“Animal health programmes will be appropriately and sustainably funded on the basis of a formal objective evaluation of benefits and costs.”

# Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive summary</td>
<td>4</td>
</tr>
<tr>
<td>Background</td>
<td>16</td>
</tr>
<tr>
<td>Summary of previous reviews</td>
<td>21</td>
</tr>
<tr>
<td>Stakeholder consultations</td>
<td>32</td>
</tr>
<tr>
<td>Programme costs</td>
<td>40</td>
</tr>
<tr>
<td>Programme benefits</td>
<td>48</td>
</tr>
<tr>
<td>Economic analysis</td>
<td>59</td>
</tr>
<tr>
<td>Conclusions</td>
<td>75</td>
</tr>
</tbody>
</table>

## Appendices

<table>
<thead>
<tr>
<th>Appendix</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Glossary</td>
<td>79</td>
</tr>
<tr>
<td>B: SITC codes considered</td>
<td>80</td>
</tr>
<tr>
<td>C: Methodological approach</td>
<td>81</td>
</tr>
<tr>
<td>D: Stakeholders consulted</td>
<td>87</td>
</tr>
</tbody>
</table>
Executive summary
Introduction

Grant Thornton was engaged by the Department of Agriculture, Food and the Marine (DAFM) on behalf of the TB Stakeholder Forum to conduct a review of the TB Eradication Programme.

The objective of this report was to provide a comprehensive and independent assessment of the costs and benefits associated with the scheme. The TB Forum requested that the Department commission a detailed independent review of the TB Eradication Scheme to answer key questions about the operation of the scheme. The review was to:

- Use an established methodology, undertake a Cost Benefit Analysis (CBA) of Ireland’s bovine TB Eradication Programme to include all direct and indirect costs and benefits;
- Evaluate the costs and benefits, and apportion them between public and private good based on what is accepted internationally as public and private good;
- Undertake analysis that is informed by relevant national and international research in the area of cost/benefit analysis and animal health programmes; and
- Engage Stakeholders in a process of consultations as part of the research.

The approach taken in developing this report has consisted of the:

- Identification and review of the processes involved in operating the scheme;
- Desktop review of the relevant available literature, scheme, departmental and industry statistics;
- Extensive stakeholder consultation exercise with a wide range of interested parties both within and outside of the TB Stakeholder Forum through a series of face to face, remote and paper-based interviews and questionnaires; and
- Comparative analysis of the approaches taken in other jurisdictions with TB eradication schemes.

A full breakdown of the methodology undertaken in completing this engagement is included in the Appendix.

Stakeholders across the industry, within the Department and further afield engaged openly and honestly with the Grant Thornton project team and provided a range of perspectives, drawn from their own experience and expertise and we thank them for their time, patience and input in assisting with the development of this report.

This report represents the independent viewpoint of Grant Thornton based on our analysis of the above factors related to the TB Eradication Scheme.
Costs of the scheme

The costs associated with the TB Eradication Scheme in Ireland are published annually each year by the DAFM. As such they are available to all interested parties. The most recent figures available are set out below.

**TB Eradication Programme Costs and Funding 2017-2020**

<table>
<thead>
<tr>
<th>Expenditure (€ ’000s)</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>Increase</th>
<th>% Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Staff &amp; Admin Costs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DAFM Staff Costs &amp; Admin</td>
<td>€26,924</td>
<td>€27,029</td>
<td>€27,502</td>
<td>€28,500</td>
<td>€1,576</td>
<td>6%</td>
</tr>
<tr>
<td>Supplies</td>
<td>€4,839</td>
<td>€4,376</td>
<td>€4,426</td>
<td>€5,278</td>
<td>€439</td>
<td>9%</td>
</tr>
<tr>
<td><strong>Wildlife Programme</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wildlife Programme</td>
<td>€3,465</td>
<td>€3,635</td>
<td>€4,040</td>
<td>€4,568</td>
<td>€1,103</td>
<td>32%</td>
</tr>
<tr>
<td><strong>PVP Testing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farmer Paid PVP Testing</td>
<td>€27,908</td>
<td>€27,746</td>
<td>€27,400</td>
<td>€27,400</td>
<td>-€508</td>
<td>-2%</td>
</tr>
<tr>
<td>DAFM Paid PVP Testing</td>
<td>€7,028</td>
<td>€7,313</td>
<td>€8,541</td>
<td>€8,498</td>
<td>€1,470</td>
<td>21%</td>
</tr>
<tr>
<td><strong>Compensation Scheme</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On Farm Market Valuation</td>
<td>€10,500</td>
<td>€14,255</td>
<td>€14,047</td>
<td>€16,388</td>
<td>€5,888</td>
<td>56%</td>
</tr>
<tr>
<td>Compensation - Other</td>
<td>€3,545</td>
<td>€3,832</td>
<td>€3,674</td>
<td>€3,706</td>
<td>€161</td>
<td>5%</td>
</tr>
<tr>
<td>Valuer Fees</td>
<td>€539</td>
<td>€548</td>
<td>€602</td>
<td>€740</td>
<td>€201</td>
<td>37%</td>
</tr>
<tr>
<td>Arbitration</td>
<td>€15</td>
<td>€11</td>
<td>€10</td>
<td>€10</td>
<td>-€5</td>
<td>-33%</td>
</tr>
<tr>
<td><strong>Research</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>bTB Research</td>
<td>€1,666</td>
<td>€1,618</td>
<td>€1,136</td>
<td>€2,225</td>
<td>€559</td>
<td>34%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>€86,429</td>
<td>€90,363</td>
<td>€91,378</td>
<td>€97,314</td>
<td>€10,885</td>
<td>13%</td>
</tr>
</tbody>
</table>

| Financing (€ ’000s)         |         |         |         |         |          |            |
| Farmers                     | €34,845 | €35,101 | €34,768 | €34,882 | €37      | 0%         |
| EU                          | €9,851  | €8,773  | €7,425  | €5,420  | -€4,431  | -45%       |
| Exchequer                   | €41,733 | €46,489 | €49,185 | €57,012 | €15,279  | 37%        |
| **Total**                   | €86,429 | €90,363 | €91,378 | €97,314 | €10,885  | 13%        |

Source: DAFM
It is clear from the above table that costs have consistently risen year-on-year over the period resulting in a 13% or almost €11 million increase in total costs overall over the period.

Key drivers of this increase are:

- On Farm Market Valuation related compensation - €6.2 million
- DAFM Staff & Admin costs - €1.6 million
- DAFM paid TB testing - €1.5 million

The growth in these costs over the period reflects the increase in disease incidence rates which have been negatively trending over recent years resulting in greater testing requirements, compensation payments and staffing complement to manage the larger workload. However, it is also fair to say that the costs of the scheme also rose consistently during periods where incidence levels remained flat.

It is important to note that the cost category DAFM Staff & Admin Costs includes all staff costs whether they are administrative or linked to specific activities of the programme such as Research or Wildlife Control. As such this line is exaggerated in comparison to others.

While costs have been increasing, the change in financing contributions between the three parties involved – Farmers, the Exchequer and the European Union (EU) is of equal concern for the future of the scheme.

Over the period examined, the EU’s contribution has fallen considerably by almost half at €4.4 million less than 2017. This reflects reduced funding ceilings and penalties related to deteriorating disease incidence levels.

While funding contributions have fluctuated considerably over the years, Sheehy and Christiansen’s 1991 Cost Benefit Analysis of Irish bTB Schemes estimated that in 1988 farmers contributed 61% towards the total costs of the scheme and the Exchequer contribution was 39% with no EU funding available at the time, after a period in which farmers contribution had increased significantly, growth in costs in recent years has largely been funded by the Exchequer.

The significant increase in programme costs allied with reductions in EU funding has seen Exchequer funding of the TB Programme rise from €41.7 million in 2017 to €57 million in 2020 (+€15.3 million or 37%) or 62% of overall funding when EU funding is removed. The Department and the Minister have both indicated that this level of increase in investment is not sustainable.

Costs of the scheme not captured

These figures represent the costs that are currently captured and determined to be direct programme contributions, however, all stakeholders consulted agreed that there are indirect or unseen contributions to the efficacy of the programme that are not captured in these figures.

In particular, the issue of farmers’ time contribution is one that repeatedly came up in stakeholder consultations. While Departmental staff, veterinarians, valuers, hauliers, researchers etc. time is factored in at their actual cost, farmers’ time is not. In other jurisdictions, such as the UK, there is an acceptance of a trade-off between farmers not making a direct financial contribution to the scheme instead of recognition of the time that they put into making the scheme work. These costs typically include assembling animals for testing and managing reactors if they test positive amongst other areas. However, in the Southern Hemisphere which has seen the most success in eradicating TB, this is not typically taken into account with only direct financial contributions considered. This has been felt to be a key factor in those scheme’s success in that it created greater ownership and an incentive to ensure the scheme succeeded in order to remove that direct financial burden.

However, in Ireland, farmers do contribute directly to the programme in terms of paying for annual PVP herd tests and disease levies. It, therefore, seems reasonable that there is some recognition of the labour time that farmers contribute to the scheme.
There are two things to note, however, when considering this.

This report provides an estimation of the value at which this contribution may be recognised at the request of the members of the TB Stakeholder Forum. While several estimations were provided during stakeholder consultations it was not possible to validate these within the scope of this project e.g. a valuation of €35 million was provided from a pro-rata assessment of a figure commonly referred to in England of £50 million. However, in consultation with Department for Environment, Food & Rural Affairs (DEFRA) no underlying calculations or assumptions to allow validation of how this figure was produced were available. Similarly, insufficient or unverified data prevented this for other estimates that were provided. An additional secondary exercise may be required if all parties wish to accurately calculate the level of this contribution and agreement would have to be reached as to how to value this.

Secondly, while this report would recommend this exercise takes place for the aforementioned reasons, it is not within the scope of this review to determine if these costs should attract additional financial compensation. That is for the relevant parties to agree, however, it is fair to say that the focus of the scheme and its future strategy with a 2030 target in place for the eradication of TB in Ireland is firmly on ensuring resources are allocated to directly target achieving this goal.

The view of this report is that only the labour contribution in facilitating the required annual herd test should be considered for inclusion as a programme cost. The rationale for this is that additional labour post-test result can be considered to be not dissimilar to any other additional labour requirement for any health and safety issue arising from a disease outbreak within the herd. The estimation of farmers’ labour contribution in this report is calculated through a derived return per hour based on outputs of the National Farm Survey as set out on pages 45-46 of this report.

Outside of recognition of farmers’ labour contribution, there are a large number of additional costs that are also not captured which all parties recognise exist and play an important role.

These include costs such as:

• cost of movement restrictions;
• cost of replacing livestock;
• personal and social costs; and
• opportunity costs.

Over the same period, with regards to these costs there is very little available data to allow quantification of these costs even if there was value in doing so. In particular, however, personal and social costs in the form of the impact on the mental health of those who suffer a TB breakdown need to be considered and adequately addressed by the programme. This is considered in more detail in the OFMV Review conducted previously by Grant Thornton.

**Opportunity costs**

The largest of all costs of the scheme is undoubtedly the opportunity cost associated with it and this is something that all stakeholders should be mindful of when considering future strategies and arrangements. These are the potential benefits that stakeholders are missing out on when having to choose one alternative over another, in this instance, making significant annual contributions to the scheme that could be used to invest elsewhere to benefit individual businesses and the industry as a whole.

The TB Eradication Scheme is estimated to have cost €5.5 billion over its 70-year history and while progress has been significant and benefits from it demonstrable. The further estimated €1 billion costs out to 2030 should focus minds on the medium to long-term benefits of achieving the scheme’s goal and reducing this cost freeing up valuable funds for investment in other areas rather than short-term gains that do not advance the scheme.
Methodology

The approach taken to answering the questions set out in the terms of reference for this project consisted of:

1. Identifying the relevant costs and benefits that are or should be included within the scheme through stakeholder consultations, desktop research and literature review, and comparison to other jurisdictions.


3. Using scenario analysis to create a counterfactual scenario whereby the TB Eradication Scheme no longer exists resulting in A – access to markets being lost, B – an increase in reactors in line with a series of historical incidence levels, C – a reduction in milk productivity, and D – a reduction in beef productivity.

4. Applying those already calculated proportional benefit splits to the scenario analysis to calculate estimated revenue lost as a result.

While the calculation of € values for those benefits are of some interest they are estimations based on the assumptions contained within the model to conduct the analysis. Of more relevance are the proportional splits in considering which beneficiaries enjoy those benefits and to what extent.

Scenario analysis was selected as the method by which to analyse the productivity and welfare benefit. This reflects the difference in these when compared to the market access benefit specifically the timeline over which they would be expected to occur.

The assumptions underpinning the export benefit analysis suggest that market access would be removed in the very short-term. For animal productivity and welfare, those same assumptions, namely the impacts of the absence of a TB Eradication Scheme, would be felt in the medium to long-term through a gradual decline in animal welfare as bTB incidence levels increased resulting in an associated reduction in productivity of both the animals and the herdowner.

For the purpose of this report we have looked at a single year where scenario A, a loss of market access, is said to have already occurred and the scenarios assessed for B, C and D then look at different points on the timeline to assess the impacts of these assumptions on animal productivity and welfare over time.
Benefits of the scheme
The benefits of the scheme over that time are easily identified and have not changed significantly over those near 70 years. The scheme was founded on three principles:

- improve public health;
- improve animal productivity and welfare; and
- ensure access to export markets.

Public Health
Over the years of the scheme, TB as a public health issue has dramatically decreased to the point where it is no longer considered a significant public health risk. The advent of improved living conditions, reduced human contact with animals, pasteurisation of milk and slaughterhouse checks; and improved medical detection and treatment has seen the HSE deprioritise TB in general and the m.bovis bTB bovine related strain in particular. In modern Ireland, TB cases in humans are largely restricted to those who have travelled to or were originally born in countries with less stringent food chain standards or who regularly drink unpasteurised milk.

Animal productivity and welfare
As well as human health the scheme facilitates improved animal welfare and as a result, increased productivity. Just as in humans, bTB infection is harmful to an animal’s welfare resulting in breathing difficulties, weight loss, and occasionally fatality even without the necessity of culling to prevent the spread of the infection. In terms of productivity, research such as Zinnstag et al (2006) indicates that animals with TB produce a reduced milk yield, provide fewer kgs of beef as a result of weight loss and across the herd calf less frequently. As well as direct impacts, caring and managing for an ill animal is a significant time-consuming activity for farmers and one that incurs additional costs. Coupled with the requirements to isolate the animal from the rest of the herd and the restrictions that are placed on the herd these all take away resources in terms of time and money from other more productive farming activities.

In addition to these productivity benefits, it was considered that the advancements that have been made in statistical analysis and development of bloodlines across the Irish herd have in large part been made possible by the reduced risks of losing valuable bloodstocks to TB related culling. These have hugely benefited the productivity gains in yield and kgs of beef that the industry has seen over the years.

Market access
The final benefit, and the most significant by far, relates to ensuring access is maintained to existing export markets and enabling access to new markets. This is facilitated in several ways but most importantly through reputational benefits and ensuring compliance with legislative and contractual requirements.

While over the years the target markets have changed from the UK in the 1950s and 1960s (store cattle sold to the UK), to the EU in the 1970s and 1980s (access to the Single Market through complying with EU trade laws), to the Rest of the World since the 1990s (Ireland’s reputation as a high-quality, safe and sustainable producer and compliance with third-party country requirements) in a global facing industry, the role played by the various iterations of the scheme in facilitating access to those markets has remained.

Without a scheme that is recognised as effective and making continued progress towards eradicating bTB, notwithstanding the risk of TB incidence rates rising, access to these markets would be severely at risk in the future. This is evidenced by the loss of market access during the Foot and Mouth crisis of 2001 and more recently in China banning beef imports from Ireland due to an atypical BSE case found in the national herd in 2020.

As Ireland exports 90% of its bovine produce overseas, any disruption to this access would have catastrophic implications for the industry. A scenario where the TB Eradication Scheme does not exist resulting in a loss of market access provides the counterfactual in our scenario analysis.

While there are undoubtedly other benefits, almost all previous reports on the subject of TB eradication schemes identify these as the most important and this was acknowledged by stakeholders consulted as part of this review.

Beneficiaries of the scheme
While the benefits were generally agreed upon, though with conflicting views as to their relative importance, the beneficiaries of the scheme was a much more polarising issue for stakeholders.

Irish Society and the Exchequer
In consultations with stakeholders, farming representatives strongly considered that the Irish Exchequer or society as a whole were the main beneficiaries of the scheme. The reasoning for this view was twofold.
First, some considered that the public health benefit was the most important of those identified. The scheme was initially established at a time when TB was a major issue in Ireland being both far more prevalent and deadly in the Irish herd and society as a whole. The point was raised that as a zoonosis, eradicating the disease had a clear public health benefit which is brought into increasingly sharp focus by the COVID-19 pandemic.

Additionally, as the largest component of Ireland’s largest industry and a hugely significant employer across Ireland, in particular in rural communities, access to markets and the opportunity to grow exports provided greater benefits to wider Irish society as a whole than it did simply to the farmers themselves.

It was suggested that all parties who benefit from the existence and operation of the scheme should be contributing financially too with examples cited including the retail, hospitality and tourism sectors as other beneficiaries.

The point was raised that of the total value reported for exports of beef and dairy products, farmers received a minority proportion of that and therefore cannot be seen as the primary beneficiaries of the scheme.

A review of relevant literature in the form of decades of reviews, reports, and academic analysis in Ireland and elsewhere was initially conducted. From this, while there were few examples of an analysis of specific beneficiaries or the proportions to which they benefited, there was a broad consensus that the primary beneficiaries of any such scheme were farmers themselves through increased productivity and enhanced market access.

Examples of this were found in how funding of equivalent schemes was calculated and split in Australia and New Zealand with industry funding the majority of costs (up to 70%) as the confirmed primary beneficiaries of eradicating bTB. It was also seen in the Sheehy Christiansen CBA report and academic research by More and Good for example.

Public vs private good

Of particular relevance though are the economic definitions of what constitutes a public good and benefit and what constitutes a private good or benefit.

While a public good is: ‘a good or service that can be consumed simultaneously by everyone and from which no one can be excluded’ a private good is: ‘one for which consumption is rival and from which consumers can be excluded’.

Purchasing an item secures the right to consume it and (in theory) compensates the producer for the costs involved in making it. As such, profit is often considered the motive for the production of a private good as without this incentive a company is unlikely to want to produce the good. With a public good, there is no profit motive because it is freely available to all to enjoy without the possibility of exclusion – hence the free-rider issue.

Applying this economic theory to the TB Eradication Scheme would suggest that if the scheme is seen as a public health benefit first and foremost then it can be considered a public good. However, if the key benefits of the scheme are improved productivity and market access then it is a private good.

Additionally, the suggestion that wider beneficiaries of the scheme exist including the retail, hospitality, and tourism sectors etc. is entirely correct. However, each of these benefits can also be considered to be private goods not public in that they continue to meet that same definition in the products and services they provide.
If this definition of a public and private good is accepted then the main benefits received by producers and private industry are the increased animal productivity and market access and for the state, in the absence of a wider public health benefit, the public benefit is the increased tax returns arising from those private benefits.

An argument can certainly be made that the wider agricultural industry outside of farmers benefits to a larger extent than farmers themselves from both upstream and downstream economic impacts (buying inputs and selling on outputs as part of the value chain). However, it is also fair to say that each of these upstream and downstream beneficiaries also constitutes private beneficiaries rather than public beneficiaries as per the economic definitions established.

Finally, a further argument can and was made that while those businesses and sectors may be private beneficiaries they are not contributing directly to the scheme from which they are benefitting, indeed, farmers are the only private beneficiary currently making a direct financial contribution.

Again, this is correct, but returning to economic theory in defining a private good would consider that, in theory at least, a purchaser of a product would compensate the producer fully for the costs involved in making it. In other words, the contractual arrangements and market mechanisms in place which determine the price of the product that farmers sell should provide sufficient compensation to cover farmers’ contribution to the scheme.

If this is not the case then it may be considered to be an example of a market failure and one which may need further consideration. However, it is already the case that one of the remits of the Common Agricultural Policy is to ensure that this market failure is directly or indirectly addressed through supporting primary agricultural incomes. It is also not the purpose nor is it within the ability of the TB Eradication Scheme to ensure that this potential market failure is addressed.

Calculating proportional benefits

Having established what the benefits are and who benefits the next question to consider was to what extent each beneficiary enjoys the benefits of the scheme.

When the private benefit is considered to be market access and the primary beneficiary is the industry then if the assumption is made that in the absence of a functioning and effective TB Eradication Scheme as required by EU law and which underpins third-party country export agreements it is fair to consider that the entire export value of the sector is the quantum of benefit received from the scheme.

In reality, there are numerous factors that go into achieving this benefit but for this analysis, the fact that exports would be severely disrupted or likely halted altogether.

Equally, given the terms of reference of this review, the key issue is to identify the proportionality of that benefit between private and public not the quantum of that benefit. To calculate this the Central Statistics Office’s (CSO) Value at Current Prices for Output, Input and Agriculture by State, Statistical Indicator and Year was utilised to provide an approximate breakdown of a profit and loss account for the entire industry e.g. Operating Surplus is considered a proxy for profit.

The report shows the value of the inputs that make up the outputs that are ultimately exported. Beef and dairy products make up the vast majority of the data underpinning the CSO analysis and as such the data can be considered representative of the inputs and outputs of the dairy and beef sectors for our analysis.

The table is reproduced below alongside proportions which indicate what percentage each line item constitutes when compared to the full Agricultural Output at Basic Prices.

Export proportions based on agricultural input/output

<table>
<thead>
<tr>
<th>€ (millions)</th>
<th>Average 2017-2019</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goods Output at Producer Prices</td>
<td>8,089</td>
<td>94.5%</td>
</tr>
<tr>
<td>Contract Work</td>
<td>431</td>
<td>5.0%</td>
</tr>
<tr>
<td>Subsidies on Products</td>
<td>92</td>
<td>1.1%</td>
</tr>
<tr>
<td>Taxes on Products</td>
<td>(51)</td>
<td>(0.6%)</td>
</tr>
<tr>
<td>Agricultural Output at Basic Prices</td>
<td>8,561</td>
<td>100.0%</td>
</tr>
<tr>
<td>All Intermediate Consumption</td>
<td>(5,668)</td>
<td>(66.2%)</td>
</tr>
<tr>
<td>Gross Value Added at Basic Prices</td>
<td>2,894</td>
<td>33.8%</td>
</tr>
<tr>
<td>Fixed Capital Consumption</td>
<td>(910)</td>
<td>(10.6%)</td>
</tr>
<tr>
<td>Net Value Added at Basic Prices</td>
<td>1,983</td>
<td>23.2%</td>
</tr>
<tr>
<td>Other Subsidies Less Taxes on Production</td>
<td>1,717</td>
<td>20.1%</td>
</tr>
<tr>
<td>Factor Income</td>
<td>3,701</td>
<td>43.2%</td>
</tr>
<tr>
<td>Compensation of Employees</td>
<td>(560)</td>
<td>(6.5%)</td>
</tr>
<tr>
<td>Operating Surplus</td>
<td>3,141</td>
<td>36.7%</td>
</tr>
</tbody>
</table>

To these, we can then apply tax rates as shown below to calculate the tax benefit that is provided to the Exchequer or public benefit e.g. the public benefit of the industry profit or Operating Surplus is therefore 11% of the Agricultural Output at Basic Prices (the full value of exports). All tax assumptions are detailed in the Economic Analysis section of this report.

### Public/Private benefit split calculation

<table>
<thead>
<tr>
<th>€ millions</th>
<th>Proportion</th>
<th>Tax</th>
<th>Public</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goods Output at Producer Prices</td>
<td>94.5%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Contract Work</td>
<td>5.0%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Subsidies on Products</td>
<td>1.1%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Taxes on Products</td>
<td>(0.6%)</td>
<td>100.0%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Agricultural Output at Basic Prices</td>
<td>100.0%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>All Intermediate Consumption</td>
<td>(66.2%)</td>
<td>9.1%</td>
<td>6.0%</td>
</tr>
<tr>
<td>Gross Value Added at Basic Prices</td>
<td>33.8%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Fixed Capital Consumption</td>
<td>(10.6%)</td>
<td>23.0%</td>
<td>2.4%</td>
</tr>
<tr>
<td>Net Value Added at Basic Prices</td>
<td>23.2%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Other Subsidies Less Taxes on Production</td>
<td>20.1%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Factor Income</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Compensation of Employees</td>
<td>(6.5%)</td>
<td>30.0%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Operating Surplus</td>
<td>36.7%</td>
<td>30.0%</td>
<td>11.0%</td>
</tr>
</tbody>
</table>

**Public proportion** 22.0%

**Private proportion** 78.0%

Sources: Grant Thornton analysis of CSO data

The outcome of this analysis is an estimate that the public benefit of the TB Eradication Scheme amounts to 22% of the overall value of the benefits of the scheme with private benefits accounting for the remaining 78%.
Productivity

The next benefit to be considered was animal productivity and welfare. To do so, ‘What if?’ scenario analysis was conducted to look at the productivity impacts on the national herd of two separate areas linked through a single scenario, namely, the non-existence of a TB Eradication Scheme. It does not consider any alternative replacement for the scheme.

This allowed for consideration of the impacts of a range of higher disease incidence rates linked to historic periods ranging from current 0.27% over the three-year average 2017-2019 to the 17% levels seen in the mid-1950s at the start of the TB Eradication Scheme. This scenario approach seeks to replicate what would be the growth in incidence of bTB in the national herd should there be a prolonged absence of a bTB eradication scheme as was the case for a period during the 2001 Foot and Mouth crisis.

