people are employed at the address?

	Total	Permanent	Temporary/seasonal
Full time staff			
Part time staff			
Total			

5. Is the business local, regional or national? (circle) Local Regional
National

6. Has the business been affected by TB? Yes / No

If NO, do you expect it will be in the future if the number of TB incidents continues to rise?

Please provide detail and then end:

THOSE WHO HAVE BEEN AFFECTED BY TB

7. Has the business been affected in a negative or positive way? Negative /
Positive

Negative effects

8. Overall, would you describe the effects as:

- Very severe/devastating/business threatening
- Severe/major negative impacts
- Moderate/significant negative impacts
- Slight/some negative impacts

8. What has caused the difficulties? Give detail

Positive effects

9. Overall, would you describe those effects as:

- Giving a strong boost to the business
- Giving a moderate boost to the business
- Giving a slight boost to the business

10. How has TB given your business a boost? Give detail

ALL RESPONDENTS

11. What percentage change in turnover has TB had on the business?

Lower – turnover is down by %

Higher – turnover is up by %

12. Could you put an approximate cash value on the change in turnover?

- Losses of £ - Q13
 Gains of £ - Q 21
 Don't know - Q13 (negative) or Q21 (positive)
 Refused - Q13 (negative) or Q21 (positive)

THOSE WITH NEGATIVE EFFECTS DUE TO TB

13. Have you made any staff redundant as a direct result of reduced trade or income caused by TB? Yes / No

If yes, please provide detail

How many full time redundancies?

How many part time redundancies?

14. Have you reduced the hours of work for any staff as a direct result of TB?

Yes / No

If yes, please provide detail

THOSE WITH NEGATIVE EFFECTS FROM BOVINE TB CONTINUED

15. Have you already or are you considering, any of the following in response to difficulties caused by TB?

Take out a loan or increase the overdraft to overcome losses / cash flow difficulties Yes / No

Cancel or postpone investment in stock, premises or equipment Yes / No

Cancel or postpone expansion plans for the business Yes / No

Diversify into other or new lines of business Yes / No

Advertise or market the business more widely or more intensively Yes / No

Permanently close or sell the business Yes / No

Temporarily close or sell the business Yes / No

16. Is there any other business tactic or strategy you have used or are considering using to deal with the effects caused by TB?

Yes / No

If yes, please provide details

SOCIAL IMPACT

17. Has TB affected your daily life in any way? Yes / No

If yes, how?

18. Has TB affected your family or household in any way? Yes / No

If yes, how?

19. Has TB affected your employees in any way? Yes / No

If yes, how?

20. Has TB affected your community in any way? Yes / No

If yes, how?

THOSE WITH POSITIVE EFFECTS DUE TO TB

21. Have you taken on any staff as a direct result of TB? Yes / No

If yes, please provide detail

How many full time recruits?

How many part time recruits?

22. Have you increased the hours or paid overtime for any staff as a direct result of TB?

If yes, please provide detail

NON PROFIT, PUBLIC SERVICE ORGANISATIONS OR SIMILAR

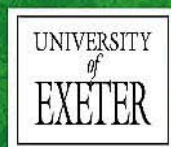
23. What sorts of value are they trying to create?

25. What do they depend on to create this value?

26. What is the value impact of TB?

27. What is the potential value impact of TB to their work?

Thank you for your time and co-operation with our study



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