The impacts were therefore considered to be a:

- decrease in the number of healthy animals resulting in increased culling;
- reduction in milk productivity; and
- reduction in beef productivity.

The assumptions underpinning this analysis used reduced yield estimates collated from *Economics of Bovine Tuberculosis* by Zinsstag et al (2006) to hypothesise the reduction in milk and beef yield and calculate potential losses in each area.

The output of this is contained in the tables alongside. These losses are then split using the same 78:22 proportions split between public and private as identified in developing the market access analysis.

### Productivity Loss: Increased Culling of National Herd

<table>
<thead>
<tr>
<th>Incidence Level</th>
<th>Dairy</th>
<th>Beef</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Increase in reactors</td>
<td>Lost value (€’000)</td>
<td>Lost quantity (tonnes)</td>
</tr>
<tr>
<td>Dairy</td>
<td>197,259</td>
<td>682,008</td>
<td>210,056</td>
</tr>
<tr>
<td>Beef</td>
<td>458,192</td>
<td>342,539</td>
<td>76,749</td>
</tr>
<tr>
<td>Other</td>
<td>289,653</td>
<td>4,296</td>
<td>1,494</td>
</tr>
<tr>
<td>Total</td>
<td>945,104</td>
<td>1,028,843</td>
<td>288,299</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Incidence Level</th>
<th>Dairy</th>
<th>Beef</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Increase in reactors</td>
<td>Lost value (€’000)</td>
<td>Lost quantity (tonnes)</td>
</tr>
<tr>
<td>Dairy</td>
<td>36,404</td>
<td>125,864</td>
<td>38,766</td>
</tr>
<tr>
<td>Beef</td>
<td>84,559</td>
<td>63,215</td>
<td>14,164</td>
</tr>
<tr>
<td>Other</td>
<td>53,455</td>
<td>793</td>
<td>276</td>
</tr>
<tr>
<td>Total</td>
<td>174,418</td>
<td>189,872</td>
<td>53,205</td>
</tr>
</tbody>
</table>

Sources: Grant Thornton analysis of CSO data

### Productivity Loss: Dairy Sector

<table>
<thead>
<tr>
<th>Incidence Level</th>
<th>Dairy</th>
<th>Beef</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Increase in incidence</td>
<td>Lost qty (tonnes)</td>
<td>Lost value (€’000)</td>
</tr>
<tr>
<td>Low</td>
<td>15,754</td>
<td>51,151</td>
<td>11,274</td>
</tr>
<tr>
<td>High</td>
<td>26,257</td>
<td>85,251</td>
<td>18,790</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Incidence Level</th>
<th>Dairy</th>
<th>Beef</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Increase in incidence</td>
<td>Lost qty (tonnes)</td>
<td>Lost value (€’000)</td>
</tr>
<tr>
<td>Low</td>
<td>2,907</td>
<td>9,440</td>
<td>2,081</td>
</tr>
<tr>
<td>High</td>
<td>4,846</td>
<td>15,733</td>
<td>3,468</td>
</tr>
</tbody>
</table>

Sources: Grant Thornton analysis of CSO data

### Productivity Loss: Beef Sector

<table>
<thead>
<tr>
<th>Incidence Level</th>
<th>Dairy</th>
<th>Beef</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Increase in incidence</td>
<td>Lost qty (tonnes)</td>
<td>Lost value (€’000)</td>
</tr>
<tr>
<td>Low</td>
<td>4,605</td>
<td>20,552</td>
<td>4,530</td>
</tr>
<tr>
<td>High</td>
<td>9,210</td>
<td>41,105</td>
<td>9,060</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Incidence Level</th>
<th>Dairy</th>
<th>Beef</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Increase in incidence</td>
<td>Lost qty (tonnes)</td>
<td>Lost value (€’000)</td>
</tr>
<tr>
<td>Low</td>
<td>850</td>
<td>3,793</td>
<td>836</td>
</tr>
<tr>
<td>High</td>
<td>1,700</td>
<td>7,586</td>
<td>1,672</td>
</tr>
</tbody>
</table>

Sources: Grant Thornton analysis of CSO data

---

Cost-benefit analysis TB Eradication Scheme | DAFM 14
Conclusion

The Irish TB Eradication Scheme has for almost 70 years provided significant benefit to the agricultural industry in particular and Ireland as a whole. While with progress stalling in recent years the scheme currently sits at a crossroads in how to achieve the ambitious goal of eradication by 2030 the historical role it has played in facilitating the spectacular growth of Ireland into a powerhouse global exporter cannot be downplayed.

This is not a Value for Money review or an assessment of the effective use of resources of the scheme but in identifying the costs and benefits of the scheme, separating them into public and private, and especially in assessing the proportional beneficiaries of those benefits it should not be forgotten that each party receives a significant positive return on the investment that they make into the scheme. Whether those benefits are considered to be public health, access to export markets or improved animal productivity and welfare the €100 million scheme plays a significant role in facilitating an industry worth circa €7 billion in exports to Ireland as a whole.

While key stakeholders in the Department and industry share different views on the priority of benefits and who the actual beneficiaries are the review considers that there is a high degree of commonality between both those consulted outside these groups, literature reviews and comparative analysis from other jurisdictions.

Benefits of the scheme are well established across years of research and policy debate and have not changed significantly since the formation of the TB Eradication Scheme in 1954.
- Market Access
- Animal Welfare and Productivity
- Public Health

However, in modern Ireland, the public health benefit is negligible due to factors external to the bTB scheme.

Benefits

<table>
<thead>
<tr>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Costs continue to rise approaching €100 million in 2020.</td>
</tr>
<tr>
<td>• Need to progress the scheme from current period of stagnation to ambitious 2030 Eradication target a key driver: significant opportunity cost associated with the estimated €1 billion expenditure over the next decade.</td>
</tr>
<tr>
<td>• Farmers’ labour contribution up to the point where a positive test is confirmed should be recognised as a programme cost.</td>
</tr>
</tbody>
</table>

Long-established in literature that private industry is the key beneficiary due to Market Access being the most valuable benefit. This is reflected in the approach taken by some jurisdictions, particularly Australia and New Zealand, to use a ‘beneficiary pays’ model. Analysis in this report concludes that while there are significant benefits to public beneficiaries, private beneficiaries retain the majority of benefits arising from the operation of the TB Eradication Scheme by a factor of 78/22. Where beneficiaries external to the primary agriculture sector can be identified such as retail, hospitality, tourism etc. they too can be considered to be private beneficiaries rather than public as they continue to meet the definition of providing a private good rather than a public good.

While it is not the purpose of this report to suggest apportionment of funding between the various stakeholders for the purpose of informing future discussions the graphic below provides a breakdown of current funding, funding levels under a 78/22 split and funding levels if the estimated farmers’ labour contribution is taken into account.

Funding split comparison using 2020 costs – assuming EU funding removed and apportioned between Exchequer and Farmers

<table>
<thead>
<tr>
<th>Current - 2020</th>
<th>Current – 2020 + €8.8 million of Farmers’ Labour Contribution Added</th>
<th>78/22 Beneficiary Pays Split</th>
</tr>
</thead>
<tbody>
<tr>
<td>62% - €60.4m</td>
<td>38% - €36.9m</td>
<td>57% - €60.4m</td>
</tr>
</tbody>
</table>

Exchequer Funding Contribution

Farmer Funding Contribution
Background
Overview of Ireland’s Agri-Food Sector

Ireland's agri-food industry remains a key component of her modern economy and is at the core of Ireland’s economic and social well-being. On average, between 2017-2019, the industry accounted for some 4.7% of Gross Domestic Product (GDP) of which 1.5% was related to primary agriculture. Average employment for those years was around 170,000 jobs or circa 7.6% of total employment.

Of these 170,000 jobs this includes:

• 78,000 beef farmers;
• 17,000 dairy farmers;
• 19,000 employed in the processing and preserving of meat and production of meat products;
• 8,000 employed in the manufacture of dairy products; and
• 2,000 employed in the manufacture of prepared animal feeds.

In particular, the industry is a significant employer in rural areas of Ireland where it plays a key role in the wider rural and local economy.

The industry accounts for a major proportion of exports of Irish-owned enterprises and its products are sold in over 180 markets around the world. Between the period 2010 to 2019, agri-food exports increased by 67% to a point where 2019 saw total exports to €13.2 billion with beef exports accounting for €2.1 billion and dairy exports €5.0 billion in 2019.

This export success story has been founded on the strong reputation that Ireland has built-in both food quality and safety and in recent years on the perceived sustainability of its production systems and the traceability of its products.

With world food production requirements expected to double by 2050 to cater for forecast population growth, Ireland has ambitious plans to grow the industry further with a series of existing and future strategies underpinning those plans. Maintaining and enhancing this reputation is essential for Ireland to enjoy further growth in the coming years.

Overview of the Bovine TB Eradication Programme

Established in 1954, Ireland’s Bovine TB Eradication Programme (bTBEP) was set up to overcome a range of bTB related challenges that Ireland and the agri-food industry was facing at the time with 80% of cattle herds and 17% of cattle affected by bTB.

Ireland’s live trade to the UK at that time was under threat as a result of the high levels of TB encountered in live bovine animals imported from Ireland.

Development of live export markets was constrained and intensification of the industry was difficult due to high-levels of BTB within the national herd. Before pasteurisation, the consumption of raw milk and raw milk products from animals impacted by bTB resulted in high levels of TB infection within the national population. Many people continued to contract bTB from cattle, some from direct contact with infected animals but many more from the consumption of bTB infected milk with a recorded rate of notifications in people in Ireland of 230/100,000 population in 1952.

The TB Eradication Programme has played a significant part in reducing the prevalence of TB in Ireland. Over the next 10 years, some 800,000 bTB reactors were slaughtered from a population of around 5 million. By the 1990s, 44,000 reactor animals were being culled per annum. Today over 96% of all herds are free from TB and over the last five years approximately 17,000 bovine reactor animals have being culled annually.

Since the establishment of the programme, there have been many advancements both within the industry and across society that have improved the situation dramatically and today, TB in humans in Ireland in general, is extremely rare with on average fewer than 5/100,000 (<300 annually across Ireland) cases and less than 5% (<5 annually across Ireland) of that figure traceable to M. bovis the causative agent of tuberculosis in cattle (bTB).

The scheme, however, is not without cost. In 2020 the scheme cost €97 million, of which the Exchequer contributed circa €57 million, the EU €5 million and the remaining €35 million from herdowners through the cost of annual bTB tests and disease levies.
The amount of funding provided from the EU has also been reducing and will continue to reduce over the coming years as a result of funding demands from diseases impacting other Eastern European countries such as Lumpy skin disease to deteriorating results of the scheme. A €1 million penalty was incurred in respect of 2018 due to deteriorating results of the scheme in recent years with further penalties applied in 2019 and 2020.

It is estimated that since the scheme was established in 1954, total expenditure, accounting for inflation, has amounted to over €5.5 billion.

Why a Bovine TB Eradication Programme is Needed

Despite the cost, the programme continues to provide a significant value for stakeholders and the agriculture industry in particular.

Benefits of the scheme are largely considered to fall within the same three key reasons as when the scheme was originally established in 1954, namely:

**Retaining access to valuable export markets**

Following the accession of Ireland to the European Union (EU) in 1973, Irish producers were required to comply with the legislation in Directive 64/432/EEC, to export and trade live bovine animals, beef, and dairy products with fellow EU member states.

However, above the need to comply with regulations to gain access to export markets, member states are compelled to implement an effective TB Eradication Programme. This is a requirement of European Law which compels countries to work towards the control and prevention of Category B transmissible diseases in animals including those that can cause disease in humans such as rabies and TB.

While this is a requirement irrespective of the trade imperative, retaining access to export markets is of significant importance to the beef and dairy industries. Complying with EU legislation is essential to retain this market access as Ireland exports approximately 90% of its beef and dairy output.

These requirements range from having officially tuberculosis-free (OTF) status, pre-movement tests, live animal tests, meat inspection at slaughter, heat-treatment etc.

For countries outside of the EU, there are often more stringent requirements imposed by trade deals which are essential for access to new third-party markets such as China which represent significant future opportunity growth markets for Irish exports.

**Maintaining farm productivity and animal welfare**

In addition, to the trading needs met by the bTB programme, there is also a further benefit in terms of the reduction of the level of tuberculosis-related animal production losses that would be expected to occur in its absence.

bTB levels have significantly fallen over the near 70–year history of the scheme. It is fair to say that there have been many improvements in both our understanding and our approach to agricultural measures that minimise the spread of bTB, but it is also fair to hypothesise that the abandonment, or significant reduction, of the current monitoring programme, would likely result in a resurgence of TB-related production losses in the national cattle herd. The experience in Ireland and Great Britain of the rapid uplift in TB incidents following the curtailment of the TB testing programme during the Foot and Mouth epidemic of 2001 provides evidence of this potential impact with a 92% uplift between 2000 and 2002 TB incidents.

Production losses range considerably but may include the:

- The animal’s failure to thrive resulting in reduced size (kgs) and reduced quality and quantity of output (dairy);
- Increased medical intervention and associated costs;
- Increased requirement to destroy animals and product if the infection is too great;
- Receipt of reactor value rather than market value at slaughter;
- Loss of highly valuable bloodlines; and
- Opportunity cost losses from the inability to utilise lost revenue elsewhere more productively.

**Protecting public health**

The link between tuberculosis in cattle and humans has been long-established even before the creation of the TB Eradication Scheme.

Protecting public health was a significant issue when the TB Eradication Programme was launched. Transmission to the human population was much more prevalent than it is now with preventative measures such as the pasteurisation of milk and routine carcass inspections at meat processing plants helping to alleviate this risk. However, a risk does still exist, primarily through the consumption of raw milk and through members of the agriculture industry having direct contact with infected animals.
Principles of the Irish Bovine TB Eradication Programme

Identifying the disease
- Herds are identified for disease control, through herd registration.
- Movement of animals is monitored through the Animal Identification and Movement System (AIM System).
- Post-mortem examination at slaughterhouses forms part of the TB surveillance programme.
- All animals in the country are tested for bTB at least once a year (with the exception of calves under the age of 6 weeks born on the holding).
- Geographic Information System (GIS) is used to identify parcels of land and the herds using them and DAFM’s Animal Health Computer System (AHCS) is used to manage the testing of animals.
- Veterinary laboratory services carry out diagnostic testing and research.

Confining the disease
- When animals are found to react positively to a TB test, the herd that they are present in then becomes restricted, whereby no cattle can move into or out of the herd until at least two consecutive tests have been passed by all animals.
- Herds neighbouring the diseased herd are tested.
- Restricted herds owners are forbidden from selling animals on the open market to ensure that bTB does not spread to other herds across the country.
- A herd will only become de-restricted upon passing two consecutive tests and cleansing and disinfection of the premises has taken place.

Eradicating the disease
- When animals are identified as reactors, and all appropriate assessment and paperwork are completed, they are removed from the farm by licensed hauliers to a slaughtering plant.
- A valuation service is provided to determine the market value of the animals.
- Herdowners may be eligible for an Income Supplement Scheme, or a Depopulation Grant is available when a decision is made to fully depopulate the herd.
- An additional support known as the Hardship Scheme is available to support herdowners during the winter period.
- On-farm checks are carried out to ensure compliance with eradication requirements.
- Badgers are also targeted in cases where they are implicated in a disease breakdown. Culling and vaccination programmes take place to control disease spread.
- Additional blood tests are used to adjunct to the bovine TB skin test.
- Herds are depopulated where necessary.

The Main Stakeholders in the Scheme
The nature of the scheme leads to there being many parties involved. While there are three parties funding the scheme, namely herdowners, the Department and the EU, there are other relevant players. Broadly speaking, the main players can be classed into seven distinct groups.

i. The Farming Community
ii. The Department of Agriculture, Food and the Marine
iii. Private Veterinary Practitioners
iv. Marts, Exporters and Slaughterhouses
v. Milk Processors
vi. The Research Community
vii. The European Union

Other parties such as Teagasc, Bord Bia, the HSE, business representative groups and wildlife advocacy groups also play a part in interacting with the wider TB Eradication Scheme and policy environment.
Background to the Review

Currently, bTB herd incidence in Ireland stands at just over 4% on a 12-month rolling basis (July 2020). While still low relative to historical figures, of concern is that herd incidence is now at its highest level since 2012. Progress towards eradication has largely flat-lined in recent years, with rising costs associated with the TB Eradication Scheme not garnering further reductions in bTB incidence levels. This has been exacerbated by a reduction in the level of EU funding for the scheme as a direct result of the stalled progress against the objectives of the scheme.

Should Ireland continue with the current trajectory it is forecast that eradication would not occur before 2080, while even if the Government’s target of eradication by 2030 is achieved, this will be at an estimated cost (based on present levels of expenditure) of an additional €1 billion. Achieving eradication would therefore result in real and substantial ongoing savings that would accrue to both industry and the State.

The recent lack of progress is of significant concern and will result in considerable and ongoing costs for both herdowners and the government. This reality has led to a re-examination of the policies needed to achieve eradication promptly to the benefit of all parties. In May 2018, the Government approved a proposal to commit to the eradication of Bovine TB by 2030.

To drive forward this enhanced commitment, a TB Forum was set up to bring key stakeholders together to discuss and propose policies to help achieve eradication within this timeframe.

The need for an independent review of several components of the TB Eradication Scheme emerged from that forum as part of an overarching consideration of some of the key aspects of the scheme before an agreement on its future approach. It is noted that while the Department issued the tender for this report, it did so on behalf of the TB Forum and as such the report will be disseminated to all relevant members of the TB Forum for feedback.

Scope of assignment

DAFM published a request for tender on 8 October 2019, for the “Provision of Cost Benefit Analysis of the Bovine TB Eradication Scheme” (RFT 128458 – PAS097F). The ask was to undertake a CBA of the bovine tuberculosis eradication programme, delivering a detailed, comprehensive and quantitative analysis of all direct and indirect costs and benefits of the BTBEP.

Following a tendering process, Grant Thornton was chosen as the service provider. Pursuant to the Multi Supplier Framework Agreement (RFT 128458 – PASO97F), the DAFM outlined that the final report should:

- Using an established methodology, undertake a CBA of Ireland’s bovine TB Eradication Programme to include all direct and indirect costs and benefits;
- In evaluating the costs and benefits, apportion them between public and private good based on what is accepted internationally as public and private good;
- Undertake analysis that is informed by relevant national and international research in the area of cost/benefit analysis and animal health programmes; and
- Engage stakeholders in a process of consultations as part of the research.

The TB Eradication Programme costs have increased by almost €15 million since 2015 despite only marginal increases in herd incidence.

This report will provide an independent Cost Benefit Analysis (CBA) of the entire Programme which has been proposed in the recent TB Stakeholder Forum Report to the Minister for Agriculture, Food and the Marine. This CBA examines if the current split of funding between public and private sources is optimal in the context of achieving eradication.
Summary of previous reviews

The analysis discusses not only the cost relating to the Exchequer, but any costs relating to the bTBEP incurred nationally, such as the opportunity cost of the resources used in disease control, the extent to which National Income is reduced by such a use of the resources, and private testing and disruption of herd management.

**Costs**

The report defines costs as:

- The on-farm losses incurred by the removal of reactors and the animal movement restrictions;
- Removal of reactors: the difference between the salvage value of the reactor and the market value of a healthy animal (reactor depreciation). The compensation paid to farms may not correspond with this;
- Losses caused by herd restrictions were calculated within the report as a reduction of 10% in the growth rate of dry stock in the winter months;
- The salaries and fees paid to administrative and veterinary personnel;

The 1991 report highlights the overstatement of this cost due to the high unemployment rates at the time. We can consider the opportunity cost of vets time, where they could be treating other conditions

- the materials, travel, rents etc involved in the scheme
- % of costs associated with various items was elaborated in the 1991 report

**Benefits**

This report defines benefits as:

- those deriving from retaining access to premium markets which would be lost or curtailed in the absence of the Scheme;
- benefits discussed relate to quantifying the value of past market movements and attributing that to the scheme because in the absence of the scheme the access would not be there. However, we cannot consider that to be the counterfactual.
  - benefits being: deficiency payments in the UK; the extra carcases which would have been condemned; the export refunds on all TB infected carcasses
- those deriving from improved animal productivity

Professor Roger Morris of Massey University, New Zealand calculated these benefits for the CBA with estimates of:

- 3-4% of total cattle and milk output
- increased productivity does not include the benefit of the extra expansion of the national herd which the scheme facilitated
- those resulting from improved human health

Even in 1991, the improvement to human health was not quantified and considered a small benefit. Benefits quantified amounted to £146m in 1988 (7% of total cattle and milk output). Approx. 50% of benefits each from improved market access and improved productivity.

**Other points of interest**

- The CBA highlights the lack of involvement and ownership by farmers. The report considers the Scheme to be a problem for the Government. It highlights that the main losers and potential gainers from more effective disease control are farmers themselves.
- The report comments that reallocating to farmers the responsibility of maintaining their herds’ disease clearance status could fundamentally change attitudes. Shifting some of the ownership of the scheme to farmers should have positive effects on the disease control practices of farmers themselves and their relationship with veterinary practitioners and scheme management.
- This ownership issue also has behavioural consequences in which gains and losses of the scheme are distributed. Farmers contribute through levies that are not related to disease control practices and consequent risk but on the standard rate per animal or per gallon of milk. However, they receive compensation based on disease experienced. If the likelihood of breakout is 100% external (e.g. wildlife) then farmers should be 100% compensated, but if there is a fault or neglect, they should be penalised.
- The report suggests the transformation of the present disease levy into a compensation fund which would be managed by farmers and would differentiate in favour of good performance could be an important positive influence on the efficiency of the operation.
Study of Socio-economic impediments to bovine tuberculosis eradication (1993)

This report set out the challenges that the goal of achieving bTB eradication had faced and continued to face through a series of consultations with key stakeholders and a review of the scheme's operation.

The report established that main socio-economic limitations impeding the eradication of TB in Ireland were identified to be:

- the traditional arrangements whereby private veterinary practitioners test their own clients' cattle
- the situation whereby Ireland's persistent bovine TB problems must be addressed without disruption to trading practices with farmers not in favour of further restriction on cattle movement, and post-movement tests as it delays payments.
- the fact that the issue is seen as a DAFM problem rather than a farming problem which in most circumstances must be addressed by the farmers themselves
- the situation whereby some farmers encounter serious financial difficulties because of bovine TB
  - due to the extreme financial difficulties faced when there is a bTB outbreak, some farmers try various strategies to avoid notification. Switching ear tags and the use of drugs to interfere with test results. This also puts pressure on the vets to make liberal interpretations of test results, due to the hardship faced when restrictions are placed on the herds.
- the extent to which the level of reactor compensation influences farmer cooperation in the scheme
  - most farmers felt under-compensated, and did not agree with insurance type of set up whereby higher payments are requested from farms with outbreaks, agreed to pay equal amounts.
- the extent to which the control of badgers and other infected wildlife is limited by ecological considerations
  - It is generally accepted that badgers have a large contribution to the spread of bTB and cannot be killed due to ecological conservation.

To quantify the impact of these factors, the research was commissioned. Results of this research based on a survey of herd owners (random stratified into four disease categories) and veterinary practitioners.

Other

Practitioners and farmers agreed the most important measures to introduce were:

- restrict cattle movement
- control wildlife
- improve the test
- improve reactor compensation

Practitioners and farmers agreed the most important measures that farmers could take were:

- breeding own replacements
- install stock proof fencing
- buy from a known source

Published by DAFM in 2008, the Value for Money report assessed the performance of the Bovine TB eradication programme between 1996-2006. The review was carried out by the then Superintending Veterinary Inspector, Mr Joseph O’Flaherty and was overseen by a Steering Committee. While addressing all aspects of the programme, the review’s focus was primarily on the overall efficiency and effectiveness of the, highlighting the factors that impinged upon the programmes overall success.

The review makes the point that the Department should keep under review the level at which costs are shared between the state and the private sector in the delivery of the Programme, which a view to achieving an appropriate level of private sector participation.

The paper defines their understanding of efficiency as that used by the Department of Finance; as being the optimisation of the ratio of inputs to outputs and economy as the securing of the appropriate quality of inputs at the best price. They review all aspects of the programme including; the OFVP, depopulation grant, income supplement and the hardship grant, Tuberculin testing, reactor removal services, AHCS, post-mortem surveillance wildlife control and the movement control systems which are in place. They appraised the performance of these outputs using data from a variety of sources, including the CVERA.

The report found that in regards to efficiency, generally outputs were delivered in a timely and complete manner, and in compliance with the provisions of the domestic and European legislation.

In regards to effectiveness; cost of inputs, quality assurance and resource allocation findings were: An evaluation of the impact of the programme by appraising all direct and indirect costs, as mentioned above, pertaining to the programme.

2006 marked the lowest level of programme expenditure on for the previous twenty years, with costs being 40% less than those of 1999. 2006 programme expenditure was approximately €36 million, with income supplement accounting for 67% overall.

In regards to programme cost efficiency, although it noted that considerable progress has been made in overcoming the constraints to eradication, the existence of an infected wildlife reservoir remained a continuing and substantial obstacle to the eventual eradication of bovine TB.

The review findings stated that although the OFVS was more expensive than its processor, the Reactor Grant Scheme, the programme represented a more accurate reflection of market value and reduced distortions in the market for reactor cattle.

The report stated that upon comparison with other jurisdictions, the depopulation, income supplement and Hardship grant schemes were unique to Ireland, and were successful in alleviating income losses uncured by herd owners from disease outbreak, however, it was noted that more accuracy within the target categories could be achieved.

The review felt that due to the significant role the wildlife in maintaining the prevalence of bovine TB within Ireland justified a greater investment in the operation of a targeted interim wildlife strategy, and in particular the further development and establishment of vaccination programmes.

Upon conveying results, the report also suggested some alternative approaches that could be employed alongside the current programme, approaches that would complement the current programme efforts, these suggestions included:

Enhanced diseased control for high-risk herds through the implementations of pre-movement testing, enhanced movement restrictions for chronic herds, field testing

While the economic benefits of utilising non-veterinarians to deliver some, or all, aspects of the TB testing, it would be prudent of the Department to clearly establish the legal position relating to the use of lay testers in this jurisdiction and to actively monitor development in this regards

Other points of interest

The rationale of the programme was for the eradication of bovine tuberculosis.

The report states that the department should keep under review the level at which costs are shared between the state and the private sector in the delivery of the programme to achieving an appropriate level of private participation.

Research and technological development remain crucial to the resolution of the factors that continue to constrain progress towards the eradication of Btb and the appropriate measures to maintain and support this research should be continued,
Economic Impact Assessment of Bovine Tuberculosis in the South West of England (2010)

This report describes the burden of bTB through case study interviews with farmers to illustrate the economic impacts of bTB on farms and the wider rural community.

The report is primarily focused on the economic impacts, however, it does highlight the stress and upset that bTB breakdowns can have on the farming industry. These arise from the movement restrictions, increased workloads and financial ramifications that can result from a bTB breakdown.

The Economic Cost of bTB at the farm level

- The cost differential of administrating and reading the intradermal tuberculin (skin) test is minimal. While the cost for each test varied considerably between a low of £1.36 and a high of £6.10, most were between £1.95 and £2.97 per animal.
- There was no cost differential between dairy and beef farms bTB testing, however, there were indirect costs associated with other activities being impacted or delayed. These ranged from delays to silage making, milk production and additional fuel and feed costs. These costs are not currently compensated for under the scheme.
- Movement restrictions were identified as being an additional cost for farmers. The need to retain animal stock results in extra bedding, feed and labour costs. These can also result in increased workload and overstocking which can lead to breaches in organic certifications or regulatory compliance.
- The scheme derives sale data from store markets, prime markets, rearing calf sales, breeding sales and dispersal sales in Great Britain, rather than individual animal valuations. This can lead to high-value cattle stock being undervalued and under-compensated and low-value stock being overcompensated. The former can result in farmers having difficulty securing replacement stock of the same calibre.
- The replacement of stock results in many hidden costs not factored for under the compensation scheme. These can include the labour in sourcing new cattle, their subsequent haulage costs and the production losses should all slaughtered cattle not be replaced.
- Additional costs, directly and indirectly, related to the disease can also include financing biosecurity measures and delayed capital investment. These are difficult to quantify but the report recognises these as important to consider.

The Economic Cost on bTB case study farms

The monthly cost of bTB breakdown was found to range from approximately £505 to £3,184. The range in cost is due to several factors mentioned below. The report notes that the figures presented are likely underrepresentation's of the true cost due to hidden or unquantifiable costs.

The range of losses is dependent on;
- the type of farm;
- the scale of operation;
- restocking policy;
- area farmed;
- number of holdings away from the farmstead; and
- how much the farm is restricted.

The report notes that dairy farms tend to record the greatest losses during bTB breakdowns while pedigree cattle farms also incur high costs.

Other points of interest

The report examined a limited number of farms for its case study approach and its findings cannot be extrapolated fully to represent the whole industry, however, it does demonstrate the variability in costs and compensation that exists.

The report demonstrated through its survey and interview approach that farmers view the compensation scheme as not fully considering the direct and indirect economic losses arising from bTB breakdowns. There are many hidden and long-term costs that are beyond the scope of the compensation scheme that imposes considerable hardships on farm households and raises livestock welfare issues where restrictions are in place. Average figures were found to obscure the true costs at the individual farm level of bTB breakdowns and contribute to an imperfect compensation scheme.
The Economic and Societal Importance of the Irish Suckler Beef Sector (2018)

This review was compiled in 2018 and was funded by the Irish Farmers Association. It examines the vital role the Irish suckler beef sector plays for both the Irish economy and rural communities. This report principally focused on the benefits rather than the costs associated with the industry and this reflected in the key points outlined below.

Benefits

- The agri-food sector provides direct and indirect employment to over 300,000 people across Ireland.
- The economic impact of agriculture and beef is considerable for the Irish economy. Output in this sector generates relatively more economic activity than a comparable increase in other industrial sectors. Cattle farmers spend over €1.5 million on farm inputs annually, most of which is concentrated in rural Ireland.
- The multiplier effect for the beef sector is greater than the broader agriculture sector. The report notes that a €1 million increase in beef sector output generates €2.11 million in the wider economy. It also supports an additional 16 jobs. The comparative figure for the broader agriculture sector is €1.44 million.
- Direct payments to farmers were found to provide a substantial contribution to the wider rural economy as farmers purchase inputs locally that generates local economic activity. It notes that for every €1 of direct payments to cattle farmers, €4.28 of output is produced for the rural economy.
- Suckler farms are generally located in marginal or socially disadvantaged areas. Their presence adds to the social fabric and cultural capital of their communities.
- Farmers produce public goods such as environmental protection and the preservation of landscapes which contributes to biodiversity, preservation and maintaining the image and future of rural Ireland.
- Irish suckler cattle play an important role in Ireland reputation as a major exporter of high-quality prime beef. This beef is also viewed as amongst the worlds most sustainable as it’s the fifth lowest in Europe and 75% less than that of Brazilian beef.
- Ireland is also viewed by the United Nations as the most water-efficient producer of food globally.

Challenges for the industry

- There is a view amongst farmers that the standards placed on the industry are onerous which threatens livelihoods and their competitiveness.
- The three major issues facing the industry are the costs of production, the price that producers are paid and direct payments from the CAP.
- Production costs have been rising consistently while direct payments have remained stagnant since 2004.
- Retail prices are being compressed by the market power of large retails and competition from discounters.
- There are significant ongoing issues between food processors and farmers regarding the transparency of pricing and how factory feedlots may be used to influence supply.
- The report discussed the considerable power over prices possessed by retailers in negotiating with processors and in turn producers.
- Various indices indicate that Irish producers have typically been paid a lower amount than UK and EU counterparts.
- Brexit is a concern for the industry as the absence of an agreement between the UK and EU could lead to WHO rules and trade for the British market.
- The industry lacks a ‘brand’ and is therefore vulnerable to the imposition of tariffs to a greater degree than other agricultural products.

Other points of interest

Current beef prices make all sucking systems loss-making which is not sustainable long term. The author views interventions to subsidise production as necessary if the Irish suckler herd is to be preserved. In the absence of such supports, only one-third of suckler farmers are viewed as sustainable due to their lack of scale and efficiency.

The report’s author emphasises that a successful industry cannot be built upon a supply chain that is as dysfunctional as exists in the Irish suckler market. The lack of transparency in the market makes progress in resolving these issues difficult to achieve.
Eradicating Bovine TB in Northern Ireland (2018)

This analysis was commissioned by the Northern Ireland Audit Office for the Northern Ireland Assembly to report on the significant expenditure since 1964 trying to eradicate Bovine TB from NI. The report acknowledges the high rate and the relative failure of the scheme compared to comparable countries while also highlighting the important role of the scheme in protecting its beef export industry.

Costs

- Between 2006 and 2018 £356 million was spent on the NI bTB eradication programme. Almost half of these costs relate to compensation. During this period £158 million of compensation was paid to farmers for the compulsory removal of almost 127,500 cattle under the bTB scheme.
- Since 1998 the exchequer has underwritten farmers’ 100% of the risk of herds contracting bTB which provided little incentive for the industry to share ownership of the problem.
- Around 45 per cent of the expenditure relates to compensation.
- If OTF-status was achieved by NI annual compensation payments (over £23 million in 2017-18) and testing costs (over £9 million in 2017-18) would be reduced substantially.
- bTB also imposes significant costs on farmers and taxpayers. The government pays for the testing programme and compensation while farmers incur disease prevention costs, costs of facilitating testing and compliance costs associated with clearing infected herds.

Benefits

- Retaining access to higher-value markets which would be threatened by the termination of the bTB scheme is identified as a key benefit of the scheme. The department’s intervention through the scheme has maintained an export industry worth £1.5 billion a year.
- The Department retains the right to salvage income for carcasses of animals sent for slaughter under the eradication programme. The amount varies depending on market prices but amounts to £4.6 million in 2017/18. If the entire carcass is unfit for the food chain the disposal cost is incurred by the department. This amounted to £200 thousand in the same year.
- The Department believes there is benefit in farmers ensuring that they have as much information as possible when bringing animals into their herds.

Obstacles to progress

- The report highlights the lack of ownership and incentives built into the Northern Ireland TB Eradication Scheme.
- TB Eradication Schemes internationally have had the greatest success in combating the disease where cooperation between industry and government is highest.
- Two attempts have been made to amend the compensation regime but political opposition from the Northern Assembly prevented this.
- The European Commission has been critical of several practices within NI that impact bTB infection control. These include controls on animal movements, biosecurity measures and the level of Departmental engagement with stakeholders.
- 26% of the herds that tested positive had more than one source of infection with badgers identified as the confirmed source in 22% of breakdowns.
- With the UK set to leave the EU bTB represents a significant barrier to trade with the EU or other countries.
- In 2009, the Department told the public accounts committee that, “although there had been concerns that increasing compensation levels would encourage farmers to ‘invent’ or import reactors, the lack of government intervention in the reservoir of infection in badgers made it reasonable for the public purse to cover the full cost of compensation”.
- The Department has proposed to keep under review the potential benefits of herd classification and purchasing based on herd bTB history as operated in New Zealand.

Other points of interest

The report concluded that a revised approach was necessary to move towards the eradication of bTB in NI. A recommendation of particular importance was the need to move towards shared ownership between industry and the government to reduce the burden on the government. This would be achieved by reducing the current rate of compensation below 100%. Higher standards of herd management and biosecurity were deemed necessary by farmers and improved enforcement by authorities. An effective approach to wildlife management of bTB was also deemed of high importance.

This analysis was prepared by the Irish Government Economic and Evaluation Service (IGEES) for DAFM to assess the net costs of Ireland’s most significant farmed animal health programme, the bTB Eradication Programme. It reflects on the ongoing costs of the programme and the need for additional policy measures to accelerate progress towards eradication.

The report sets out three broad research questions around the scheme’s progress towards the 2030 target of achieving bTB-free status, the current funding arrangements, and whether the bTB scheme reflects international best practice in the context of economic considerations.

2030 Target Progress

The report develops a background of bTB incidence in Ireland and the approach taken by the scheme over its history to address this challenge. The report details the operation of the scheme and the actions taken by DAFM to advance its objectives.

In particular it focuses on initiatives emerging from the bTB Stakeholder Forum aimed at progressing the bTB Eradication Strategy including increased biosecurity, designated ‘Black Spot Action Plans’, wildlife control and strengthening industries role in future activities.

The implementation of such activities will inform whether the 2030 target is achievable without additional measures being required.

It provides a synopsis of previous reviews, in particular the Value for Money and Policy review conducted in 2008 (DAFM 2008) which concluded that a bTB programme was necessary to ensure access to export markets.

Current Funding Mechanism

- The net cost of the programme in 2018 was €92 million. The breakdown of costs was €47 million from the Exchequer, €9.7 million co-financed by the EU and €35.2 million paid by farmers.
- The €35.2 million includes an estimated €28 million of bTB testing and a further €7 million in bovine disease levies.
- Programme costs have increased by €8.2 million (10%) since 2015 despite the stable levels of herd incidence. These increases have been driven by an increase in financial support payments paid to farmers, accounting for €4.7 million of this increase.
- The total expenditure over the schemes 70-year lifespan is an estimated €5.5 billion while an additional €1 billion of expenditure is forecast to 2030.
- The cost of the scheme has increased by 36% relative to 2017. These cost increases have been driven by lower salvage values, the higher market value for reactors and a larger ‘gross differential amount’.

The decline in EU funding due to declining bTB eradication performance levels is set out showing a 35% reduction over the previous five years with identification of additional penalties to be applied in forthcoming years.

The report questions the allocation of a significant proportion of programme funding to financial supports in the event of a breakdown and whether it is consistent with the economic principles of moral hazard or ensuring industry is incentivised to take ownership of the problem.

International Best Practice

The report highlights that the Irish example shares common similarities with international counterparts, as well as significant differences. These countries have also had varying degrees of success in eradicating bTB with their approaches.

Reviews are ongoing across the UK bTB programmes which with the exception of Scotland have consistently struggled to move towards eradication within their national herds.

This was contrasted to the Australian and New Zealand experiences where bTB has either been eradicated or successfully reduced to minimal levels.
Estimating the consequential cost of bovine TB incidents on cattle farmers in the High Risk & Edge Areas of England & High and Intermediate TB Areas of Wales (2020)

This report was prepared for the UK Department for Environment, Food and Rural Affairs to analyse the impacts of bTB breakdowns on cattle farms. The report was commissioned to identify and update cost estimates using a large scale survey to provide a representative sample of farms.

Costs

- Costs arising from slaughtered animals are routinely monitored and compensated for, however other costs arising from breakdowns are not.
- There can be lingering costs on production and management that can extend beyond the end date of a breakdown.
- On average, testing, movement restrictions and output losses account for almost two-thirds of total costs.
- The report notes the significant psychological and emotional burden arising from a breakdown for farmers.
- There are also implications for future growth ambitions of beef or dairy enterprises in terms of loss of productivity.
- The most commonly reported change beyond the end of a breakdown was an increase in biosecurity.
- The composition and magnitude of costs can vary greatly across breakdowns. This occurs due to farm characteristics such as farm type and size and the timing and duration of the breakdown. For these reasons, it’s difficult to characterise what a “typical cost” of a breakdown is.
- The report found the total cost of breakdowns had a median value of approximately £6,600 and an interquartile range of c.£20,800 across all farms in the survey.
- In England and Wales, the median total costs for large herds were approximately £18,600 whilst the figure for small herds was £1,700.
- Median total costs for long breakdowns (>273 days) were c.£16,000, those for very short breakdowns (≤150 days) are c.£4,600.
- 95% of surveyed farms reported testing costs and over 65% reported movement restriction costs. However, only 44% reported output losses. The inter-quartile ranges for large, medium and small farms were respectively approximately £3,400, £3,750 and £4,300.

The results from the survey confirmed that costs vary significantly across breakdowns with a few farms incurring very high costs and most incurring modest costs.

Comparison with other estimates

The results from the survey were found to be broadly consistent with the findings reported in the literature and expert opinion. However, it notes that direct comparisons are challenging to make given the variation in how the data is presented when the data and cost estimates were gathered and given that farming practices, structures and policy measures change over time.

- The report cites Bennett et al. (2004) reported total costs of a breakdown ranging from between about £300 and £143,000 with median breakdown costs of approximately £7,000 for dairy farms and £3,750 for beef farms. This literature also cited the challenges of highly skewed data.
- Sheppard and Turner (2005) reported total costs of £162,000 however the median breakdown cost for two-thirds of dairy and beef farms was around £10,000 and £2,700 respectively.
- Sheppard & Turner (2005) reported testing costs per farm per breakdown of up to £15,000 for dairy farms and up to £6,750 for beef farms. The medians for dairy and beef farms were £1,350 and £800 respectively while costs of movement restrictions were reported at £180,00 per breakdown but around a median of zero for both farm types.
- Bennett et al. (2004) report testing costs of up to £11,000 per breakdown, but with medians of £1,350 and £800 for dairy and beef farms respectively, and costs of isolating animals of up to £6,000 per breakdown, but with a median of £200.

Other points of interest

The DEFRA and other surveys mentioned in this section relied on the self-reporting of UK farms which could lead to some inaccuracies or overstating of costs. However, the report states that there is no evidence to suggest systematic exaggeration in their survey. The large sample size, sampling design and exclusion of statistical outliers resulted in a statistically robust survey detailing many of the costs incurred by farmers during bTB breakdowns that supported the inputs of the Cost Benefit Analysis Model.
New Zealand (Livingstone et al 1993 and 2015)

In 1993 and again in 2015, PG Livingstone et al described the progressive development of New Zealand’s national strategy for control of tuberculosis in its agricultural sector which stretches back over 40 years.

Key Points

- Bovine TB is defined as a wasting disease that causes loss of production. Local experience quotes within the report suggested that an average 5% loss of production was incurred due to Bovine TB. In addition, the report discusses the transmission rates of TB and states that Bovine TB is highly infectious, with reactor animal likely to infect five others per annum in an average-sized New Zealand dairy herd (Animal Health Board).

- The report raises the concern of increasing consumer interest in food safety and food origin traceability. In the New Zealand situation, the report felt that the risk of consumer boycott due to poor disease management practices provided an additional reason to eradicate the disease.

- In addition to the loss of production, high levels of disease could present a risk to trade in meat and dairy products, especially into high-value overseas markets where consumers increasingly demand high standards of food safety.

- The scheme is administered through the Animal Health Board, a non-government organisation comprising of its key funders – Local Government Association, Central Government, New Zealand Dairy Board, New Zealand Deer Farmers Association and Federated Farmers of New Zealand.

- It replaced the existing National Health Advisory Committee once industry became more incentivized to participate following the announcement of plans to decree that farmers contribute 48% of the TB programme costs increasing to 66.6% over three years – previously this was 100% government funded.

- Industry funding has not fallen below 50% since 1985 and at times has reached 70% of the costs of the scheme.

- Vector control is arguably AHB’s most significant activity consuming approximately 65% of total AHB resources to control TB in wildlife vectors.

- There has been a 96% reduction in the number of infected cattle and dairy herds, from 1,694 in June 1994 to 72 by June 2014. The scheme has generated a sense of partnership between government and industry as well as ownership of the strategy, with surveys showing 85% support among farmers.

Analysis Expenditure and funding arrangements of New Zealand’s bTB Eradication scheme 1985-2010

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Income</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central and Local Gov</td>
<td>4.3</td>
<td>5.9</td>
<td>11.2</td>
<td>26.0</td>
<td>36.0</td>
<td>34.1</td>
</tr>
<tr>
<td>Levies and Industry Fund</td>
<td>3.3</td>
<td>13.5</td>
<td>21.5</td>
<td>26.2</td>
<td>45.3</td>
<td>44.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>7.6</td>
<td>19.4</td>
<td>32.7</td>
<td>52.2</td>
<td>81.3</td>
<td>79.0</td>
</tr>
<tr>
<td>Industry Share (%)</td>
<td>43%</td>
<td>70%</td>
<td>66%</td>
<td>50%</td>
<td>56%</td>
<td>57%</td>
</tr>
<tr>
<td><strong>Expenditure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operational</td>
<td>-</td>
<td>2.2</td>
<td>1.4</td>
<td>3.6</td>
<td>6.0</td>
<td>6.3</td>
</tr>
<tr>
<td>Disease Control</td>
<td>4.7</td>
<td>8.1</td>
<td>11.7</td>
<td>14.5</td>
<td>17.7</td>
<td>18.4</td>
</tr>
<tr>
<td>Compensation</td>
<td>1.8</td>
<td>3.5</td>
<td>3.5</td>
<td>1.2</td>
<td>0.9</td>
<td>0.5</td>
</tr>
<tr>
<td>Research</td>
<td>0</td>
<td>0.5</td>
<td>1.8</td>
<td>2.5</td>
<td>2.6</td>
<td>2.5</td>
</tr>
<tr>
<td>Vector Control</td>
<td>1.1</td>
<td>4.1</td>
<td>14.3</td>
<td>30.4</td>
<td>54.1</td>
<td>51.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>7.6</td>
<td>18.4</td>
<td>32.7</td>
<td>52.2</td>
<td>81.3</td>
<td>79.0</td>
</tr>
</tbody>
</table>

Sources: Grant Thornton analysis of Development of the New Zealand strategy for local eradication of tuberculosis from wildlife and livestock (2015)
### Australia (More et al 2015)

The report reviews the Australian eradication effort, which saw the successful removal of Bovine TB from wildlife in 1997. It outlines the Brucellosis and Tuberculosis Eradication Campaign (BTEC), the eradication programme, which ran for 27 years, and its successor TB Freedom Assurance Programme (TFAP) and (TFAP 2) – a surveillance management plan to provide confidence on ongoing eradication.

**Features of the programme:**

- A whole herd test and slaughter programme were operated throughout the BTEC years, with the use of single intradermal testing, through the caudal fold and a cattle tracing system, which was introduced in the 1970s.

- Abattoir surveillance played a central role throughout BTEC and in 1992, the National Granuloma Submission Programme was introduced, which extended abattoir testing to include Buffalo, Camel and Deer testing.

- Although rapid progress towards eradication occurred in Southern parts of Australia, largely due to progress made by the dairy industry pre-BTEC, the northern regions of Australia proved more challenging.

- Substantial changes in the manner of how farming was performed were required. Intensified cattle management procedures were introduced throughout the North, where previously, cattle auditing had only been orchestrated during a time of harvesting.

- The paper states that 20% of BTEC overall costs were incurred in the Northern territories, where approximately 5% of the National Herd were found.

- The national programme was underpinned by an active research programme, funded in part by the government and industry. The agenda was to improve the understanding of TB epidemiology and diagnostics.

- In the north, methods were introduced which included helicopter mustering, paddock checks, bush destocking through the use of ‘Judas cows’, herd segregation and accelerated destocking of high-risk groups (Lehane 1996). The required severity of the measures introduced was determined depending on the herd and area classification.

- Initially instigated to protect exports and trade, the industry has played a central role and has been a major financial contributor – many attribute the success of BTEC to this industry ownership.

- Producers paid levies that were held in a trust account for the specific purpose of the eradication effort.

### Summary

The first point to note is that this is certainly not the first review of Ireland’s TB Eradication Scheme with previous reports reviewed in this report being issued in 1991, 1993, 2008, 2019 as well as at other points. The issues facing the scheme are not new.

There is a consistent view across these reports as to the benefits of such a scheme and the important role it has already played in the growth of Irish agriculture and the potential for further future growth. These benefits are aligned with the approach taken in this report.

The reports highlight the importance of ensuring that funding for the scheme is maintained but is also fairly shared between the relevant parties. There are, however, differing views as to whether that split of costs should be engineered in such a way as to incentivise greater ownership of the issue to one party or another. Reports from other jurisdictions where bTB has been successfully eradicated highlight the benefits of using the programme cost burden to incentivise stakeholders. Some reports also highlight the change in the relative importance of benefits from a Public Health concern (though even this is linked to the threat of losing access to the UK market at the time) to access to export markets and cite this as a reason for a greater cost burden falling on those that benefit the most from the outputs of the scheme.

Where beneficiaries are identified they are always seen to be primarily the industry as a result of the necessity of maintaining access to markets to export products that are produced in far greater quantities than can ever be consumed domestically.

There is widespread acceptance that certain costs incurred through the operation of the scheme, particularly to farmers, are not captured in or compensated through the scheme though there is a view that some of these costs would likely be incurred by farmers as a cost of doing business and maintaining both reputation and access.

There is some acknowledgement of the non-financial costs and hardships that are placed on farmers both by the threat of a bTB outbreak and the actuality of a breakdown event occurring and the restrictions that this results in.
Stakeholder Consultations
Consultation Process

During the period between February and April 2020, Grant Thornton undertook a stakeholder consultation exercise to identify and understand the concerns and opinions of the wider agri-food community who have a touchpoint with the Bovine TB Eradication Scheme. A broad cross-section of stakeholders was engaged to gain a comprehensive collection of views and concerns relating to the aforementioned scheme. The views were collected through face-to-face stakeholder meetings and phone calls where logistics and timings did not allow. Each stakeholder was allowed to speak freely, and all of the comments were collated and anonymised unless otherwise stated.

Following each of the consultations, a summary of the minutes taken was drafted and shared with the stakeholder to ensure that all points raised were noted correctly, and to provide the opportunity for additional comments to be included. Any updated comments were noted by the team. Following the completion of the consultations, a summary of the main concerns was drafted and circulated to all stakeholders for comment and review. The issues raised were grouped into separate themes, and questions surrounding these themes were put to the stakeholders to:

- ensure all views had been appropriately understood and captured;
- include all of the key concerns; and
- provide the opportunity for stakeholders to comment and propose solutions to those concerns.

The themes that emerged from this process are outlined in the following pages, and the feedback we received, along with the original comments have been analysed and the findings from these have been presented. The responses to the consultation process reflect the opinions of respondents not our own views which are captured in detail elsewhere in this report.

Of particular concern given the terms of reference for the engagement were:

- What are the key costs of operating/facilitating the scheme?
- Are the costs of the scheme incurred at an appropriate level?
- Are all costs incurred in operating/facilitating the scheme adequately captured?
- What are the key benefits of the scheme?
- Who are the key beneficiaries of these benefits and to what extent?

Stakeholder Breakdown

Consultations were undertaken with 35 individuals or organisations. The following table displays the breakdown of respondents among different groups. A broad section of stakeholders was chosen to ensure a wide range of concerns and opinions were captured. Herdowners consulted for the process of this analysis were chosen at random from a full list of herdowners who had engaged with the OFMV Scheme in a previous two week period.

<table>
<thead>
<tr>
<th>Breakdown of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farming Representative Groups</td>
</tr>
<tr>
<td>Farmers</td>
</tr>
<tr>
<td>Valuers/Valuer Representative Groups</td>
</tr>
<tr>
<td>Veterinary Representative Group</td>
</tr>
<tr>
<td>Business Representative Groups</td>
</tr>
<tr>
<td>Other</td>
</tr>
</tbody>
</table>

Themes Arising from the Consultation

It is important to note that this was not intended as an exhaustive response to every issue raised during the initial consultation phase. Instead, the responses to the consultation process were examined to determine whether there were any overarching themes or areas of broadly-held concern.

A list of commonly raised issues was drawn up and subsequently shared with all of the stakeholders for comment. This allowed the stakeholders more time to reflect and provide insightful suggestions than they were previously afforded in the one to one consultations held. Some key areas of concern were put to the stakeholders which are outlined below, along with the summation of the commentary received on them. The issues raised mirrored many of those that had arisen as part of the discussions at the TB Forum.

<table>
<thead>
<tr>
<th>Main Themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unacknowledged farmer labour contribution</td>
</tr>
<tr>
<td>Downstream beneficiaries</td>
</tr>
<tr>
<td>Public health risk</td>
</tr>
<tr>
<td>Compensation levels</td>
</tr>
</tbody>
</table>
Stakeholder Consultations - Costs

General costs

The question of the general scale of costs was addressed with stakeholders. There were some concerns expressed around what was considered the opaque nature of the reporting of the costs incurred at a Departmental level and in particular the reporting of staff costs where questions were asked around the apportionment of staff time directly to the scheme. It was suggested there were 'hidden' administration costs with no clear line of sight as to how these positively impacted the goals of the scheme.

This was directly related to a belief amongst some stakeholders that the programme was largely designed to keep both departmental staff and veterinarians in jobs rather than to address TB eradication with some citing the disparity between the amount spent on admin and that spent on research and wildlife control. The question was also asked of stakeholders as to whether or not the testing regime and associated practices in aligning with the Irish TB Eradication Scheme was considered overly onerous or included unnecessary levels of activity such as over-testing etc. While responses to this varied depending on an understanding of what is required of the Irish programme by the EU and what is considered 'best practice' for such a scheme the overall opinion was that Ireland’s approach was set and conducted at an appropriate level.

A majority of industry-related stakeholders expressed the opinion that the cost that has been burdened on farmers on a percentage basis has been increasing, particularly from the baseline figures of 2012-2018, but even more so when costs are examined over the past two decades. This is in contrast to the reduction in funding on a percentage basis provided by the State. There were suggestions that the Department’s desire to engage with farmers at this juncture while driven by the ongoing reduction in EU funding for the scheme was focused primarily on a need to make up that shortfall from the industry rather than a need to reduce bTB incidence levels in line with EU expectations.

It was also highlighted that only in Ireland does the industry contribute funds directly to the scheme in the form of funding the mandatory annual testing regime. A comparison was made between the amount of direct financial contribution made and the direct benefits which were largely seen as the compensation paid for reactors with the suggestion being that there was not a reasonable return for farmers already without any further measures or associated costs being considered.

When questioned about moving towards a system with increased cost-sharing, the likes of which have proven successful in Australia and New Zealand, differing opinions were presented. While various stakeholders believed that to eliminate bTB in the coming years, greater ownership and buy-in would be required from the industry, other stakeholders believed that a further increase to the cost burden of the farmer would be fatal, especially for the beef industry, which is already under considerable stress. Others highlighted that comparisons to Australia and New Zealand could not be realistically made due to the herd size, spatial differences and presence of wildlife reservoirs and the ability to cull the same.

By far the larger focus of stakeholders’ concern was on costs that were considered omitted from consideration and calculation of the overall programme costs.

The Department when consulted highlighted the challenges that the scheme faces currently and the risks that those challenges pose. In particular, with incidence levels remaining stagnant, the costs of the operation of the scheme rising and European funding supports falling considerably in recent years there would be inevitable questions as to the value for money that the scheme brings without a significant change in strategy. The goal to eradicate TB was also felt to be very unlikely to be met without such a change in strategy and that would necessitate a rethinking of how the scheme is funded and how that funding is best utilised.
Unacknowledged farmer contributions and costs

A consistently expressed concern of the farming industry emerging from the stakeholder consultations was whether the current costs of the TB Eradication programme adequately account for the total contribution actually required and made in operating the scheme.

It was suggested that while Departmental staff, Veterinary Practitioners and Valuers were all compensated appropriately for their time and these associated costs included within the calculation of the cost of the overall scheme, farmers’ labour contribution was neither quantified nor recognised as a programme cost.

Indeed, previous reports on TB Eradication Schemes in Ireland and elsewhere highlight that there is undoubtedly an element of additional cost incurred by farmers in facilitating the scheme but while this is acknowledged there have been very few attempts to quantify it accurately.

Key labour costs incurred by farmers in facilitating the scheme were said to be additional labour time in:

- Assembling animals in advance of both TB test days and returning of animals following both test days, including time off work for part-time farmers;
- Managing TB reactors as a separate group of animals as required by DAFM;
- Assembling and presenting reactor animals for valuation;
- Presenting animals for collection by the reactor removal service;
- Purchasing disinfectants and disinfecting of facilities; and
- Maintaining handling facilities on-farm suitable for a full herd test.

Further additional costs incurred by farmers highlighted were production losses and increased animal health issues from the assembly of animals.

Restrictions placed on herd movement and trading where a TB outbreak was suspected or confirmed were also referenced as a further cost that is not adequately captured and compensated currently. Finally, the costs of restocking and replacing reactors were also mentioned as not falling under any specific area of compensation.

For the Department’s part it was emphasised that in addition to reactor compensation, Ireland is the only country identified that provides additional financial supports in terms of hardship funds etc. that go some way towards providing additional compensation for farmers.

As part of the review, Grant Thornton requested submissions from those individuals and parties that supported this view to greater quantify these additional costs and these are considered elsewhere in the report. There was considerable disparity in these figures provided ranging from €12.5 million to ‘conservative’ estimates of €25 million all seemingly based on a minimum wage assumption.

The view that farmers’ labour contribution should be included as a programme cost nor the exact components or quantification of any such contribution was not a uniform view across the parties consulted. Some stakeholders took the view that the TB Eradication programme can be seen as a basic requirement for the industry to demonstrate that appropriate action is taken to ensure that food quality, hygiene and safety is maintained.

This view suggested that the beneficiaries of such a scheme are first and foremost the industry itself as it provides an assurance and in some instances meets agreed standards to customers domestic and international. The point was made that from certain reputational, contractual and legal perspectives such a scheme would be required whether or not the state was directly involved in funding or operating it.

Such an interpretation would therefore view any labour or additional costs incurred in delivering such a scheme should be considered as a cost of doing business for the industry and indeed in some jurisdictions the full costs of similar schemes are borne by private industry either alone or to a far greater degree than has been the case historically in Ireland.
Non-financial costs

While much of the discussion with stakeholders focused on the financial elements of the scheme from a cost and benefit perspective, there were several points raised around the fact that it is not just financial costs that farmers incur as part of the scheme.

A breakdown can mean herdowners worrying about significant financial loss, losing their livelihoods, being unable to support their families, and also the reputational damage due to the wider impact of a breakdown on neighbouring farms and others. The damage to the mental health of individuals and families in this situation can be substantial.

These non-financial costs are detailed and addressed more widely in the accompanying On-Farm Market Valuation Scheme Review report conducted by Grant Thornton.
Stakeholder Consultations - Benefits

General benefits and beneficiaries

When the question of the benefits of the TB Eradication Scheme was put to stakeholders there was broad agreement as to what the benefits were but strong disagreement as to what level of importance should be ascribed to each benefit in comparison to others and who ultimately is the main beneficiary of those benefit.

In general three key benefits were identified by all stakeholders, namely:

- the benefit to public health of limiting the transfer of bTB between animals and humans;
- the continued levels of access to markets for exports and the opportunity to access future markets; and
- the increased herd size and productivity levels associated with limited bTB incidence levels.

Disagreement was found in trying to apportion these benefits to public or private beneficiaries.

In general, those involved directly with the farming industry were more likely to suggest that the programme and the benefits it accrued were of greater value to society at large and the Irish economy as a whole rather than farmers individually or the industry as a sector. That belief was driven by the idea that the scheme’s purpose was to aid public health first and foremost and where there were additional benefits such as access to markets or increased productivity that the downstream or multiplier impacts of these benefits on the wider economy exceeded the direct benefit received by the producers.

The Department and some other stakeholders highlighted that historically across a range of previous reviews in Ireland and in other jurisdictions, the key beneficiaries of eradication schemes in Ireland and elsewhere have always been considered to be private industry. The focus of that benefit was on the access to markets, particularly the EU but with a greater future focus on third-party markets such as China, and increase both in the overall size but also the productivity of the Irish herd.

Public health

The first benefit typically highlighted by most stakeholders was in the area of Public Health. This was stated as being the primary reason for the introduction of the TB Eradication Scheme back in the 1950s as TB was rife both in the Irish herd but also in the general Irish human population. References were made to the damage the disease caused and the costs in terms of human life as well as in monetary terms.

There was a recognition that the situation had improved dramatically since the 1950s and a belief that the TB Eradication Scheme had played a significant role in that and continued to do so. The nature of some strains of TB as a Zoonoses that can transfer from animals to humans meant that this was very topical in some of the later consultations given the current COVID-19 pandemic. This was highlighted as a strong factor in the need to consider TB Eradication as a Public Health benefit first and foremost and the project team was urged to speak to the HSE and HPSC to confirm this which we were happy to do so.

Other stakeholders were less focused on the Public Health component of the scheme, suggesting that TB was far less prevalent and that the reasons for that lay outside of the work and role of the programme. These stakeholders highlighted other changes such as greater pasteurisation, improved living conditions and medical treatments as having a greater impact than the scheme. The point was raised that TB is seen as a disease of the past in Ireland and something that largely affects either very vulnerable populations or is more of a global concern in less developed areas.

Finally, some stakeholders did not feel they were appropriately knowledgeable on the subject and were keen to defer to the experts within the Public Health sphere.
To understand what the Public Health benefits of the TB Eradication Scheme may be, the project team consulted with several specialists within the Health Services Executive (HSE) and with the Health Protection Surveillance Centre (HPSC). In particular, the consultations focused on:

- How does TB manifest itself?
- What are the general trends around TB?
- What does TB infection mean for the Health Service? How is it treated in terms of risks and importance and therefore in planning and funding?
- What is the risk of TB transmission from cattle to humans?
- What are the public health benefits associated with the TB Eradication Scheme and to what scale?

The findings of those consultations are detailed below.

Incidence of TB has fallen significantly since the 1950s from over 7,000 cases per year to typically fewer than 300 cases. The reasons for this were largely considered to be:

- improved living conditions;
- reduced contact with animals;
- pasteurised milk; and
- medical detection and treatment.

As a result, TB is no longer viewed as a significant risk in Ireland nor largely on the political agenda as evidenced by the fact that there is no longer a universal program for managing TB, there is no dedicated budget, and the BCG programme is being withdrawn as it is not considered to be cost-effective for the level of TB in the country.

High-risk populations for contracting and spreading TB are considered to include asylum centres, the homeless community, and prisons as opposed to the general population.

Zoonotic TB or bTB is typically spread from animals to humans in modern-day Ireland through direct contact with animals e.g. inhaling airborne TB from animals with TB in winter sheds. This is more likely to affect farmers but not a risk to the general population and only typically 2-3 cases of bTB strain present each year as evidenced in HPSC annual reports.

**Export markets**

While some stakeholders viewed the scheme as being public health-focused, all stakeholders highlighted the importance of the industry to maintaining access to overseas export markets and the role played in that by the presence of a TB Eradication Scheme. It was noted that 90% of Ireland’s agricultural produce was exported around the world with far more produce than could ever be consumed domestically. This has been both facilitated and been driven by the opening up of additional markets and the capability to export to those markets. The example of the growth in the Irish dairy herd since quota restrictions were lifted and the additional benefits for exporting other dairy-related products to other jurisdictions was cited. Higher stocking, greater intensification and growth of the herd size had made the industry even more dependent on access to export markets.

The EU was seen as being the largest marketplace for Irish exports of which the UK (prior to Brexit) was the single largest country to which Ireland’s exported its products, both finished goods and those for further processing.

It was felt that EU standards were higher than some other export markets and while this placed additional requirements and costs on producers it also enhanced the reputation of Ireland’s produce and this differentiation had helped facilitate growth in other Rest of the World markets.

It was also considered that some new markets where future growth is anticipated had requirements that go beyond those of the EU’s trade laws and necessitated the continuance of many of the scheme’s features if these markets were to be accessed.

There was agreement that the failure to have a scheme in place in some shape or form would have a negative impact on many of the advantages that the industry perceived were of benefit to their product, however, there were also widespread concerns as to whether the programme in its current format would ever succeed in eradicating TB. This, it was felt, had the potential for Ireland, if it stood still or went backwards in its TB incidence levels, while competitors moved forward with their own schemes, could result in competitive disadvantages in the long-term.
Maintaining farm productivity and animal welfare

Stakeholders highlighted that the scheme alongside other efforts had done a lot over the years to improve both farm productivity and animal welfare.

There was a belief that the Irish herd should have the “best herd health status possible” as it provided significant knock-on reputational benefits associated with healthy sustainably and humanely produced food. This benefits the industry both domestically in terms of public perception but also allows Ireland to focus on high-quality international segments of the beef and dairy markets through the knowledge of export customers that Ireland has stringent and robust bTB and other controls in place.

This was felt to be particularly the case when compared to some other competing jurisdictions such as the USA and Mercosur whose testing standards and animal welfare controls are considered more accepting and less stringent than those imposed under EU trade law. Examples cited included a comparison to the use of growth hormones, antibiotics and washing of chicken in chlorine as equivalent areas where public confidence had been shaken closing off access to certain markets.

It was felt that the growth of Ireland’s capability to produce was not just related to a growth in the national herd but in the improvement in productivity of individual animals in terms of yield of milk or weight in kgs. This growth was in large part linked to Ireland’s ability to cultivate bloodlines and conduct long-term statistical analysis through bodies such as the Irish Cattle Breeding Federation (ICBF) to identify and develop positive characteristics within the Irish herd. Such statistic led breeding programmes were felt to have played a key role in growing the productivity and quality of the Irish national herd.

The absence of the TB Eradication Scheme, it was felt by some, would have led to a continuation of bTB infection levels and associated culling in the order of those seen in the early days of the scheme. This would have severely impacted Ireland’s ability to develop advanced scientific approaches and damaged the breeding programmes which have played a significant role in enabling that growth.

A bTB outbreak has the opposite impact on farm productivity in that it directly reduces or stops the output of the affected animal, it leads to additional costs for the farmer in terms of time and money in dealing with the outbreak, and it places a significant mental toll on not just the farmer suffering the outbreak in their herd but in surrounding herds as well.
Programme Costs
Costs overview

Approach to the identification of costs

In line with our methodology, costs have been identified through a mix of desktop research and consultations with key stakeholders. For the purposes of this exercise, it was important to not only identify the costs from the bTBEU but also assess their effect on the stakeholder groups. Insofar as possible, we have sought to quantify these costs and assign them to the relevant stakeholder.

As part of this review, costs have been separated into three categories for further analysis:

- Current costs of the TB Eradication programme;
- Proposed costs to be considered for inclusion as programme costs;
- Further costs which are not currently proposed to be considered for inclusion as programme costs.

Current costs of the TB Eradication Programme

Broadly the costs associated with running the TB Eradication Scheme into:

- Staff and administration costs;
- Wildlife programme;
- Private Veterinary Practitioner (PVP) testing;
- Compensation Scheme; and
- Research.

A breakdown of these costs provided in the table below, showing the total cost of €97.3m in 2020, increasing by €10.9m since 2017. The main drivers for this increase in expenditure explained in more detail below, and broadly relate to increases in compensation in the OFMV Scheme; staff and admin costs; testing; costs associated with the Wildlife Programme.

<table>
<thead>
<tr>
<th>Expenditure (€ ’000s)</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Staff &amp; Admin Costs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DAFM Staff Costs &amp; Admin</td>
<td>€26,924</td>
<td>€27,029</td>
<td>€27,502</td>
<td>€28,500</td>
</tr>
<tr>
<td>Supplies</td>
<td>€4,839</td>
<td>€4,376</td>
<td>€4,426</td>
<td>€5,278</td>
</tr>
<tr>
<td><strong>Wildlife Programme</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wildlife Programme</td>
<td>€3,465</td>
<td>€3,635</td>
<td>€4,040</td>
<td>€4,568</td>
</tr>
<tr>
<td><strong>PVP Testing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farmer Paid PVP Testing</td>
<td>€27,908</td>
<td>€27,746</td>
<td>€27,400</td>
<td>€27,400</td>
</tr>
<tr>
<td>DAFM Paid PVP Testing</td>
<td>€7,028</td>
<td>€7,313</td>
<td>€8,541</td>
<td>€8,498</td>
</tr>
<tr>
<td><strong>Compensation Scheme</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On Farm Market Valuation</td>
<td>€10,500</td>
<td>€14,255</td>
<td>€14,047</td>
<td>€16,388</td>
</tr>
<tr>
<td>Compensation - Other</td>
<td>€3,545</td>
<td>€3,832</td>
<td>€3,674</td>
<td>€3,706</td>
</tr>
<tr>
<td>Valuer Fees</td>
<td>€539</td>
<td>€548</td>
<td>€602</td>
<td>€740</td>
</tr>
<tr>
<td>Arbitration</td>
<td>€15</td>
<td>€11</td>
<td>€10</td>
<td>€10</td>
</tr>
<tr>
<td><strong>Research</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>bTBE Research</td>
<td>€1,666</td>
<td>€1,618</td>
<td>€1,136</td>
<td>€2,225</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>€86,429</td>
<td>€90,363</td>
<td>€91,378</td>
<td>€97,314</td>
</tr>
</tbody>
</table>

Notes:
1. Farmers costs assumes farmers privately pay the same rate as DAFM to Private Veterinary Practitioners for PVP testing;

Sources: DAFM
Staff and administration costs
This expenditure category relates to the cost of administering the scheme including supplies. The total cost of this category amounted to €33.8m, representing 35% of the total cost of the scheme.

The staff costs relate to DAFM employees working on the TB Eradication Scheme. The time allocated to the TB Eradication Scheme was determined through a survey of internal staff across policy, laboratories, Regional Veterinary Offices etc. Results of the internal survey estimated 620 staff within DAFM spend at least part of their time implementing the TB Programme.

Wildlife programme
As part of the TB Eradication Scheme, it is recognised that the bacteria which causes bTB can infect the wildlife population, such as badgers and deer. The wildlife programme recognises the important role badgers play in spreading bTB in cattle and seeks to reduce the risk to cattle through:

• removal of badgers from areas where severe TB outbreaks have been epidemiologically linked to badgers; and
• vaccination of badgers in areas where the risk posed to cattle by infected badgers has been brought under control.

Since 2017, the expenditure levels associated with running the Wildlife Programme have amounted to €4.6m, increasing by 31% since 2017.

Private Veterinary Practitioner (PVP) testing
A major activity within the TB Eradication Scheme is the cost associated with testing through Private Veterinary Practitioners. The total cost of PVP testing amounted to €35.9m in 2020. This was the largest expenditure category, amounting to 37% of the total cost of the scheme.

This cost is split into PVP testing paid by the Department (24%) and PVP testing paid by farmers (76%). PVP testing paid by farmers relates to the requirement that each animal is tested annually. Any additional tests, such as in the case of restricted herds or confirmatory blood testing is paid for by the Department.

The value associated with farmers PVP testing assumes that farmers privately pay the same rate as DAFM to Private Veterinary Practitioners.

Compensation scheme
As part of the scheme, eligible compensation measures will be provided in the case where a reactor is identified. Compensation schemes include the On Farm Market Valuation (OFMV), Income Supplement, Depopulation and Hardship Grant schemes. Other costs associated with compensation include arbitration and Valuer fees.

Income Supplement
This is payable when more than 10% of cattle are removed but the removal of the whole herd (known as depopulation) is not appropriate. It is paid up to a maximum of 100 cattle, but the herd owner is not eligible for payment once cattle are moved on to the restricted farm. The rate is 25.39 euro per animal per month.

Depopulation Grant
This is payable during the rest period following partial or full depopulation. The rate paid may vary depending on the length of the rest period.

Hardship Grant
This helps owners of restricted herds when cattle have to be kept and fed while the herd is restricted. It is paid for cattle kept between 1 November and 30 April. The herd must be restricted for 60 days before the herd is eligible, and can receive up to 253.94 euros a month up to a maximum of four months.

In 2020, costs associated with Compensation schemes amounted to €20.8m, which is 21% of the total cost of the scheme.

Since 2017, the cost associated with compensation has increased by €6.2m. This is largely due to an increase in compensation through the OFMV scheme which increased by 56% (€5.8m). This represents the most significant cost increase of the scheme and is largely due to the higher incidence of disease.

Research
The cost associated with research amounted to €2.2m in 2020, increasing by €560k since 2017. Research relates to the comprehensive research programme aimed at preventing TB spread by wildlife and the development of blood tests, vaccines and other technological tools required to improve the effectiveness of programmes.
Funding of the scheme

The identified costs of the scheme are financed through contributions from both private and public funding sources. Private funding relates to the expenditure financed by farmers, this accounts for 35.6% of the scheme in 2020. Public funding relates to the EU and Exchequer and accounts for 64.4% of the scheme during the same period. A breakdown of funding from 2017 to 2020 is provided in the adjacent table.

TB Eradication Programme Funding 2017-2020

<table>
<thead>
<tr>
<th>Financing (€ '000s)</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmers</td>
<td>€34,845</td>
<td>€35,101</td>
<td>€34,768</td>
<td>€34,882</td>
</tr>
<tr>
<td>EU</td>
<td>€9,851</td>
<td>€8,773</td>
<td>€7,425</td>
<td>€5,420</td>
</tr>
<tr>
<td>Exchequer</td>
<td>€41,733</td>
<td>€46,489</td>
<td>€49,185</td>
<td>€57,012</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>€86,429</strong></td>
<td><strong>€90,363</strong></td>
<td><strong>€91,378</strong></td>
<td><strong>€97,314</strong></td>
</tr>
</tbody>
</table>

Notes: 1. Farmers costs assumes farmers privately pay the same rate as DAFM to Private Veterinary Practitioners for PVP testing.

Sources: DAFM

Farmer contributions to the Programme have remained stable over recent years, reflecting the mechanism through which their contribution to the Programme is recognised. Farmer contributions relate to the assumed annual cost to the farmer of TB testing and receipts from bovine disease levies, it does not include the contribution of farmers time as further discussed in the next section of this report.

As incidence levels have increased over the years, EU contributions have decreased sharply - reflecting reduced funding ceilings and penalties related to deteriorating disease incidence. This is expected to continue for the foreseeable future placing pressure on the scheme.

The rise in costs resulting from increased bTB incidence, coupled with the reduced EU funding has been bridged through increased Exchequer contributions.

Comparative Funding

<table>
<thead>
<tr>
<th>Programme financing (€'000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
</tr>
<tr>
<td>10,000</td>
</tr>
<tr>
<td>20,000</td>
</tr>
<tr>
<td>30,000</td>
</tr>
<tr>
<td>40,000</td>
</tr>
<tr>
<td>50,000</td>
</tr>
<tr>
<td>60,000</td>
</tr>
<tr>
<td>70,000</td>
</tr>
</tbody>
</table>

Sources: DAFM

EU Funding

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount allowable</td>
<td>12.0</td>
<td>12.7</td>
<td>11.1</td>
<td>10.9</td>
<td>9.7</td>
<td>9.8</td>
<td>8.3</td>
<td></td>
</tr>
<tr>
<td>Amount to be received</td>
<td>10.2</td>
<td>12.7</td>
<td>10.7</td>
<td>10.4</td>
<td>9.9</td>
<td>8.8</td>
<td>7.4</td>
<td>5.4</td>
</tr>
</tbody>
</table>

Notes: 1. 2021 is an estimate

Sources: DAFM
Proposed costs to be considered for inclusion as programme costs

A consistently expressed concern of the farming industry emerging from the stakeholder consultations was whether the current costs of the TB Eradication programme adequately account for the total contribution actually required and made in operating the scheme. The key additional cost not currently attributed to the scheme was felt to be the time put into the scheme by farmers.

Farmers’ time

It was suggested that while Departmental staff, Veterinary Practitioners and Valuers were all compensated appropriately for their time and these associated costs included within the calculation of the cost of the overall scheme, farmers’ labour contribution was neither quantified nor recognised as a programme cost.

This approach is consistent with many other TB Eradication Schemes reviewed in undertaking this report where farmers’ labour contribution is not considered to be a quantified element of the overall programme costs. However, it is also fair to say, as was expressed in consultations, that a review of other jurisdictions’ schemes, in particular across the UK, highlighted that farmers were not required to directly compensate veterinarians engaged to carry out annual TB testing.

In effect, there is considered to be a trade-off between farmers’ labour contribution and farmers’ direct payment for services under the programme. There was a common opinion among the farming industry stakeholders that Irish farmers are therefore hit twice in the pocket compared to their neighbours.

Indeed, previous reports on TB Eradication Schemes in Ireland and elsewhere highlight that there is undoubtedly an element of additional cost incurred by farmers in facilitating the scheme while this is acknowledged there have been very few attempts to quantify it accurately.

However, it is also fair to say that there is a clear split between the approach to farmers’ time contribution taken in the UK, where bTB eradication, with the exception of Scotland, has failed and Southern Hemisphere countries such as Australia and New Zealand who have had significant success. This success has often been linked to the incentives for industry to lead on bTB schemes in order to reduce the direct financial cost imposed on them as the main funders of the scheme. In other words, actual financial contributions rather than implied or imputed farmers’ labour contribution.

It may also be true to say that the Common Agricultural Policy provides significant subsidies for the farmers’ time input in to the scheme to ensure:

“Farmers provide an impressive variety of abundant, affordable, safe and good quality products”.


The considered view of this report is that it seems appropriate that farmers’ labour contribution is valued as an equally important component of the efficient operation of the overall scheme as any other stakeholder.

While during the course of this review, several stakeholders provided estimations of the potential value of this contribution, estimations varied considerably in terms of methodology, assumptions, and ultimately final values. There are considerable challenges in validating these as part of this review and equally the exact quantum of time and appropriate valuation of same is difficult to establish with any degree of confidence given the lack of validated data available in developing this report.

For example, the amount of time of a herdowner that is attributable to the bTB scheme depends on several factors and is very specific to the individual herd. Examples of reasons for variations in time may include:

• Dairy herds may have the animals gathered up already for milking, and the animals tend to be easier to line up for testing.
• The time of the year might impact if the animals are grazing or whether they are in a barn.
• The timing of the test could be organised to coincide with other veterinarian visits.

For the purpose of this report we have sought to estimate this value based on the information available to us. There may be a need, however, in order for all parties to reach an agreed position for an additional exercise to take place e.g. a time and motion study with its scope agreed, and its outcomes approved.

It is, however, important to note that any estimate does not constitute a recommendation that additional compensation is provided for this contribution, merely that it be appropriately recognised in the programme costs.
Farmers’ labour contribution estimation

In order to illustrate the time commitment required we have estimated the required time in days based on the statutory obligation imposed on the farmers as part of the scheme. This relates to the requirement for the single annual bTB test required to determine the herd’s health status.

Any additional time or costs required in responding to the results of this test are considered to be standard health and safety requirements or activities that would be necessary following an outbreak as they would for any other disease other than bTB and therefore not directly related to the TB Eradication Scheme.

These activities carried out in light of an outbreak occurring are a responsible response to protect a farmer’s business, livelihood and the welfare of the animals within their herd, as well as minimising the risk to neighbouring farms where inaction would likely result in greater harm.

This means that activities post-testing are not included in this analysis, including:

- Additional testing for restricted herds
- Restricted herds disinfection
- Additional bio-security measures
- Presentation for valuation
- Facilitation of removal of reactors

Having established the activities which are considered appropriate for inclusion in the analysis the next step is to make an assumption as to the amount of time required to complete this activity. There is likely to be significant variation in the need to muster animals and ensure they are appropriately presented for testing with variables such as number of animals, size of farmland over which they are spread, condition of that farmland etc. all impacting on time.

Sheppard and Turner (2005) using surveys of farms in South-West England estimated that activities related to testing took a day with some reporting up to two days labour involved.

Assembly of animals for testing takes place over two days, the first to administer the test and the second to read the results of the test. For the purpose of this analysis the assumption used is that the overall process requires a single day to muster the animals, administer the test and consider results.

Return to farmer

To estimate value for farmers’ labour contribution outcome a second analysis was undertaken to estimate a return per hour from agricultural activity rather than relying on a minimum wage.

Herd related assumptions

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total animals</td>
<td>6,608,967</td>
</tr>
<tr>
<td>Average size of a herd</td>
<td>66</td>
</tr>
<tr>
<td>Number of herds</td>
<td>100,136</td>
</tr>
<tr>
<td>Herds restricted</td>
<td>3,940</td>
</tr>
</tbody>
</table>


As with all analysis in the report, where possible, a rolling-average figure using data from 2017-2019 was used to reduce the potential for an unrepresentative outlier year skewing the calculations.

Using data from the CSO the national herd size was apportioned between Dairy Beef and Other as set out below.

Cattle by category

<table>
<thead>
<tr>
<th></th>
<th>Average 2017-2019</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy</td>
<td>1,379,400</td>
<td>20.9%</td>
</tr>
<tr>
<td>Beef</td>
<td>3,204,067</td>
<td>48.5%</td>
</tr>
<tr>
<td>Other</td>
<td>2,025,500</td>
<td>30.6%</td>
</tr>
<tr>
<td>Total</td>
<td>6,608,967</td>
<td>100%</td>
</tr>
</tbody>
</table>

Notes: Herd size taken to be 3-year average from 2017 - 2019, Dairy cows representing Dairy stock, Beef cows representing Other cows, Cattle male and female above 1 year. Remaining categories from CSO grouped into Other. Livestock market represents Dairy, Beef and Other as base stock.

Sources: CSO; Grant Thornton calculations
Using the “Teagasc National Farm Survey 2017-2019”, average income per farm was calculated to be:

- Dairy: €71,114
- Cattle rearing: €9,949
- Cattle other: €15,173

Assuming the average return for the national herd is proportional to the herd size, we weighted the average income levels per category based on their representation of the national herd.

### Estimating return of national herd

<table>
<thead>
<tr>
<th>€</th>
<th>Average Income 2017-2019</th>
<th>Proportion of herd</th>
<th>Weighted income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy</td>
<td>71,114</td>
<td>20.90%</td>
<td>14,863</td>
</tr>
<tr>
<td>Cattle rearing</td>
<td>9,949</td>
<td>48.50%</td>
<td>4,825</td>
</tr>
<tr>
<td>Cattle other</td>
<td>15,173</td>
<td>30.60%</td>
<td>4,643</td>
</tr>
</tbody>
</table>

**Average income of national herd**: 24,331

Sources: 1. Teagasc National Farm Survey; 2. CSO

Based on the average income per farm and the proportion of activity, the average return was estimated to be €24,331 per farm.

From this an average return per hour can be calculated by dividing the average income of the national herd by the total number of hours worked to complete the actions being assessed i.e. 24,331/2,216. This gives a figure of return per hour to be €10.98.

### Working hours per FTE

<table>
<thead>
<tr>
<th>Units</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days worked a week</td>
<td>days</td>
</tr>
<tr>
<td>Annual leave</td>
<td>days</td>
</tr>
<tr>
<td>Sick leave</td>
<td>days</td>
</tr>
<tr>
<td>Public holidays</td>
<td>days</td>
</tr>
<tr>
<td>Working days a year</td>
<td>days</td>
</tr>
<tr>
<td>Hours worked a day</td>
<td>hours</td>
</tr>
<tr>
<td>Hours worked a year</td>
<td>hours/year</td>
</tr>
</tbody>
</table>

**Average income of national herd**: 24,331

**Return per hour**: return/hour | 10.98

Sources: Grant Thornton assumptions

This was then multiplied by the number working hours (8) in our number of days input to facilitating the testing scheme (1) and then by the total number of herds in Ireland (100,136).

Based on this, the value of time was estimated to amount to €8,795,946.
Further costs which are not currently proposed to be considered for inclusion as programme costs

In addition to farmers’ time there are several other costs which are recognised as being incurred by one or more stakeholders of the scheme. Some of these are listed below. There is a more detailed review of these within the OFMV Report previously released. It is not the recommendation of this report that further compensation is appropriate or necessary but as previously highlighted in the OFMV, appropriate steps should be taken to minimise the impacts of these costs and to provide non-financial supports where possible.

The cost of movement restrictions

At a farm level, the near 4,000 bTB restrictions each year are a source of significant mental and financial stress. A restriction can impede a farmer’s planned production cycle resulting in challenges to manage stock and finances.

The costs of keeping additional stock accrue in costs for extra bedding, feed and labour to keep stock on the farm. The inability to move stock off-farm (or around a farm for those businesses composed of more than one holding) creates a significantly increased workload and may also be associated with problems of overstocking and unintentional breaches of organic certification and cross-compliance regulations.

The cost of replacing livestock

The costs associated with replacing stock vary considerably, and the practicalities of replacing stock can have wider impacts on herd management and the farm business. In addition to the direct cost of the livestock itself, the costs of sourcing replacement stock include labour time taken to source cattle, the cost of travelling to see stock, and the costs of haulage once the cattle are purchased.

The ability to replace livestock may in part depend on the amount of compensation received. Due to the variability of compensation payments and the mismatch between compensation payments and market values (see below), not all farms can afford to replace all cattle slaughtered. Not all farmers buy-in replacements. Some have chosen to maintain a closed herd and breed their own replacements. This can be associated with a significant loss of milk revenue.

Personal and social costs

The stress and upset that bTB can bring to the farming industry is highlighted in how the disease can significantly change the manner in which a farm operates, as well as the additional workload that movement restrictions as a result. There is the feeling of helplessness in the management of the disease, with farmers feeling like ‘bystanders’, which is deeply upsetting for many farmers and their families, for whom breeding cattle is more than just a business.

The long term costs of bTB

There are numerous longer-term costs of bTB that impact upon farm businesses. Some are directly related to dealing with the demands of the disease, such as additional paperwork or financing biosecurity measures, while others are structural, including the extension of overdrafts or the postponement of capital investment. However, the longer term effects of farming under bTB restrictions are difficult to quantify accurately since business decisions are undertaken for a variety of reasons. While the disease may have a considerable influence, it is unlikely to be the only factor in the equation. Nevertheless, this report demonstrates that bTB frequently influences decision-making and in some instances acts as a ‘tipping point’ which precipitates change in the business.

However, perhaps the greatest cost of the scheme is to be found in its opportunity cost. To date the scheme is estimated to have cost around €1 billion over its lifetime with annual costs currently approaching €100 million. While clearly not all of these costs could have been directed elsewhere, the eradication of bTB from the Irish herd would allow for a not insignificant amount of that investment to be targeted elsewhere both in terms of public and private funding to enhance and grow Irish agriculture further.
Programme Benefits
Benefits overview

Approach to the identification of benefits

The initial reasoning behind the introduction of the TB Eradication Programme in 1954 was the benefits that could be derived from its eradication from the national herd. Those benefits were as follows:

- to preserve the valuable trade of store cattle;
- to address concerns regarding the threat to human health; and
- to mitigate TB related animal production losses.

Eradication has remained the long term objective of the Programme from its inception to the present day. The interim objective since the early 1990s has been to control bTB at levels consistent with maintaining trade in bovine animals and their products, at minimum cost to the Exchequer, while overcoming the constraints to eventual eradication through investment in research and technology.

In line with our methodology, the current benefits have been identified through a mix of desktop research and consultations with key stakeholders.

For the purposes of this exercise, it was important to not only identify the benefits resulting from the bTBEP but also assess their effect on the stakeholder groups. Insofar as possible, we have sought to quantify these benefits and assign them to the relevant stakeholder.

Broadly, the benefits relate to the following areas:

- Public health;
- Market access;
- Animal productivity; and
- Reputational benefits.

Protecting public health

The public health benefits of the TB Eradication Scheme were highlighted by industry stakeholders as being the primary benefit and indeed founding purpose of the programme with a strong benefit for Irish society as a whole.

Background

Statistics from the 1880s through to the 1950s show that TB was a primary cause of death for those living in overcrowded urban areas in Ireland. There were nearly 7,000 human cases in Ireland each year in the early 1950s, with an incidence of TB in the population recorded at 230/100,000 population in the 1950s. The disease, when not resulting in death, caused significant debilitation in many of those infected.

The original motivation for the TB Eradication programme in Ireland was twofold, concern with the effect it was having on public health and to preserve market access to the United Kingdom in response to strict UK importing requirements governing bTB contaminated herds.

There were thousands of bTB cases a year in herds in Ireland during the 1950s. Approximately 80% of cattle herds and 17% of the 4.5 million cattle were infected with Mycobacterium bovis or M. bovis. Many people were affected by TB outbreaks with farmers, those who worked with cattle or cattle carcasses, those who drank unpasteurised milk and young infants particularly vulnerable to contracting the disease.
While the bTB eradication programme is currently enshrined in EU general laws governing human health and that of animals in the food chain the programme predates this. It was instituted to tackle the high TB numbers both in the Irish herd and the population. It was also in response to strict UK importing requirements governing bTB contaminated herds. The economic rationale of the programme was viewed as benefiting farmers and producers through improved market access and animal productivity while society at large benefitted from the wider economic spillover effects arising from the performance of an important domestic industry and improved public health from reduced TB incidence in the population.

The scheme played a role in the reduction of the incidence levels through a steady decline in the years after the introduction of the bTB eradication programme in 1954 to the point where now cases of bTB in humans are an extremely rare occurrence in Irish society. However, it is questionable as to how much the scheme itself was responsible for that fall or how much of a role it currently plays in the small number of bTB cases reported in Ireland in recent years.

Indeed, when one considers the typical routes to transmission, the groups most at risk and the recommended strategies for reducing transmission at the animal-human interface, much of the success in dramatically reducing TB in Ireland can be credited to other preventative measures and societal changes.

Tuberculosis (TB) is a Zoonotic disease

TB remains a global challenge, one of the top 10 causes of death and the leading cause from a single infectious agent it resulted in the death of an estimated 1.4 million people in 2019 of the 10 million people who fell ill with TB according to the World Health Organisation which is leading a $13 billion drive to virtually eliminate TB by 2035.

While most cases of TB are caused by the bacterial species, *Mycobacterium tuberculosis*. Zoonotic TB (the infectious disease able to transfer from a non-human animal, in this instance typically bovine, to a human) is a form of TB in people predominately caused by a closely related species, *M. bovis*.

Zoonotic TB was estimated to be responsible for 12,500 deaths globally in 2016 from new cases of 147,000 though this is likely to be underreported.

The WHO supported *Roadmap for Zoonotic Tuberculosis* report and programme states that

“the main route of transmission of *M. bovis* to people is indirect. It is most commonly transmitted through the consumption of contaminated milk and other dairy products that have not been heat-treated. Less commonly, it can be transmitted through the consumption of raw or improperly cooked contaminated meat. Direct airborne transmission of *M. bovis* has also been reported from infected animals or animal products to people, as well as between people.”

The report also states that

“cases of zoonotic TB in people are uncommon in countries where bovine TB in cattle is controlled and where standards of food safety are high.”

Finally, the report highlights that those most at risk are

- “communities living in close contact with livestock and where access to safe food, healthcare, veterinary services may be poor, including rural communities or semi-nomadic/nomadic pastoralist populations;
- people with occupational exposure to livestock, including farmers, veterinarians and other animal health workers, abattoir workers, butchers and livestock traders; children and those more likely to consume unpasteurized milk and dairy products; and
- immunocompromised people, such as those living with HIV/AIDS.”
The report goes on to highlight its ten priority areas for tackling zoonotic TB in people and bovine TB in animals the most relevant of which in the context of the TB Eradication Scheme is **4. Ensure safer food**.

Priority 4 states that food safety practices play a central role in the control of zoonotic disease, both at the household and the commercial level and are highly cost and resource-effective. The most important of which are:

- **pasteurisation** - the decontamination of milk through exposure to high temperatures for a specified period, remains the most effective control measure to prevent the foodborne transmission of pathogens, including *M. bovis*, to people.

- **sanitary inspection of carcasses at abattoirs** - an important component of food safety that must be applied routinely, leading to the removal of potentially contaminated animal products from the food chain and the traceback of animals to potentially infected herds of origin.

While the legal status of the sale of raw milk and dairy products using raw milk in Ireland has fluctuated over the past decade the vast majority of milk produced, sold and consumed in Ireland is routinely pasteurised on an industrial scale using advanced technologies.

All animals entering the food chain are subject to checks in the 12 months prior to slaughter and a post-mortem inspection. This ensures that infected meat can be removed or treated before human consumption.

All cattle slaughtered for human consumption undergo a post-mortem inspection carried out by a vet in the abattoir. If an animal is clinically healthy at ante-mortem inspection and has no visible tuberculous lesions on post-mortem examination, the carcass is passed as fit for human consumption irrespective of whether or not it is a tuberculin reactor.

There are no barriers to trade in this meat within Ireland or within the European Union. In the event that tuberculous lesions are detected in a lymph node draining one organ or part of the carcass only (e.g. a forequarter), that part of the carcass is declared unfit for human consumption. In the event that tuberculous lesions are detected on post-mortem examination in two or more organs or regions, the entire carcass is considered unfit for human consumption and is sent for destruction.

**2001 Foot and Mouth Crisis**

Further evidence as to the limited risk of the *M. bovis* related TB strain in modern Ireland and therefore the limited public health benefit derived from the TB Eradication Scheme in this area comes from the 2001 Foot and Mouth crisis.

The 2001 Foot and Mouth (FMD) outbreak resulted in bTB checks being withdrawn for 12 months and a subsequent backlog of tests for 6 months. In the period that followed this outbreak there was a considerable growth in bTB as the absence of testing allowed the disease to linger and spread in herds and then transfer across the national herd as farms urgently restocked and traded for animals that had an incomplete TB history.

The herd incidence of bTB in Northern Ireland and Great Britain increased during the period 1997 to 2002 from 4.1% - 9.9% and 4.6% - 7.46% respectively. While this represented longer-term trends of increasing incidence levels the growth in herd incidence rose most sharply between 2000 and 2002 in both jurisdictions.

Despite this outbreak several academic analyses of the data of the period such as ‘*Bovine tuberculosis trends in the UK and the Republic of Ireland, 1995 – 2010*’, ‘*Bovine tuberculosis risk factors for British herds before and after the 2001 foot-and-mouth epidemic: what have we learned from the TB99 and CCS2005 studies?’ conclude that there was no increase in the incidence of the *M. bovis* strain of TB amongst the general population.

Other factors which can be said to have played a role in the reduction of the threat of Zoonotic TB in Ireland may include:

- reduced direct interaction between general population and bovines as agriculture has become more ruralised;
- reduced direct interaction between those engaged in agricultural employment and bovines as agriculture has become more mechanically automated;
- improved understanding and standards compliance with food safety domestically and commercially;
- improved housing of animals on the farm; and
- improved housing, living conditions and health.
TB in Modern Ireland

TB in modern Ireland cannot and is not considered to be a statistically significant risk. Reported incidents, according to the WHO, are less than 500 per year over the past decade. However, this reports overall TB incidents and does not show the animal-related strain *M. bovis* which is relevant when considering the benefits and beneficiaries of the TB Eradication Scheme.

Data from the Food Safety Authority of Ireland estimated that between 1% and 4% of TB cases in Ireland are *M. bovis* related and therefore contracted from animals. Over the period from 2010, this would result in between 3 and 18 cases annually.

Actual figures from the *Annual Tuberculosis Epidemiological Report* produced by the HSE’s Health Protection Surveillance Centre (HPSC) show that between 2 and 7 TB incidents a year can be attributed to *M. bovis* since 2016.

It is likely that even fewer of these 2 to 7 cases can be in any way directly related to the current Irish TB Eradication Scheme as 24% of cases occurred in those aged 65 years and older and just 40% were born in Ireland. These figures could indicate that TB including *M. bovis* related TB was initially contracted either at a time when pasteurisation was less prevalent or while overseas or in contact with someone who was contracted TB overseas.

This is consistent with the UK where just 0.8% of total TB cases or 23 cases in total were identified with *M. bovis* in 2018 with the majority of cases related to older age groups or people either not born in the UK or from a non-UK parentage who were either in close contact with individuals born overseas or had travelled overseas themselves.

Total annual reported TB incidents in Ireland

Source: WHO database

Data from the Food Safety Authority of Ireland estimated that between 1% and 4% of TB cases in Ireland are *M. bovis* related and therefore contracted from animals. Over the period from 2010, this would result in between 3 and 18 cases annually.

Actual figures from the *Annual Tuberculosis Epidemiological Report* produced by the HSE’s Health Protection Surveillance Centre (HPSC) show that between 2 and 7 TB incidents a year can be attributed to *M. bovis* since 2016.

It is likely that even fewer of these 2 to 7 cases can be in any way directly related to the current Irish TB Eradication Scheme as 24% of cases occurred in those aged 65 years and older and just 40% were born in Ireland. These figures could indicate that TB including *M. bovis* related TB was initially contracted either at a time when pasteurisation was less prevalent or while overseas or in contact with someone who was contracted TB overseas.

This is consistent with the UK where just 0.8% of total TB cases or 23 cases in total were identified with *M. bovis* in 2018 with the majority of cases related to older age groups or people either not born in the UK or from a non-UK parentage who were either in close contact with individuals born overseas or had travelled overseas themselves.

Total annual reported *M. bovis* TB incidents in Ireland

Source: HPSC Annual TB reports

This is also consistent with the views expressed in the consultations with HSE representatives who highlighted that while TB overall remains an area of focus for Ireland, it is not considered a high-risk area as evidenced by the phasing out of mandatory BCG vaccinations. *M. bovis* related TB strain was considered to be a very small proponent of that overall TB subset and where it is recorded further investigation typically indicates that it is either long dormant within the older population or is likely to have been contracted overseas or from an individual previously resident overseas.
Conclusion

While TB remains a serious ongoing issue globally as evidenced by millions of annual fatalities reported by the WHO, the key original purpose, whether to protect domestic Irish citizens or market access to UK citizens that underpinned the TB Eradication Scheme in Ireland no longer exists.

The review conducted on the public health benefit component of the TB Eradication Scheme indicates that there is little or no benefit from a public health perspective.

All available evidence strongly indicates that food safety preventative measures such as pasteurisation and spot checks at slaughterhouses contribute far more effectively to preventing TB from transferring to the human population rather than the TB Eradication Scheme.

Indeed, risk factors identified by the WHO would suggest that those most at risk of contracting M. bovis are members of the farming community and their families through closer interaction with bovines and the consumption of unpasteurised milk.

Retaining access to valuable export markets

The market access benefits of the TB Eradication Scheme were highlighted by many stakeholders as being the primary benefit and indeed founding purpose of the programme with the strongest benefit for Irish society as a whole.

Background

Agriculture has always been a hugely important sector for Ireland playing a significant role in its economic, social and cultural life and which almost 170,000 rely directly and indirectly upon for employment and produce. As a small nation, Ireland does not have the domestic demand necessary to support growth in agriculture as with many other industries and has always relied on its ability to export its produce initially to the UK, then over the years to the EU and finally the Rest of the World. Exports are the lifeblood of the industry and retaining access to markets and opening up new markets are key drivers of that growth.

In order to maintain this crucial part of the economy, it is important that Ireland takes the necessary steps to protect against potential risks, these risks include the threat of bTB to our export markets, both European and international. The creation of a national TB Eradication Scheme in the 1950s was one such step seeking as it did to preserve market access for Irish store cattle to the UK. The UK established its own TB scheme in the 1930s and since the 1940s had started removing bTB infected cattle from its own herds using a test and cull scheme. The UK declared its national herd ‘attested’ in the early 1950s and to protect this status insisted that Irish imported cattle should also be TB-free.

The implementation of a national TB Eradication Scheme had significant early success reducing the number of reactors from 30 per 1,000 to 4 per 1,000 in the first decade and continues to underpin Ireland’s ability to export to existing markets and open up new markets to the present day.

Growth of exports

Since that period, Ireland’s growth in exports of its agricultural products has been a dramatic success. Over the past decade, there has been extraordinary growth in the value of Irish food and drink exports with ten consecutive years of growth resulting in an increase of 67% over the period according to BordBia’s Performance and Prospects 2019-2020 report. Ireland exports to more than 180 markets worldwide relatively evenly split between the UK, the EU and the Rest of the World.
Dairy and Meat & Livestock make up almost 2/3rds of those exports at 34% and 30% respectively contributing export values of €4.4 billion and €4.0 billion of which €2.2 billion is Beef related products.

**Value of export markets**

<table>
<thead>
<tr>
<th>€millions</th>
<th>Dairy</th>
<th>Beef</th>
<th>Live Animals</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK</td>
<td>1,016</td>
<td>1,125</td>
<td>28</td>
<td>2,170</td>
</tr>
<tr>
<td>EU</td>
<td>1,633</td>
<td>1,072</td>
<td>51</td>
<td>2,755</td>
</tr>
<tr>
<td>Rest of World</td>
<td>2,120</td>
<td>198</td>
<td>19</td>
<td>2,337</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>4,769</td>
<td>2,395</td>
<td>98</td>
<td>7,263</td>
</tr>
</tbody>
</table>

Source: Grant Thornton analysis of CSO

Indeed, an estimated 90% of Ireland’s produce is exported to overseas markets. These figures highlight the value of bovine related exports to the Irish economy.

**Intra-Union trade for bovine animals**

Since Ireland’s accession to become a member state of the European Union in 1973, intra-Union trade has grown substantially. Indeed being able to access the Common Market/Single Market was a key argument for joining the EU and a trigger for moving away from a reliance on the UK market with the EU, prior to Brexit, accounting for around 2/3rds of Ireland’s Bovine exports and remaining the single largest economic trading area to which Ireland exports. In order to continue to trade within the Union Ireland must ensure it complies with the relevant EU legislation that underpins EU trade law.

The implementation of a TB Eradication Programme is a requirement of member states under EU trade law with the required goal of working towards OTF status. The European legislative requirements are laid down in the following:


Failure to comply with these requirements would likely result in a restriction in the ability of Ireland to export bovine produce.

The implementation of a TB Eradication Programme is a requirement of member states under EU trade law with the required goal of working towards OTF status. The European legislative requirements are laid down in the following:


Failure to make progress towards achieving these goals has already seen funding for the programme fall in recent years as the EU has imposed penalties on co-funding. This is likely to continue without significant progress resulting in a shortfall of funding which a combination of the State and industry will need to meet.
Third-party countries (Rest of the World)

Countries outside the EU with which we trade (known as third-party countries) may also have requirements in relation to the control of bTB, over and above the controls required under EU law. This has been evident in recent trade negotiations where some third-party countries have explicitly provided in our trade agreements that they will not accept meat from bTB infected herds.

Over the past 10 years, there has been a 409% growth in the Asian market for Irish exports by far the largest percentage growth over that period.

Access opened for Irish beef exports to China in April 2018 and over 1,000 tonnes of Irish beef was exported to China by the end of the year.

2019 saw an increase of 147% in the Chinese market for Meat & Livestock exports. Demand continues to be strong and the rate of growth in beef consumption in China make it a potentially highly lucrative future market for Irish beef.

The same is true for Irish dairy exports where China is one of the Top 5 markets with a value of €584 million in 2019 with Dairy and Nutritional Powders. Currently, 10% of all Irish dairy exports are destined for China. This has been made possible by the world-class safety and quality credentials of Ireland’s offering. Any threat to this through loss of reputation would potentially severely impact negatively on this growth.

This is because China is an example of a country with stringent requirements related to bTB for example.

The Chinese trade agreement protocol for beef market access specifies that live cattle from which beef is to be exported must originate from farms that have not been restricted due to bTB within the last 12 months. Any significant increase in bTB incidence levels would likely result in local restrictions being placed on Irish produce in China and elsewhere. This threat was clearly manifested in the temporary suspension in May 2020 of Irish beef exports following the discovery of an atypical BSE case in the national herd, a ban which remains in place. Loss of access to the second largest beef import market is a significant setback for the beef sector.

2001 Foot and Mouth Crisis

The 2001 Foot and Mouth Crisis proves instructive in terms of providing a counterfactual. While it is not possible to make a direct comparison between FMD and bTB (e.g. FMD is not considered a human health threat) there are similarities in terms of their economic impacts on animal productivity and the approach to dealing with such an outbreak e.g. weight loss, reduced milk yields, fatality, culling etc..

The outbreak originating in the UK had a devastating impact on the agriculture industry there. Thanks in large part to stringent control measures put in place by the then Irish Department of Agriculture, Food and Rural Development (DAFRD) to try to prevent transmission of the disease from the UK, to limit the extend of the outbreak which did occur and then to prevent its spread, Ireland managed to avoid many of the greatest economic costs. The reason for doing so was to limit the potential closure of export markets that would come about from loss of Ireland’s ‘white listed’ status. An Indecon study, Economic Evaluation of Foot and Mouth Disease (2002), estimated that likely impacts of the FMD outbreak if control measures had not introduced would include a:

- ban on all exports of susceptible products to the EU and non-EU countries;
- need for a comprehensive programme of culling and disposal of animals and the consequent loss in stock; and
- significant loss of reputation for Ireland’s food producing image.

This was based on the actual impact on the UK (an industry far less reliant on overseas exports than Ireland) at the time and in subsequent years where:

- 4 million animals were slaughtered or 7% of all UK cattle;
- disintegrated from EU markets: unable to export potentially infected products until three month period without a new outbreak – the outbreak lasted 221 days;
- requirement to seek international clearance to resume trading to Rest of the World;
- fall in price of product due to domestic oversupply and reduced value in future contract negotiations; and
- estimated losses to agriculture and the wider food chain of £3.1 billion.
Conclusion

Ireland’s success in exporting its food and drink products is extraordinary. The sustained, incremental increases in both value and volume across all food and drink categories, and across the more than 180 markets it serves is impressive.

It is clear that the success is a testament to Ireland’s enduring reputation as a source of high-quality, safe, and sustainable food and drink and it is this reputation that provides a strong foundation for future development and growth. The importance of trade access to third-party countries is likely to become increasingly important in post-Brexit agri-culture. Now more than ever, our production of exports for the International market must be expanded.

The TB Eradication Scheme is one which alongside many others underpins that hard-won reputation and ensures that Irish Bovine related products can continue to access key markets in the UK, the EU and beyond across the Rest of the World.

Whether enshrined in legislation or contractual basis as a requirement to trade or through the risk of damage to that reputation it is fair to assume that if the TB Eradication Scheme were to be absent then these arrangements that facilitate trade would be called in to question.

Maintaining farm productivity and animal welfare

Productivity

Beef and cattle production dominate the Irish agricultural economy. Milk and beef output accounted for over 61% of agricultural goods output at producer prices in 2017 (Teagasc). As well as human health the scheme facilitates improved animal welfare and as a result, increased productivity.

Just as in humans, bTB infection is harmful to an animal’s welfare resulting in breathing difficulties, weight loss, and occasionally fatality even without the necessity of culling to prevent the spread of the infection.

This has an impact on productivity of the animal with research indicating that animals with TB produce a reduced milk yield, provide fewer kgs of beef as a result of weight loss and across the herd call less frequently.

Research from Zinsstag et al (2006) and Hernandez and Baca (1998) show productivity losses of between 7.5% to as much as 12.5%, for dairy, 6% and 12% of beef and one fewer calf bred per infected cow. The economic implications of such losses on the industry would be considerable. In order to protect against the production losses caused by bovine TB, the eradication of TB must be achieved. Two papers which discuss the implications on bovine productivity as a direct result of Bovine TB are presented on the next page.

As well as direct impacts, caring and managing for an ill animal is a significant time-consuming activity for farmers and one that incurs additional costs. Coupled with the requirements to isolate the animal from the rest of the herd and the restrictions that are placed on the herd these all take away resources in terms of time and money from other more productive farming activities.

In addition to these productivity benefits, it was considered that the advancements that have been made in statistical analysis and development of bloodlines across the Irish herd have in large part been made possible by the reduced risks of losing valuable bloodstocks to TB related culling.

Finally, as with any business operating in a competitive environment it is essential that resources are used as efficiently as possible in order to secure a competitive advantage. The sub-optimal aspects of reduced productivity impacts not just the farmer’s ability to compete but also adds to the climate related challenges that the agriculture sector in general faces. Teagasc estimates that Agriculture is responsible for 33% of Ireland’s total greenhouse gas emissions.
Teagasc estimates that Agriculture is responsible for 33% of Ireland’s total greenhouse gas emissions despite being amongst the lowest carbon footprints in the EU for dairy and beef produce. In order to meet future emission targets agriculture production will need to be highly efficient and reducing sub-optimal productivity has a valuable role to play.

**Economics of Bovine Tuberculosis. Mycobacterium bovis infection in animals and humans 360, 2006**
Authors: Zinsstag, J., Schelling, E., Roth, F. & Kazwala, R.

This study sought to calculate the economic impacts of bTB in both animals and humans. It highlights the animal productivity impacts associated with bTB infection in cattle including milk yield, beef yield and increase in foetal miscarriages or sterility.

The study summarises a range of other academic sources investigating the value of these impacts including Meisinger in Germany (1969), Morris in Sheehy and Christiansen’s (1991) review of the Irish scheme, Management Consulting Services in Canada (1979), and Denes in Hungary (1986).

Through these estimations of productivity losses of between 6% - 12% for beef and 7.5% and 12.5% for dairy are identified.

**Effect of tuberculosis on milk production in dairy cows, 1998.**
Authors: Hernandez J, Baca D.

The paper examined the milk production yields of cows with positive and negative tests results for bovine TB testing. 369 Holstein cows within 360 days were engaged in the research project.

Using farm records, an extensive documentation process was involved, which collected data on milk production, parity, calving season, days of lactation, previous milk production and whether cows had clinical mastitis.

170 cows had positive tuberculin test results, and 199 had negative results. Cows with positive tests resulted in an average of 347 kg less milk being produced than did cows with negative test results after adjusting for variables biologically related to milk production.

The results of this paper concluded that cows who tested positive to TB were associated with a 4% decrease in milk production.

**Conclusion**
Ireland’s success in exporting its food and drink products has been greatly helped by the ability to maximise the yield and productivity of its produce. As a small nation that exports globally in huge numbers being able to exploit its resources to the fullest is essential.

bTB outbreaks reduce farmers’ ability to do this by diverting valuable time, money and other resources to managing the outbreak for significant periods of time. bTB has been shown across a range of studies to result in reduced productivity, increased mortality and reduced fertility in bovine animals further impacting the productivity of the herd. While these studies are not directly comparable to the current situation in Ireland, they provide an indication of the potential impacts if bTB incidence were to rise from current levels.

Higher incidence rates naturally result in greater restrictions of trade and increased levels of culling curtailing valuable bloodlines and carefully selected breeding.

This leads to sub-optimal production levels which have knock-on implications for agriculture’s green agenda and the country’s greenhouse gas emission targets in the future.

As such, animal productivity and welfare is clearly a key benefit of the TB Eradication Scheme and should be analysed further.
Reputation

As Ireland exports approximately 90% of its beef and dairy output, the bTB Eradication Scheme is a fundamental pillar in supporting Irish agriculture.

At the farm level, the near 4,000 bTB restrictions each year are a source of significant mental and financial stress. A restriction can impede a farmer’s planned production cycle resulting in challenges to manage stock and finances.

During the consultation process, several stakeholders mentioned the negative repercussions of having or previously testing positive to TB, being located in a black spot, or neighbours having gone down because of TB.

Farmers mentioned a complete lack of interest in their animal. Word spreads within the community and buyers, acting out of precaution, avoid the farms that previously went down for TB. This results in the farmer being unable to sell calves at the marts, with many stating that this lack of interest continued for long after the farm restrictions had been lifted.

The reputational damage done from being associated with TB can have a detrimental effect on the farm’s revenue, with the only remaining option being the factory for these animals.

This reputational damage at a local level can be easily scaled up to a global level when it comes to trading overseas. Ireland has established a proud reputation of providing high-quality, safe, and sustainably farmed produce, which has provided a significant competitive advantage when attempting to access new markets globally. But reputations are easily damaged as evidenced by the impacts of health scares such as previous outbreaks such as Salmonella with eggs, Creutzfeldt-Jacob Disease, and Foot and Mouth. Each of these result in severe damage being done domestically and internationally with the result of lower sales and even curtailing of market access until appropriate steps had been taken to demonstrate the safety of products impacted.

The TB Eradication Scheme as one of many factors that provides an assurance particularly to overseas markets of the care and attention that goes into Irish produce to ensure it is not just safe and fit for consumption but of a high-quality standard. It ensures compliance with EU trade law requirements and third-party country export legislation that enables Ireland to export to over 180+ countries globally.

Reputation is clearly a benefit of the scheme, however, it is fair to say that it is encapsulated within the access to markets and animal welfare and productivity benefits and so will not be assessed in and of itself in this review.
Economic Analysis
Economic concepts

Before analysing further it is important to understand some of the key economic concepts that underpin the analysis contained within it. The 2008 Value for Money Review conducted on the TB Eradication Programme provides an appropriate framework for the economic theory behind the approach taken to reviewing the scheme that is still as relevant today. In particular, the concept of whether there is a justification for public intervention and funding of the Programme.

As such, this report does not intend to examine these in further detail, instead, this section will provide an overview of the key economic theories and discussion points that underpin the analysis and conclusions contained within this report.


While the need and responsibility for having a programme for the eradication of bovine tuberculosis fall largely on the State based on the directive from the European Commission, the rationale for public invention and funding of the bTB scheme must be explained further.

The Economic and Social Research Institute (ESRI) sets out four key rationales for public intervention as a means to address a distortion or market failure:

• Corrective subsidies to correct for general ongoing externalities;
• Targeted subsidies to overcome specific externalities;
• Spending on a public good; and
• Spending with a redistribution function.

Externalities

An externality is a cost or benefit caused by a producer that is not financially incurred or received by that producer. Almost all externalities are considered to be technical externalities. Most externalities are considered to be negative in that they have an impact on the consumption and production opportunities of unrelated third parties, but the price of consumption does not include the externalities or the benefit gained by others is not compensated for. This exclusion creates a gap between the gain or loss of private individuals and the aggregate gain or loss of society as a whole. This gap can be considered a market deficiency, providing the reason for government intervention to curb negative externalities through taxation and regulation to impose the cost of externalities on the producer or to ensure that benefits are shared fairly across all parties.

Public good

A public good can be considered to be a type of market failure in that it is a good or service for which it is not possible or convenient to directly charge all beneficiaries. In effect, making it available for an individual makes it available for many more with examples typically including street lighting and defence. Similarly, a public good may be one that requires a wider approach in the form of a national programme to organise so many individuals and ensure that all parties play a concerted role to ensure maximum benefit to all stakeholders.

As TB Eradication is considered to be a public health issue and a public good with significant externalities resulting in likely market failure in the form of a voluntary or industry-led scheme being less effective there was, therefore, a strong justification for public intervention both in the form of funding and oversight/organisation.

Private good

A private good is one that must be purchased to be consumed, and consumption by one individual prevents another individual from consuming it. It is considered to be the opposite of a public good. Purchasing the item secures the right to consume it and (in theory) compensates the producer for the costs involved in making it. As such, profit is often considered the motive for the production of a private good as without this incentive a company is unlikely to want to produce the good.

Beneficiary pays

The beneficiary pays principle or user pays is a pricing approach based on the idea that the most efficient allocation of resources occurs when consumers pay the full cost of the goods that they consume. The basic idea is that those who do not use a service or benefit from it should not be obligated to pay for it. As long as the beneficiary aligns exactly with the user, the user-pays principle works. However, such analysis is often complicated by the lack of knowledge to inform decisions as to who benefits and to what extent when compared to the associated costs.

The principle has been used most frequently with regards to climate change where additional taxes such as carbon taxes on high-polluters may be imposed to account for the social costs of the externalities associated with pollution. With regards to agriculture, it is often used to justify a cost-sharing approach between government and the private sector with the industry expected to fund the scheme to the extent that they benefit from positive externalities (Access to markets and increased animal productivity) while Government funds the public good benefit (Public Health).
General approach

The output of the terms of reference for this project was to:

• undertake a CBA of Ireland’s bovine TB Eradication Programme to include all direct and indirect costs and benefits; and

• apportion the costs and benefits between public and private good based on what is accepted internationally as a public and private good.

It is important to note that these outputs are atypical of a standard CBA which while it would identify costs and benefits would then utilise these to calculate an investment metric such as a Net Present Value to demonstrate the overall benefit that a proposal or scheme would have. The use of multipliers would not feature in a CBA and there would be no recourse to split benefits or costs between separate parties. Similarly, the outputs are also atypical of a standard Economic Impact Assessment which would look to identify the wider benefits to society including the use of multipliers but which again would not necessarily seek to split them amongst beneficiaries. As such, the methodology utilised is a hybrid approach considered most suited to the terms of reference of this project and has been undertaken using robust analysis aligned to the Public Spending Code where appropriate.

Separate models

The approach taken to this has been to model separately the estimated value of each of the benefits identified. This has been done so to reduce the risk of double-counting of benefits, to improve understanding, and to ensure that the quantum of each benefit can be estimated more fairly and clearly without overlapping or contrasting assumptions. As such, this section sets out the approach taken to the ‘Market Access’ Benefit and to the ‘Productivity and Animal Welfare’ Benefit. It is important to note that the costs and benefits identified and modelled are not intended to be exhaustive nor can they be. Even if all necessary data was available the challenge of modelling every single individual, company, or group in society impacted by a change in agricultural conditions would be daunting and likely unhelpful. Instead, the focus of this analysis is on the specific benefits called out by the scheme and the direct and indirect beneficiaries of the scheme of these benefits. This is a conservative approach but one which captures the majority impact of the main benefits of the scheme and provides a robust estimate of these.

Within the Productivity and Animal Welfare benefit analysis this has been split into three separate categories for clarity. These are:

• Benefits arising from avoided loss associated with the estimated additional culling of animals as TB incidence rises

• Benefits arising from avoided losses associated with the estimated reduced milk yield

• Benefits arising from avoided losses associated with the estimated reduced kgs meat yield

Counterfactual scenario

To develop the outputs and answer the questions posed in the terms of reference a form of scenario analysis was used. In this, a counterfactual, namely that without a TB Eradication Scheme in place, Ireland would lose access for all of its export markets, was developed to compare current benefits to counterfactual benefits. This allows the identification of ‘lost benefits’ and ultimately their beneficiaries.

The reasoning for this interpretation is explained in the ‘Retaining access to valuable export markets’ section within the Benefits discussion chapter but can be summarised as the existence and operation of the scheme is a requirement of EU trade law for market access, and research suggests that high-value, both current and forecast, exports to third-parties rely on conditions which are at least as strong and robust as EU market access. There has been no assumption made for any alternative scheme that may be put in place in the absence of the existing TB Eradication Scheme.

While this represents a counterfactual that due to its extremely negative impacts on Ireland’s economy, society, and culture, and high likelihood, would never be countenanced it is instructive in determining the benefits that are achieved through the scheme’s existence.

Similarly, It is important to note that the analysis considers a single point in time i.e. the costs and benefits accrued in just one year. While the impacts of a loss of market access would be felt in the very short-term, the impacts of losses in productivity and animal welfare would take far longer to develop even in the absence of a TB Eradication Scheme which is why different scenarios have been used to estimate these impacts in the medium to longer-term. The use of separate models for each of the benefits allows for these alternative timelines.
Costs

The previous sections highlighted and defined what can be considered to be the key direct and indirect costs of the programme and the approach taken towards analysing them for inclusion within the developed model.

The costs of the programme at a high-level are known to all stakeholders as they are reported on and published annually. This is also the case for the proportionality of the funding of these costs between the State, Farmers, and the European Union.

Benefits

Of less certainty and agreement are the benefits and beneficiaries of the scheme which are open to interpretation and debate. Given that cost apportionment can be considered to follow the ‘beneficiary pays’ economic concept e.g. if a party receives 75% of the benefits of an activity then they should incur an equal apportion of the costs of that activity it is the benefits and their beneficiaries which are most of interest.

As defined previously, the key benefits of the scheme are, as they have been for almost 70 years:
- Public health;
- Market access;
- Productivity and animal welfare; and
- Reputational benefits.

Of these benefits, public health has been ruled out as a benefit to take forward to modelling due to its negligible importance as a concern in present-day Ireland, particularly of the bTB strain.

Reputational benefits are addressed discursively elsewhere in this report and are not quantitatively modelled due to their inherent complexity and intangibility.

The remaining benefits, market access and productivity and animal welfare are both considered, but in separate models with the outputs of this analysis presented discretely.

Public vs Private goods and benefits

Definitions of public and private goods are included in the Economic Concepts section and underpin the distribution of benefits between public and private beneficiaries. In addition to the public health public good/benefit, the analysis considers that an additional benefit to society (public), while not meeting the definition of a public good or being the primary goal of the scheme, tax returns to the Exchequer can be considered a public benefit to Ireland as a country. This is effectively the financial return to the state for its ‘investment’ in the programme and the benefits it brings to the agriculture industry which is essential to so many aspects of Irish life and the economy.

Public benefits for the analysis are therefore considered to be the tax returns to the Exchequer from the industry.

Private benefits for the analysis are defined as the revenue achieved by private producers in selling their product. Within this analysis, it has been assumed that the value of products exported overseas to:
- the UK market;
- the EU market; and
- the Rest of the World.

We have split the market associated with the scheme into three main markets.

We have defined these three markets in accordance with the Standard International Trade Classification (SITC). SITC is the classification of international trade issued by the United Nations (UN), a breakdown of the relevant SITC considered under each market is provided in the appendices.
Using the relevant SITC codes, we were able to determine the quantity and value of the exported products from the CSO per country. Export values and quantities were taken to be the three-year average from 2017 to 2019. Domestically consumed products are not considered within the analysis, save for those currently displaced by imports, as it is assumed that even without a TB Eradication Scheme Irish consumers would continue to purchase Irish product.

In discussions with stakeholders, the point was raised that farmers are not the sole private beneficiaries of Irish agricultural produce as impacted by the TB Eradication Scheme. The suggestion being that farmers, while not the sole private beneficiaries of the scheme, are the sole private contributors to the scheme. This is an entirely fair point, however, the definition of a private good includes the idea that, in theory, the purchaser of a product compensates the producer for the costs involved in making it. These costs would include the contribution of farmers to the scheme as one of those costs of production.

As such, the private beneficiaries of the scheme outside of farmers e.g. retail, hospitality etc. can be considered to be indirectly contributing to the scheme through the contractual agreements in place to purchase the agricultural product at an agreed price. This is also true of downstream value chain producers providing inputs to the dairy and beef sectors. It is not the purpose of the TB Eradication Scheme to compensate producers for prevailing market conditions which may undervalue their products. Indeed there are considerably higher value schemes in place such as the income support component of the Common Agricultural Policy which provides this kind of support to producers rendering the TB Eradication Scheme’s impact, even if it was its primary goal, as negligible.

Therefore, for the purposes of the analysis, it is assumed that the full export value can be considered to be an entirely private benefit.

### Multipliers

This approach also negates the need for further multiplier analysis outside of the direct costs and benefits of the scheme. The purpose of input/output analysis or multipliers is to ascertain the economic value of something to the wider society. However, as the benefits are apportioned into public and private and private benefits are defined as any benefit retained privately then the use of multipliers to determine the benefits shared across the value chain from the agriculture industry e.g. retail, hospitality etc. would simply see the same proportion of benefits shared to the same beneficiaries.

### Market access benefit - approach taken

The approach taken is explained below in a step by step process.

1. Identify the value of the export markets split across the three main market sectors and categorised by a geographical market split in accordance with SITC codes and CSO data.
2. Divide that export value into its agricultural input/output breakdown ranging from Goods Output at Producer Prices, Intermediate Consumption, Factor Income and Operating Surplus etc. as per the CSO ‘Value at Current Prices for Output, Input and Income by Agriculture by State, statistical indicator and Year’ report.
3. Split the individual line items that make up the above report into ‘proportions’ or ratios e.g. Agriculture Output at Basic Prices captures all Agricultural Output and so makes up a 100% proportion whereas Operating Surplus is used as a proxy to indicate profit and makes up 36.7% of this total.
4. Identify where taxes are levied against these export proportions and apply where appropriate to calculate the public benefit.
5. Compare the ratio of public benefits to private benefits.
6. Apply ratios to the value of export markets across each SITC category to calculate the value of benefits to each party.
7. Apply ratios to the costs of the programme to ascertain contribution levels.
## Market access assumptions

The following tables detail the assumptions that underpin the analysis that was undertaken including assumptions around export levels and destination, imports, taxes levied etc. All figures that were applied have been calculated over a three-year average period between 2017-2019 to ensure that one-off atypical circumstances or conditions cannot impact upon an accurate and robust interpretation of market access.

<table>
<thead>
<tr>
<th>Category</th>
<th>Assumption</th>
<th>Source</th>
</tr>
</thead>
</table>
| Markets considered     | Markets considered as being impacted by the bTBEP is considered to be split into:  
• Dairy  
• Beef  
• Live Bovine Animals  
We have defined these three markets in accordance with the Standard International Trade Classification (SITC). SITC is the classification of international trade issued by the United Nations (UN). | Central Statistics Office  
Breakdown of the relevant SITC considered under each market is provided in the appendix |
| Export destinations     | Export destinations were divided into  
• the UK market;  
• the EU market; and  
• the rest of the world. | Central Statistics Office |
| Market access          | Access to the export destinations for the relevant markets (dairy, beef, live bovine animals) was considered to be lost in the case that a bTBEP was no longer operational. Therefore, the benefit associated with having a bTBEP in place relates to the benefit of not losing export revenue. | Grant Thornton assumption |
| Imports                | Losing market access for exports would result in an excess supply of dairy and beef products in the local market. This would have knock on effects in terms of domestic pricing. In the case that domestic prices fall, foreign prices would look less attractive and would therefore result in reduced imports. The decrease in imports depends on the public’s perceptions of local produce. There will be a large dependence on the level of damage done to the dairy and beef market reputation.  
While the fall in imports cannot be estimated, we can assume that goods which are imported for processing before exporting will be stopped. | Information provided by DAFM indicates that approximately €1 billion of dairy produce is imported into Ireland to be used by the ‘dairy industry’ in the manufacture of products that are then exported. |
| Value of exports        | Value of exports is taken to be the three-year average export value from 2017-2019 split by export destination and market category (as discussed above). | Central Statistics Office |
Market access assumptions

The following tables detail the assumptions that underpin the analysis that was undertaken including assumptions around export levels and destination, imports, taxes levied etc. All figures were applied have been calculated over a three-year average period between 2017-2019 to ensure that one-off atypical circumstances or conditions cannot impact upon an accurate and robust interpretation of market access.

<table>
<thead>
<tr>
<th>Category</th>
<th>Assumption</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public benefits</td>
<td>Returns to the Exchequer/Government via tax or health benefits</td>
<td>Grant Thornton assumption</td>
</tr>
<tr>
<td>Private benefits</td>
<td>Returns to all private industry associated with the activity</td>
<td>Grant Thornton assumption</td>
</tr>
</tbody>
</table>

### Overall tax assumptions

**Assumptions on public tax benefit**

<table>
<thead>
<tr>
<th>Description</th>
<th>Type of tax</th>
<th>Tax rate</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taxes on Products</td>
<td>Misc taxes</td>
<td>100.0%</td>
<td>Grant Thornton assumptions</td>
</tr>
<tr>
<td>All Intermediate Consumption</td>
<td>VAT</td>
<td>9.1%</td>
<td>Grant Thornton assumptions</td>
</tr>
<tr>
<td>Fixed Capital Consumption</td>
<td>VAT</td>
<td>23.0%</td>
<td>Department of Revenue rates database</td>
</tr>
<tr>
<td>Compensation of Employees</td>
<td>Personal</td>
<td>30.0%</td>
<td></td>
</tr>
<tr>
<td>Operating Surplus</td>
<td>Personal</td>
<td>30.0%</td>
<td></td>
</tr>
</tbody>
</table>

### VAT assumptions

Where VAT rates were unknown we assumed the conservative rate of 23%

**Calculation: VAT rate on intermediate consumption**

<table>
<thead>
<tr>
<th>Intermediate Consumption</th>
<th>Value (€’m)</th>
<th>VAT rate</th>
<th>VAT (€’m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeding Stuffs</td>
<td>(1,496)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Fertilisers</td>
<td>(558)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Financial Intermediation Services</td>
<td>(131)</td>
<td>23.0%</td>
<td>(30)</td>
</tr>
<tr>
<td>Seeds</td>
<td>(76)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Energy and Lubricants</td>
<td>(418)</td>
<td>23.0%</td>
<td>(96)</td>
</tr>
<tr>
<td>Maintenance and Repairs</td>
<td>(479)</td>
<td>23.0%</td>
<td>(110)</td>
</tr>
<tr>
<td>Other Goods and Services</td>
<td>(528)</td>
<td>23.0%</td>
<td>(122)</td>
</tr>
<tr>
<td>Crop Protection Products</td>
<td>(79)</td>
<td>23.0%</td>
<td>(18)</td>
</tr>
<tr>
<td>Veterinary Expenses</td>
<td>(307)</td>
<td>13.5%</td>
<td>(41)</td>
</tr>
<tr>
<td>Forage Plants</td>
<td>(1,164)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Contract Work</td>
<td>(431)</td>
<td>23.0%</td>
<td>(99)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>(5,668)</strong></td>
<td><strong>9.1%</strong></td>
<td><strong>(517)</strong></td>
</tr>
</tbody>
</table>

Based on the above, the weighted average VAT rate on intermediate consumption was estimated to be 9.1%.
Agricultural input/outputs

The CSO produces an annual report which highlights a breakdown of the component input/outputs of agriculture in Ireland. Of this, the vast majority of this analysis relates to the dairy and beef sectors as the two dominant sectors in Irish agriculture. As a more detailed breakdown by individual categories is not available across all inputs/outputs it is therefore assumed that it is appropriate to consider the full data bank as representative of the dairy and beef sectors for this analysis.

The ‘Value at Current Prices for Output, Input and Income by Agriculture by State, statistical indicator and Year’ report averaged across the years 2017-2019 is reproduced below. This data provides the base assumptions from which we have calculated a proportionality or ratio for each individual line item component e.g. Gross Value Added at Basic Prices represents 33.8% of the total Agricultural Output at Basic Prices. These line items are typically seen as proxy estimations of industry wide metrics e.g. the CSO determines that line items: Goods Output, Intermediate Consumption, Net Subsidies and Operating Surplus are considered to be ‘Income Indicators’ at various stages of the production process with Operating Surplus seen as an appropriate substitute for estimating the ultimate profit generated and enjoyed by the industry.

Public/Private benefit split calculation

<table>
<thead>
<tr>
<th>€ millions</th>
<th>Proportion</th>
<th>Tax</th>
<th>Public</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goods Output at Producer Prices</td>
<td>94.5%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Contract Work</td>
<td>5.0%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Subsidies on Products</td>
<td>1.1%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Taxes on Products (0.6%)</td>
<td>100.0%</td>
<td>0.6%</td>
<td></td>
</tr>
<tr>
<td>Agricultural Output at Basic Prices</td>
<td>100.0%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>All Intermediate Consumption (66.2%)</td>
<td>9.1%</td>
<td>6.0%</td>
<td></td>
</tr>
<tr>
<td>Gross Value Added at Basic Prices</td>
<td>33.8%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Fixed Capital Consumption (10.6%)</td>
<td>23.0%</td>
<td>2.4%</td>
<td></td>
</tr>
<tr>
<td>Net Value Added at Basic Prices</td>
<td>23.2%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Other Subsidies Less Taxes on Production</td>
<td>20.1%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Factor Income (6.5%)</td>
<td>30.0%</td>
<td>2.0%</td>
<td></td>
</tr>
</tbody>
</table>

Public Surplus 36.7% 30.0% 11.0%

Public proportion 22.0%
Private proportion 78.0%

Sources: CSO Value at Current Prices for Output, Input and Income by Agriculture by State, statistical indicator and Year, 2017-2019 averages; Grant Thornton analysis
Tax rates can then be applied to individual line items e.g. it is assumed that Operating Surplus is in the form of income/salaries to private individuals in the main as opposed to incorporated entities. This value for therefore attract an income tax related charge which is assumed to be circa 30%. The high-quality of the industry profit is therefore 30% of the 36.7% of the overall Agricultural Output at Basic Prices.

Taking account of the tax contribution that is returned to the Exchequer across all line items an estimation can be made as to a split between public and private benefits from market access. The analysis therefore provides a breakdown of:

### Public/Private benefit split

<table>
<thead>
<tr>
<th></th>
<th>Private benefits</th>
<th>Public benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>22%</td>
<td></td>
<td>78%</td>
</tr>
</tbody>
</table>

Having identified the proportional split between public benefit and private benefit it is possible to apportion these across the value of the relevant export markets to calculate a € figure for those benefits.

### Value of the relevant markets

Based on the assumptions for market access, an estimate of the value of exports can be made of a total of €7.26 billion. The largest export destination is the EU receiving a total of 38% of the export value. The Rest of the World exports amounted to 32% of total exports of which €488k attributable to China. The UK market accounts for 30% of total export value though it is likely this may be impacted post-Brexit.

### Value of export markets

<table>
<thead>
<tr>
<th></th>
<th>Dairy (€ millions)</th>
<th>Beef (€ millions)</th>
<th>Live Animals (€ millions)</th>
<th>Total (€ millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK</td>
<td>1.016</td>
<td>1.125</td>
<td>28</td>
<td>2.170</td>
</tr>
<tr>
<td>EU</td>
<td>1.633</td>
<td>1.072</td>
<td>51</td>
<td>2.755</td>
</tr>
<tr>
<td>Rest of World</td>
<td>2.120</td>
<td>198</td>
<td>19</td>
<td>2,337</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4,769</strong></td>
<td><strong>2,395</strong></td>
<td><strong>98</strong></td>
<td><strong>7,263</strong></td>
</tr>
</tbody>
</table>

### Value of market access

It is therefore calculated that benefit associated with having a bTBEP in place is the value of exports less the impact on imports. This is estimated to amount to €6.26 billion due to a value of €3.8 billion from the dairy market, €2.4 billion from the beef market and €98 million for the live bovine animals market. Applying the proportions calculated previously this overall value of market access can be split into the public and private benefit as €1.4 billion and €4.9 billion, respectively.

### Impact on imports

Losing market access for exports would result in an excess supply of dairy and beef products in the local market. This would have knock-on effects in terms of domestic pricing. In the case that domestic prices fall, foreign prices would look less attractive and would therefore result in reduced imports. The decrease in imports is not straightforward to assume, because this will depends on the public’s perceptions of local produce. There will be a large dependence on the level of damage done to the dairy and beef market reputation.

While the fall in imports cannot be estimated, we can assume that goods that are imported for processing before exporting will be stopped.

Information provided by DAFM indicates that approximately €1 billion of dairy produce was imported to be used by the ‘dairy industry’ in the manufacture of products we then export. There is no detailed breakdown of what proportion of this is utilised within exports and so it is conservatively assumed that all of this import can be replaced by the domestic surplus in light of the loss of overseas market access.

### Value of market access

<table>
<thead>
<tr>
<th>(€ millions)</th>
<th>Dairy</th>
<th>Beef</th>
<th>Live Animals</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK</td>
<td>1,016</td>
<td>1,125</td>
<td>28</td>
<td>2,170</td>
</tr>
<tr>
<td>EU</td>
<td>1,633</td>
<td>1,072</td>
<td>51</td>
<td>2,755</td>
</tr>
<tr>
<td>Rest of World</td>
<td>2,120</td>
<td>198</td>
<td>19</td>
<td>2,337</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4,769</strong></td>
<td><strong>2,395</strong></td>
<td><strong>98</strong></td>
<td><strong>7,263</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(€ millions)</th>
<th>Dairy</th>
<th>Beef</th>
<th>Live Animals</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private benefit</td>
<td>2,938</td>
<td>1,867</td>
<td>76</td>
<td>4,882</td>
</tr>
<tr>
<td>Public benefit</td>
<td>831</td>
<td>528</td>
<td>22</td>
<td>1,380</td>
</tr>
</tbody>
</table>

### Notes

- Total benefits adjusts the dairy market by the estimated €1 billion in imports which are processed before exporting.
- Sources: Central Statistics Office Export Values by SITC codes, 2017-2019 averages; Grant Thornton analysis

### Sources

- Central Statistics Office Export Values by SITC codes, 2017-2019 averages; Grant Thornton analysis
Productivity and Animal Welfare benefit - approach taken

The approach taken is explained below in a step by step process.

1. Identify the incidence rate of bTB in the Irish herd by using data available from DAFM over a three-year average from 2017-2019.

2. Identify the size of the Irish herd broken down into relevant categories e.g. Dairy cows, other cows etc. through CSO data over a three-year average.

3. Identify the average number of annual reactors over that three-year period.

4. Use scenario analysis to estimate the impacts of a change in alternative incidence levels that may occur depending on the status of the TB Eradication programme ranging from high – low.

5. Calculate the quantum of these additional impacts in terms of the number of additional animals culled, loss of productivity of animals infected with TB consisting of reduced milk yield and reduced kgs of meat when compared to the relevant three-year production averages.

6. Apportion benefits in terms of avoided losses to public and private using the same split as identified in the Market Access analysis.
Productivity and Animal Welfare assumptions

The following tables detail the assumptions that underpin the analysis that was undertaken including assumptions around incidence levels of TB, herd size, productivity impacts etc.

All figures that were applied have been calculated over a three-year average period between 2017-2019 to ensure that one-off atypical circumstances or conditions cannot impact upon an accurate and robust interpretation of productivity and animal welfare.

<table>
<thead>
<tr>
<th>Category</th>
<th>Assumption</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current incidence levels</strong></td>
<td>The bTB incidence rate is taken to be 0.27%. This is calculated as the average incidence from 2017 to 2019 using reactor levels (described below) as a proportion of number of animals tested. Note animals tested is between 97.00% and 97.05% of the national herd, national herd assumptions described below. In assessing the impact of an increase in bTB incidence, we have a range of scenarios considered.</td>
<td>Various described below.</td>
</tr>
</tbody>
</table>
| **Herd size**                   | Total herd size is assumed to be made up of the healthy herd plus reactors. Healthy herd is assumed to be 6.6m which is the three-year average herd size from 2017 to 2019. | • Central Statistics Office Livestock survey, 2017-2019 averages, as updated in December 2020 publication.  
• Grant Thornton assumption on categorisation. |

### Number of cattle

<table>
<thead>
<tr>
<th>Description</th>
<th>Average 2017-2019</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy cows¹</td>
<td>1,379,400</td>
<td>Dairy</td>
</tr>
<tr>
<td>Other cows</td>
<td>985,833</td>
<td>Beef</td>
</tr>
<tr>
<td>Bulls²</td>
<td>9,233</td>
<td>Other</td>
</tr>
<tr>
<td>Cattle male: 2 years and over³</td>
<td>189,133</td>
<td>Beef</td>
</tr>
<tr>
<td>Cattle female: 2 years and over⁴</td>
<td>254,667</td>
<td>Beef</td>
</tr>
<tr>
<td>Cattle male: 1-2 years</td>
<td>805,400</td>
<td>Beef</td>
</tr>
<tr>
<td>Cattle female: 1-2 years</td>
<td>969,033</td>
<td>Beef</td>
</tr>
<tr>
<td>Cattle male: under 1 year</td>
<td>954,500</td>
<td>Other</td>
</tr>
<tr>
<td>Cattle female: under 1 year</td>
<td>1,061,767</td>
<td>Other</td>
</tr>
<tr>
<td><strong>Total cattle</strong></td>
<td>6,608,967</td>
<td></td>
</tr>
</tbody>
</table>

Notes: 1. Dairy cows are those kept principally to produce milk for human consumption; 2. Bulls used for breeding purposes only; 3. Excluding Bulls; 4. Excluding Dairy cows and Other cows.

### Reactor numbers

Average reactor numbers from 2017 to 2019 calculated to be 3,940:
- 2017 – 17,266
- 2018 – 17,491
- 2019 – 17,058

Parliamentary Question 1024, published on 17 February 2021.
Productivity and Animal Welfare assumptions

The following tables detail the assumptions that underpin the analysis that was undertaken including assumptions around incidence levels of TB, herd size, productivity impacts etc. All figures that were applied have been calculated over a three-year average period between 2017-2019 to ensure that one-off atypical circumstances or conditions cannot impact upon an accurate and robust interpretation of productivity and animal welfare.

<table>
<thead>
<tr>
<th>Category</th>
<th>Assumption</th>
<th>Source</th>
</tr>
</thead>
</table>
| Incidence increase assumptions | • High increase in bTB incidence, this is assumed to be the same level of bTB incidence as in 1956.  
• Low increase in bTB incidence, this is assumed to be the same level of bTB incidence as in 1960. It is representative of a level where the scheme was still in its infancy, but after the mass culling of infected animals took place. | Years 1960 to 2009 data sourced from SANCO/10472/2013 - Eradication programme for Bovine Tuberculosis Ireland - Programmes for the eradication, control and monitoring of certain animal diseases and zoonoses. Approved* for 2013 by Commission Decision 2012/761/EU  
• Grant Thornton assumptions |
| Value and quantity per animal | Market for dairy items is assumed to depend on number of animals classified as Dairy, market for beef items is assumed to depend on number of animals classified as Beef, market for live bovine animals is assumed to depend on total national herd. Categorisation is provided in herd size assumptions and summarised below. Value and quantity per animal based on the total export value of the relevant market as described in the market assess assumptions. | Grant Thornton assumptions  
• Herd size assumption (CSO)  
• Market value and quantity assumptions (CSO) |

<table>
<thead>
<tr>
<th>Sector</th>
<th>Healthy herd</th>
<th>Value per animal (€)</th>
<th>Quantity per animal (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy</td>
<td>1,379,400</td>
<td>3,457</td>
<td>1,065</td>
</tr>
<tr>
<td>Beef</td>
<td>3,204,067</td>
<td>748</td>
<td>168</td>
</tr>
<tr>
<td>Live Animals</td>
<td>6,608,967</td>
<td>15</td>
<td>5</td>
</tr>
</tbody>
</table>

Note that the value and quantity per animal is based on total relevant healthy herd, which considers animals which are not productive in that year. Therefore value and quantity per animal is understated.

It is also important to note that there are significant and valuable linkages between the dairy and beef sectors that result in the efficiency and performance of one sectors influencing the other.
Productivity and Animal Welfare assumptions

The following tables detail the assumptions that underpin the analysis that was undertaken including assumptions around incidence levels of TB, herd size, productivity impacts etc. All figures that were applied have been calculated over a three-year average period between 2017-2019 to ensure that one-off atypical circumstances or conditions cannot impact upon an accurate and robust interpretation of productivity and animal welfare.

<table>
<thead>
<tr>
<th>Category</th>
<th>Assumption</th>
<th>Source</th>
</tr>
</thead>
</table>
| Herd sizes based on incidence assumptions | Herd size including reactors is assumed to be the same, affecting Dairy, Beef and Others proportionately. | • Incidence assumptions based on DAFM reporting  
• Grant Thornton assumptions  
• Herd size assumption (CSO) |

### Cattle by category

<table>
<thead>
<tr>
<th>Category</th>
<th>Healthy herd</th>
<th>Reactors</th>
<th>Total herd</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current levels</strong></td>
<td>1,379,400</td>
<td>3,705</td>
<td>1,383,105</td>
</tr>
<tr>
<td>Dairy</td>
<td>1,379,400</td>
<td>3,705</td>
<td>1,383,105</td>
</tr>
<tr>
<td>Beef</td>
<td>3,204,067</td>
<td>8,607</td>
<td>3,212,674</td>
</tr>
<tr>
<td>Other</td>
<td>2,025,500</td>
<td>5,441</td>
<td>2,030,941</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>6,608,967</td>
<td>17,753</td>
<td>6,626,720</td>
</tr>
<tr>
<td><strong>High increase in incidence</strong></td>
<td>1,182,141</td>
<td>200,964</td>
<td>1,383,105</td>
</tr>
<tr>
<td>Dairy</td>
<td>1,182,141</td>
<td>200,964</td>
<td>1,383,105</td>
</tr>
<tr>
<td>Beef</td>
<td>2,745,875</td>
<td>466,799</td>
<td>3,212,674</td>
</tr>
<tr>
<td>Other</td>
<td>1,735,847</td>
<td>295,094</td>
<td>2,030,941</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>5,663,863</td>
<td>962,857</td>
<td>6,626,720</td>
</tr>
<tr>
<td><strong>Low increase in incidence</strong></td>
<td>1,342,996</td>
<td>40,109</td>
<td>1,383,105</td>
</tr>
<tr>
<td>Dairy</td>
<td>1,342,996</td>
<td>40,109</td>
<td>1,383,105</td>
</tr>
<tr>
<td>Beef</td>
<td>3,119,508</td>
<td>93,166</td>
<td>3,212,674</td>
</tr>
<tr>
<td>Other</td>
<td>1,972,045</td>
<td>58,896</td>
<td>2,030,941</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>6,434,549</td>
<td>192,171</td>
<td>6,626,720</td>
</tr>
</tbody>
</table>
Productivity and Animal Welfare assumptions

The following tables detail the assumptions that underpin the analysis that was undertaken including assumptions around incidence levels of TB, herd size, productivity impacts etc.

All figures that were applied have been calculated over a three-year average period between 2017-2019 to ensure that one-off atypical circumstances or conditions cannot impact upon an accurate and robust interpretation of productivity and animal welfare.

<table>
<thead>
<tr>
<th>Category</th>
<th>Assumption</th>
<th>Source</th>
</tr>
</thead>
</table>
| Dairy productivity      | A healthy animal is assumed to represent 100% productivity. Losses to dairy productivity are assumed to affect the unhealthy herd only. A low and high productivity loss are assumed which are:  
| losses                  | • low productivity losses result in a reduction of 7.5% to productivity levels, thus the animal is 92.5% productive  
|                         | • high productivity losses result in a reduction of 12.5% to productivity levels, thus the animal is 87.5% productive.
|                         | Productivity losses are only being applied to the increase in reactors due to increased incidence levels. | Economics of Bovine Tuberculosis, Zinsstag et al. |
| Beef productivity       | A healthy animal is assumed to represent 100% productivity. Losses to beef productivity are assumed to affect the unhealthy herd only. A low and high productivity loss are assumed which are:  
| losses                  | • low productivity losses result in a reduction of 6.0% to productivity levels, thus the animal is 94.0% productive  
|                         | • high productivity losses result in a reduction of 12.0% to productivity levels, thus the animal is 88.0% productive.
|                         | Productivity losses are only being applied to the increase in reactors due to increased incidence levels. | Economics of Bovine Tuberculosis, Zinsstag et al. |
| Public-Private          | Public proportion of benefits is 22% and Private proportion of benefits is 78%                   | Public-Private assumptions described on page [x]. |
| proportion of benefits  |                                                                                                   |                                                  |

Public/Private calculation

<table>
<thead>
<tr>
<th>Category</th>
<th>Proportion</th>
<th>Public</th>
<th>Public</th>
</tr>
</thead>
<tbody>
<tr>
<td>€ millions</td>
<td>Proportion</td>
<td>Public</td>
<td>Public</td>
</tr>
<tr>
<td>Taxes on Products</td>
<td>0.6%</td>
<td>100.0%</td>
<td>0.6%</td>
</tr>
<tr>
<td>All Intermediate Consumption</td>
<td>66.2%</td>
<td>9.1%</td>
<td>6.0%</td>
</tr>
<tr>
<td>Fixed Capital Consumption</td>
<td>10.6%</td>
<td>23.0%</td>
<td>2.4%</td>
</tr>
<tr>
<td>Compensation of Employees</td>
<td>6.5%</td>
<td>30.0%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Operating Surplus</td>
<td>36.7%</td>
<td>30.0%</td>
<td>11.0%</td>
</tr>
<tr>
<td>Public proportion</td>
<td>22.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private proportion</td>
<td>78.0%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Productivity

In the case that no scheme is in place, the productivity impacts of a reduction in herd health will likely be minimal. For this reason, we discuss the productivity impacts separately.

The main productivity impacts we are considering are:

- A decrease in the number of healthy animals resulting in higher culling
- A reduction in milk production
- A reduction in beef production

These impacts have been analysed over three scenarios:

<table>
<thead>
<tr>
<th>Productivity Loss: Increased Culling of National Herd</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Increase in reactors</strong></td>
</tr>
<tr>
<td>--------------------------</td>
</tr>
<tr>
<td><strong>High increase in incidence</strong></td>
</tr>
<tr>
<td>Dairy</td>
</tr>
<tr>
<td>Beef</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
<tr>
<td><strong>Low increase in incidence</strong></td>
</tr>
<tr>
<td>Dairy</td>
</tr>
<tr>
<td>Beef</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

Sources: Grant Thornton analysis of CSO data

Reduced health of the national herd

The first section of the Productivity model looks at the likely increase in the number of reactors in the absence of a scheme. This ‘What If?’ or scenario analysis considered two different scenarios of high and low increases in incidence based on different historical levels. These are then translated into a lost value or lost tonnage in terms of beef. The outcomes are set out in the below table.

These have been calculated as two historical scenarios of different incidence levels from the scheme’s history. The idea of this is to highlight the impacts of changes in incidence levels from a less effective or non-existent TB Eradication Scheme. Through doing this it is possible to estimate the potential losses that would be incurred (or avoided) depending on the presence of an effective scheme. These can then be assessed against the previously identified proportional split between public and private beneficiaries.
Reduced in milk production

The second part of the analysis considered the impact of the scenario on milk production. This used the Zinsstag et al. assumptions on estimated reduced productivity in milk yield from cattle infected with TB. This is calculated by imposing a reduction on total yield across two levels – high and low impacts before calculating the value of this loss.

The outcomes are set out in the below table.

**Productivity Loss: Dairy Sector**

<table>
<thead>
<tr>
<th>Lost qty (tonnes)</th>
<th>Lost value (€’000)</th>
<th>Public (€’000)</th>
<th>Private (€’000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High increase in incidence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>15,754</td>
<td>51,151</td>
<td>11,274</td>
</tr>
<tr>
<td>High</td>
<td>26,257</td>
<td>85,251</td>
<td>18,790</td>
</tr>
<tr>
<td>Low increase in incidence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>2,907</td>
<td>9,440</td>
<td>2,081</td>
</tr>
<tr>
<td>High</td>
<td>4,846</td>
<td>15,733</td>
<td>3,468</td>
</tr>
</tbody>
</table>

Sources: Grant Thornton analysis of CSO data

Reduced in beef production

The final part of the analysis considered the impact of the scenario on beef production. This used the Zinsstag et al. assumptions on estimated reduced productivity in beef kgs from cattle infected with TB. This is calculated by imposing a reduction on total output across two levels – high and low impacts before calculating the value of this loss.

The outcomes are set out in the below table.

**Productivity Loss: Beef Sector**

<table>
<thead>
<tr>
<th>Lost qty (tonnes)</th>
<th>Lost value (€’000)</th>
<th>Public (€’000)</th>
<th>Private (€’000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High increase in incidence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>4,605</td>
<td>20,552</td>
<td>4,530</td>
</tr>
<tr>
<td>High</td>
<td>9,210</td>
<td>41,105</td>
<td>9,060</td>
</tr>
<tr>
<td>Low increase in incidence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>850</td>
<td>3,793</td>
<td>836</td>
</tr>
<tr>
<td>High</td>
<td>1,700</td>
<td>7,586</td>
<td>1,672</td>
</tr>
</tbody>
</table>

Sources: Grant Thornton analysis of CSO data
Conclusions
Since its inception in the 1950s, the TB Eradication Scheme in its various guises has been the subject of many reviews: Cost Benefit Analysis, Value for Money reviews, Policy and Programme reviews etc. Through these, the goals and objectives of the scheme have been well established, the policy choices and programme approaches have been debated and the costs and benefits of each have been calculated and analysed.

This report seeks to build upon those previous reports and add an additional layer of information gathering and analysis on top in the form of identifying who actually ultimately benefits from the scheme.

Through a series of stakeholder consultations across the range of interested parties, academic research of the history of the scheme, and international comparisons to the operation and governance of equivalent programmes in other jurisdictions globally this report provides an independent analysis of the programme as it currently stands.

The task from the TB Stakeholder Forum was to answer two questions:

1. What are the costs and benefits of the scheme and are they appropriately captured?
2. Who are the beneficiaries of those benefits and to what extent do they do so?

Costs and benefits

The benefits of the scheme have been well established across years of previous research and policy debate. That research has shown that the scheme historically has provided significant benefits to the sector and Ireland as a whole through reducing bTB incidence in Ireland and acting as an enabler and driver of both increased market access and animal welfare and productivity. Without these, Irish agriculture would not have been able to grow to its current status as one of the largest producers of dairy and beef products, with a truly global outlook, respected for the quality and safety of its produce.

In the 1950s and 1960s the scheme was linked with the public health benefits associated with the drive to eradicate TB from the human population even at that time there was an equally strong imperative to maintain key overseas market access, namely the UK. With Ireland’s joining of the EU in the 1970s, the TB Eradication Scheme took on a new level of importance in ensuring alignment and compliance with EU Trade Law to maintain access to the Common Market.

As Ireland expanded beyond European markets to become a truly global player in the 2000s onwards industry-wide safeguards such as those provided by the TB Eradication Scheme provided a significant competitive advantage in enhancing the reputation of Irish produce and facilitating access to third-party markets in the Rest of the World. In 2021, while the relative order of importance may have changed, the benefits remain as they were in 1954:

- Facilitating market access
- Improving productivity and increasing animal welfare
- Protecting public health

While the benefits remain the same, the magnitude of them have grown in line with the growth of the sector itself and this is also true of the costs of the programme which in 2020 approached €100 million.

The purpose of this review is not to conclude whether these costs provide value for money or are the most effective use of resources to achieve the aims of the programme. Instead, the remit of this review is to capture and define the costs and provide a view following discussion with stakeholders as to whether they are appropriately captured. To that end, there is clear merit and justification for the inclusion and recognition in some manner and to some extent of the value of farmers time contribution in ensuring the effective operation of many of the key activities of the scheme. While this review cannot opine on what monetary value should be recognised in programme costs it is appropriate that as one of many contributors to the scheme farmers time should be included alongside veterinarians, valuers, hauliers, departmental staff etc..

Beneficiaries

Having assessed and estimated the benefits achieved by the scheme the second of the two questions posed requires identification of the beneficiaries of those benefits. Just as the benefits remain as they were in 1954 so the beneficiaries remain to a large extent unchanged. As the public health benefit has receded over the years so the market access and productivity benefits have grown considerably in tandem with the growth of the industry. This is clearly to the benefit of all parties from individual farmers to the Exchequer to Ireland as a nation. The industry provides employment for tens of thousands directly and many more hundreds of thousands indirectly through retail, hospitality, tourism etc..
The focus of this report is to ascertain if those benefits and those beneficiaries are private or public. Previous reports in Ireland and elsewhere, whether Australia and New Zealand’s agreements on cost-sharing in favour of farmers paying more to fund schemes or in Cost Benefit Analyses in Ireland highlighting the return to the industry of the scheme have consistently shown that the primary beneficiaries of bTB eradication are the agricultural industry itself. This report concludes that this analysis remains the case in Ireland in 2021 and will continue to be so in the future. The analysis indicates that the proportional split between private and public benefits is:

**Public/Private benefit split of the TB Eradication Scheme**

<table>
<thead>
<tr>
<th>% Share</th>
<th>Public Benefit</th>
<th>Private Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>78%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sources: Grant Thornton analysis of CSO data

In researching this topic it is recognised that farmers as the sole beneficiaries who are also contributing to the scheme directly in financial terms consider that they are underserved by the remuneration provided for their activity by the market. If correct, this can certainly be considered to be a market failure as defined in economic terms and an is an issue deserving of further consideration. However, it must also be recognised that the purpose of the TB Eradication Scheme is not to correct any perceived market failure in ensuring a ‘fair’ valuation of private goods by the market but instead to push forward towards ensuring the eradication of the disease from the Irish national herd. This is particularly important now given the combination of rising costs of the scheme and declining funding from the EU which will place greater burden on domestic stakeholders.

Alongside this is the greater focus on ensuring that agriculture is supporting the green agenda of the country by aiding achievement of carbon gas emission targets. This will increase the need to produce primary goods in as efficient a manner as possible with both the culling of animals and their underproduction when sick being examples of sub-optimal outcomes.

Finally, there must be recognition that while there are significant and growing costs associated with the scheme for both the public and private purse, the benefits enjoyed by both derived from the important function that the scheme directly provides and the benefits it indirectly enables vastly outweigh the costs of providing it with an estimated public benefit of €1.4 billion and a private benefit of €4.9 billion from market access alone.

The scheme will continue to support these into the foreseeable future whatever form it takes.
Appendices
Glossary

TB - Tuberculosis
bTB - Bovine Tuberculosis
SMP - Summary of Market Prices
OFMV - On-Farm Market Valuation Scheme
DAFM - Department of Agriculture, Food and the Marine
EBI - Economic Breeding Index
bTBEP - Bovine Tuberculosis Eradication Scheme
DEFRA - Department for Environment, Food and Rural Affairs
AHDB - Agriculture and Horticulture Development Board
GDPR - General Data Protection Regulation
GDP - Gross Domestic Product
GIS - Geographic Information System
AHCS - Animal Health Computer System
ICBF - Irish Cattle Breeding Federation
RFT - Request For Tender
BLUP - Best Linear Unbiased Prediction
CIArB - Chartered Institute of Arbitrators
SAO - Supervisory Agricultural Officer
STF - Successfully free from bovine tuberculosis, defined in the EU as a herd incidence of bTB of less than 0.1%
M. Bovis - Mycobacterium bovis, the slow-growing aerobic bacterium and the causative agent of tuberculosis in cattle
EFSA - European Food Safety Authority
Herd prevalence - The number of herds experiencing a bTB breakdown in a given period
Herd incidence - The number of herds experiencing a new bTB breakdown in a given period
Reactors - animals positive to the skin or blood test which are removed from the farm and slaughtered
AIM System - Animal Identification and Movement System
FSAI - Food Safety Authority Ireland
OTF - Officially Tuberculosis Free
AHB - Animal Health Board
NPMP - National Pest Management Plan
OSPRI - Operational Solutions for Primary Industries
CFT - caudal fold test
CTS - Cattle Tracing System
BCMS - British Cattle Movement Service
HIA - High Incidence Area
APHA - Animal and Plant Health Agency
AHVLA - Animal Health and Veterinary Laboratories Agency
OTS - Officially tuberculosis free status suspended
OTW - Or officially tuberculosis free status withdrawn (OTW)
SICCT - Single Intradermal Comparative Cervical Tuberculin test
IV - Independent Valuer
DWHC - Dutch Wildlife Health Centre
BTEC - Brucellosis and Tuberculosis Eradication Campaign
AHA - Animal Health Australia
EADRA - Emergency Animal Disease Response Agreement
PIC - Property Identification Code
FMD - Foot and Mouth Disease
HRA - High-Risk areas
LRA - Low-Risk Areas
AHVLA - Animal Health and Veterinary Laboratories Agency
IAASA - Auditing and Accounting Supervisory Authority
FEU - Treaty on the Functioning of the European Union
HSE - Health Service Executive
GDA - Gross Differential Amount
SME - Subject Matter Expert
HSE – Health Service Executive
HPSC – Health Protection Surveillance Centre
WHO – World Health Organisation
NIAC – National Immunisation Advisory Committee
HIQA – Health Information and Quality Authority
CBA – Cost Benefit Analysis
CAP – Common Agricultural Policy

Cost-benefit analysis TB Eradication Scheme | DAFM 79
## SITC codes considered

### Beef

<table>
<thead>
<tr>
<th>SITC5</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>01111</td>
<td>Meat of bovine animals, fresh or chilled, with bone in</td>
</tr>
<tr>
<td>01112</td>
<td>Meat of bovine animals, fresh or chilled, boneless</td>
</tr>
<tr>
<td>01121</td>
<td>Meat of bovine animals, frozen, with bone in</td>
</tr>
<tr>
<td>01122</td>
<td>Meat of bovine animals, frozen, boneless</td>
</tr>
<tr>
<td>01251</td>
<td>Edible offal of bovine animals, fresh or chilled</td>
</tr>
<tr>
<td>01252</td>
<td>Edible offal of bovine animals, frozen</td>
</tr>
<tr>
<td>01861</td>
<td>Meat and edible meat offal of bovine animals, salted, in brine, dried or smoked</td>
</tr>
<tr>
<td>01760</td>
<td>Meat and offal (other than liver), of bovine animals, prepared or preserved, n.e.s.</td>
</tr>
</tbody>
</table>

### Live Animals

<table>
<thead>
<tr>
<th>SITC5</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>00111</td>
<td>Pure-bred breeding cattle</td>
</tr>
<tr>
<td>01022110</td>
<td>Pure-bred breeding heifers &quot;female bovines that have never calved&quot;</td>
</tr>
<tr>
<td>01022130</td>
<td>Pure-bred breeding cows (excl. heifers)</td>
</tr>
<tr>
<td>01022190</td>
<td>Pure-bred cattle for breeding (excl. heifers and cows)</td>
</tr>
<tr>
<td>01023100</td>
<td>Pure-bred buffalo for breeding</td>
</tr>
<tr>
<td>01029020</td>
<td>Bovine pure-bred breeding animals (excl. cattle and buffalo)</td>
</tr>
<tr>
<td>00119</td>
<td>Cattle other than pure-bred breeding animals</td>
</tr>
<tr>
<td>01022910</td>
<td>Live cattle of a weight &lt;= 80 kg (excl. pure-bred for breeding)</td>
</tr>
<tr>
<td>01022921</td>
<td>Cattle of a weight &gt; 80 kg but &lt;= 160 kg, for slaughter</td>
</tr>
<tr>
<td>01022929</td>
<td>Live cattle of a weight &gt; 80 kg but &lt;= 160 kg (excl. for slaughter, pure-bred for breeding)</td>
</tr>
<tr>
<td>01022941</td>
<td>Cattle of a weight &gt; 160 kg but &lt;= 300 kg, for slaughter</td>
</tr>
<tr>
<td>01022949</td>
<td>Live cattle of a weight &gt; 160 kg but &lt;= 300 kg (excl. for slaughter, pure-bred for breeding)</td>
</tr>
<tr>
<td>01022951</td>
<td>Heifers &quot;female bovines that have never calved&quot; of a weight &gt; 300 kg, for slaughter</td>
</tr>
<tr>
<td>01022959</td>
<td>Live heifers &quot;female bovines that have never calved&quot; of a weight &gt; 300 kg (excl. for slaughter and pure-bred for breeding)</td>
</tr>
<tr>
<td>01022961</td>
<td>Cows of a weight &gt; 300 kg, for slaughter (excl. heifers)</td>
</tr>
<tr>
<td>01022969</td>
<td>Live cows of a weight &gt; 300 kg (excl. for slaughter and pure-bred for breeding and heifers)</td>
</tr>
<tr>
<td>01022991</td>
<td>Cattle of a weight &gt; 300 kg, for slaughter (excl. heifers and cows)</td>
</tr>
<tr>
<td>01022999</td>
<td>Live cattle of a weight &gt; 300 kg (excl. for slaughter, pure-bred for breeding and heifers and cows)</td>
</tr>
<tr>
<td>01023990</td>
<td>Live buffalo (excl. domestic species and pure-bred for breeding)</td>
</tr>
<tr>
<td>01029091</td>
<td>Live domestic bovine animals (excl. cattle and buffalo and pure-bred for breeding)</td>
</tr>
<tr>
<td>01029099</td>
<td>Live bovine animals (excl. cattle, buffalo, pure-bred for breeding and domestic species)</td>
</tr>
</tbody>
</table>

### Dairy

<table>
<thead>
<tr>
<th>SITC5</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>02211</td>
<td>Milk of a fat content, by weight, not exceeding 1%</td>
</tr>
<tr>
<td>02212</td>
<td>Milk and cream, of a fat content, by weight, exceeding 1% but not exceeding 6%</td>
</tr>
<tr>
<td>02213</td>
<td>Cream of a fat content, by weight, exceeding 6%</td>
</tr>
<tr>
<td>02221</td>
<td>Milk, in solid form, of a fat content, by weight, not exceeding 1.5%</td>
</tr>
<tr>
<td>02222</td>
<td>Milk and cream, in solid form, of a fat content, by weight, exceeding 1.5%</td>
</tr>
<tr>
<td>02223</td>
<td>Milk and cream, not in solid form, not containing added sugar or other sweetening matter</td>
</tr>
<tr>
<td>02224</td>
<td>Milk and cream, not in solid form, containing added sugar or other sweetening matter</td>
</tr>
<tr>
<td>02231</td>
<td>Yogurt, whether or not concentrated or containing added sugar or other sweetening matter or flavoured or containing added fruit, nuts or cocoa</td>
</tr>
<tr>
<td>02232</td>
<td>Buttermilk, curdled milk and cream, kephir and other fermented or acidified milk or cream, whether or not concentrated or containing added sugar or other sweetening matter or flavoured or containing added fruit, nuts or cocoa</td>
</tr>
<tr>
<td>02241</td>
<td>Whey and modified whey, whether or not concentrated or containing added sugar or other sweetening matter</td>
</tr>
<tr>
<td>02249</td>
<td>Products consisting of natural milk constituents, n.e.s.</td>
</tr>
<tr>
<td>02300</td>
<td>Butter and other fats and oils derived from milk; dairy spreads</td>
</tr>
<tr>
<td>02410</td>
<td>Grated or powdered cheese, of all kinds</td>
</tr>
<tr>
<td>02420</td>
<td>Processed cheese, not grated or powdered</td>
</tr>
<tr>
<td>02430</td>
<td>Blue-veined cheese and other cheese containing veins produced by Penicillium roqueforti</td>
</tr>
<tr>
<td>02491</td>
<td>Fresh (unripened or uncured) cheese, including whey cheese, and curd</td>
</tr>
<tr>
<td>02499</td>
<td>Cheese nes.</td>
</tr>
<tr>
<td>09893</td>
<td>Food preparations for infant use, put up for retail sale of flour, meal, starch or malt extract (not containing cocoa or containing cocoa in a proportion by weight of less than 40% calculated on totally defatted basis, n.e.s., or of goods of headings 022.11 – 022.32 and heading 022.4 (not containing cocoa or containing cocoa in a proportion by weight of less than 5%), n.e.s.</td>
</tr>
<tr>
<td>09894</td>
<td>Malt extract; food preparations of flour, meal, starch or malt extract (not containing cocoa or containing cocoa in a proportion by weight of less than 40% calculated on totally defatted basis, n.e.s., or of goods of headings 022.11 – 022.32 and heading 022.4 (not containing cocoa or containing cocoa in a proportion by weight of less than 5%), n.e.s.</td>
</tr>
<tr>
<td>59221</td>
<td>Casein</td>
</tr>
<tr>
<td>59222</td>
<td>Caseinates and other casein derivatives; casein glues</td>
</tr>
<tr>
<td>59223</td>
<td>Albumins (including concentrates of two or more whey proteins, containing by weight more than 80% whey proteins, calculated on the dry matter), other than egg albumin; albuminates and other albumin derivatives</td>
</tr>
</tbody>
</table>

Cost-benefit analysis TB Eradication Scheme | DAFM 80
Methodological approach
Methodological approach

In accordance with the methodological approach set out in our proposal, we have carried out the cost-benefit analysis through a five-staged approach.

Throughout this engagement, we have used a combination of techniques to deliver a comprehensive and robust analysis on the costs and benefits related to the bTBEP.

- **Project initiation**: A list of stakeholders to be engaged with, the data and information that is already available and that which will need to be found, and reporting arrangements to be set up for the duration of the CBA project.
- **Discovery**: We assessed all information made available to us from DAFM, and performed desk top research into any relevant information on bTB.
- **Stakeholder engagement**: In order to inform our analysis, stakeholders with varying interests were engaged through one-to-one interviews, phone consultations and request for written submissions.
- **Analysis**: The costs have been identified through a combination of direct costs of currently running the bTBEP as well as the indirect costs identified through stakeholder engagement and desk research. The benefits have been identified to be those improvements when comparing the current state of bTB incidence to a hypothetical state were no such bTBEP exists. These were then analysed in accordance with international best practice and made relevant to the Irish context.
- **Final deliverables**: A final report which brought together the outputs of the other stages of this methodology was produced which highlighted the consideration of the costs and benefits appropriately associated and directly relevant to the scheme and concluded who ultimately benefitted from the scheme’s continued operation.

A description of the outcome of these stages, and their contribution to the preparation of this report provided in the pages to follow.
PHASE 1: Initiation

The Initiation phase involved introducing the relevant Departmental officials and/or Forum members to the Grant Thornton project team for this engagement, and ensuring that there is a mutual understanding of, and consensus for, the key project management requirements to ensure a successful outcome for the TB Stakeholder Forum and the Department.

At the kick-off meeting our Team:

- Reconfirmed your ask and requirements;
- Agreed a project timeline;
- Finalised a project plan;
- Identified key stakeholders and outlined initial engagements;
- Exchanged an information requirements list;
- Ensured clarity on the purpose and key deliverables resulting from this engagement including, at a high level, the structure and format of the final report.

PHASE 1: Key deliverables

- Scope document agreed by both parties inclusive of outputs, timelines and all other appropriate requirements.
- Information requirements/data request list highlighting the information necessary to complete the project and the documents that should be provided by the Department to Grant Thornton.
PHASE 2: Discovery

The Discovery phase commenced with the identification and collation of all relevant and required information relating to the project. A review of the history of the Eradication Scheme and all amendments are undertaken to establish a firm rationale for the Programme and to understand its context.

Other documents reviewed for this purpose included:
- National Farmed Animal Health Strategy 2017
- Foodwise 2025
- Origin Green
- Project Ireland 2040
- Eradication 2030
- International strategies & European policies

Grant Thornton requested all of the material collated to date by the Bovine TB Eradication Programme team. This information was gathered in line with the necessary GDPR procedures and complying with all GDPR related regulations.

Desk Research

We examined the previous reviews of the Scheme and international evidence from bodies such as the OECD. Other publications reviewed included:
- Study of Socio-economic impediments to bovine tuberculosis eradication (1993)
- The 2008 VfM review;
- Understanding and managing bTB risk: Perspective from Ireland (2015);
- Historical survey paper (Sheridan 2011);
- The Economic and Societal Importance of the Irish Suckler Beef Sector (2019); and

Comparative Analysis

A comprehensive jurisdictional comparative analysis piece was completed to benchmark domestic and international eradication progress. This analysis also allowed for the examination of the various eradication models and approaches that have been employed elsewhere. The appropriation of costs and benefits under these models and the eradication progress achieved being key to the analysis phase.

In particular, Australia and New Zealand were examined for their successful and near complete eradication programmes. Information collected during this phase was integral to the analysis phase, both in providing actual data to be used as inputs in the model, and also for informing strategies on how to collect and treat additional necessary data, and how to apportion costs and benefits between Private and Public categories.

PHASE 2: Key deliverables

- Handover and review of all relevant material
- Provision of data extracted from AIM and AHCS
- Validation of existing information
- Perform a gap analysis on information required
- Agreement on approach to close those gaps and generate required information
- Desktop research
PHASE 3: Stakeholder Engagement

The Stakeholder Engagement phase involved a process of engaging with all key stakeholder groups to gather their expertise and insights into their respective professions and industries. These groups included:

- Departmental officials
- Farmer organisations such as the IFA
- Individual farmers; pedigree and non-pedigree
- Marts
- Slaughtering premises, including abattoirs and knackeries
- Milk processors
- Exporters
- Food industry representatives
- Private veterinary practices and regional veterinary officers
- HSE Representatives.

As previous reviews were identified as not having properly taken the views of key stakeholders into account, and given the divergence of views on costs and benefits within the TB Stakeholder Forum, it was very important that the engagement process was comprehensive of all views and that the project team was receptive to all the insights and information proffered by the participants.

Consultation Process

The engagement process comprised of one-to-one interviews with key stakeholders and larger group meetings on a regional basis. In order to ascertain the views of all relevant stakeholders, Grant Thornton engaged in a process of consultations. These consultations took place between March and June of 2020, with 36 consultations taking place over this timeframe.

Due to unforeseen circumstances arising from COVID-19, several of these consultations were performed via digital consultation calls. This was necessary to facilitate the relevant stakeholders.

All individual farmers chosen for the process of this analysis were chosen at random, with the exception that all farmers previously had TB outbreaks within their herd.

Grant Thornton included farmers:
- From a mix of geographical areas;
- Beef and/or dairy holdings;
- Large and small holdings;
- Pedigree and non-pedigree herds; and
- Locations with experience of the various vector control programmes; badger and deer culling and vaccination.

<table>
<thead>
<tr>
<th>Breakdown of Consultations</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farming Representative Groups</td>
<td>4</td>
</tr>
<tr>
<td>Farmers</td>
<td>16</td>
</tr>
<tr>
<td>HSE Representatives</td>
<td>2</td>
</tr>
<tr>
<td>Valuers &amp; Valuer Representative Groups</td>
<td>7</td>
</tr>
<tr>
<td>Veterinary Representative Groups</td>
<td>1</td>
</tr>
<tr>
<td>Business Representative Groups</td>
<td>2</td>
</tr>
<tr>
<td>Wildlife Trusts and Other</td>
<td>4</td>
</tr>
</tbody>
</table>

Consultation Procedure

An interview guide document was drawn up to provide some structure and uniformity to the interviews. It was based around the key questions posed in the CBA tendering document and informed by the desk research undertaken during the discovery phase.

The guide was referred to by Grant Thornton throughout the interviews to navigate the direction of the interview, it was not done so in an intrusive manner.

The questions allowed for an open discussion to occur, where the opinions and experiences of the stakeholders relevant to the TB Eradication Scheme were heard.
A similar thread/line of questioning was employed throughout all consultations, to allow for the collection and collaboration of opinions regarding the same topics. These discussion points included, but were not limited to:

- Cost to the farmer;
- Cost to the DAFM;
- Main benefits of the programme;
- Programme performance overall;
- Communication;
- Main costs of the programme;
- Beneficiaries of the programme;
- Other players and exacerbators;
- Methodology for assessing costs and benefits; and
- Additional commentary and information.

Following the conclusion of the consultation process, the minutes from the stakeholder consultations were shared with the individual stakeholders.

Grant Thornton requested that all minutes should be reviewed to ensure that the individual/representative bodies opinions were captured correctly, with Grant Thornton undertaking any amendments to the sentiments captures, where it was highlighted by the individual stakeholders. The amended minutes were circulated before a final sign off.

The responses provided by the consultation process were analysed by Grant Thornton to identify the primary themes and opinions that emerged from the stakeholders.

**PHASE 3: Key deliverables**

- Stakeholder Management Matrix
- Overview of findings from engagements
- Strategy for on-going stakeholder maintenance process
PHASE 4: Analysis

The Analysis phase of the CBA development was largely concerned with developing meaningful and relevant output using the information collated during the Discovery and Stakeholder Engagement phases.

Our proven methodology for conducting the Analysis phase is designed to meet the requirements of the latest iteration of the Public Spending Code as set out by the Department for Public Expenditure and Reform, and we have further refined this methodology for Agri-food clients.

Our approach at Grant Thornton consists of an 8 step methodology that covers all of the key requirements as set out the Public Spending Code for an appraisal of a programme investment of the nature and scale set out by the TB Stakeholder Forum in the tender document.

Identification of costs

An integral part of the analysis phase was the appropriation of all costs and benefits. In order to complete a robust analysis, Grant Thornton began by considering all of the relevant direct and indirect costs and benefits associated with the TB Eradication Programme.

Working closely with the Department and/or representatives from the Forum, and also drawing on the findings from the Discovery and Stakeholder Engagement phases and our research, we developed a comprehensive and robust list of costs. Costs include the carrying out of tests; control of restricted herd movements; compensation schemes; farmers’ time; maintenance of electronic record systems; slaughterhouse surveillance programmes and vector control programmes.

Identification of benefits

The identification of benefits proved more specific to each project. Information relating to the operating costs of the Programme was provided to Grant Thornton by the Department. Benefits that are likely to be amenable to quantification include:

- reduced compensation costs and other Programme operating costs, should the disease be successfully eradicated;
- avoided lost sales to the farmer (only that value over and above the compensation costs paid, to avoid double-counting); and
- improvement in the perception of Irish beef as a premium product due to lower levels of disease.

Data

Data used during the analysis phase has been collected from a variety of accredited sources, these included:

- DAFM and equivalent bodies in other jurisdictions
- ECB
- European Commission
- WHO
- Eurostat
- CSO

Where data gaps were identified, we sought information from industry sources and all missing data has been highlighted, and the impact of those inputs on the results have been reported.

For some costs and benefits, there was a range of options in terms of assumptions and data that may be applicable. Where this is the case we will seek to set out the alternative assumptions and provide sufficient discussion and explanation as to the choice made within the model.
Public and Private Costs and Benefits

Once all costs and benefits associated with the TB Eradication Scheme were identified, Grant Thornton commenced the apportionment of costs and benefits to Public and Private baskets. The determination of whether the costs and benefits are public or private was integral to the design of the cost-sharing elements of the TB Eradication Programme.

Multipliers

This can be extended to include the induced impacts to take account of the multiplier effect of the flow of money, this is not standard under the Public Spending Code. Costs and Benefits which cannot be quantified are examined and described in as much detail as possible, their impacts of each on Irish society. However, in this instance, it was not felt to be appropriate to use multiplier analysis given the definition of private good and private beneficiaries.

Results and Conclusions

An extensive breakdown of all results and the conclusions derived from the analysis phase is contained in the report.

PHASE 4: Key deliverables

- Place Programme in strategic context
- Define options for appraisal
- Calculate NPV and IRR and other metrics and test variables for sensitivity
- Test results for robustness
PHASE 5: Deliverables

The report that follows is adherent to the specific criteria as outlined by the Department of Agriculture, Fisheries and Marine in the RFT 128458 – Framework PAS097F, on behalf of the TB Forum.

The report provides an independent evaluation of the current Bovine TB Eradication Programme in operation in Ireland. Through the combination of data, industry expertise knowledge and research undertaken through credible sources, the outcome of this report attempted to appropriate, insofar as possible, all direct and indirect costs and benefits of the TB Eradication Programme.

Grant Thornton confirm that all aspects of the analysis undertaken were done so in compliance with the guidelines of the revised Public Spending Code.

PHASE 5: Key deliverables

- Completed report detailing the findings of the analysis
- Cost Benefit Analysis model with user interface allowing the impact on the results of varying certain parameters
Stakeholders Consulted

As part of the review of the scheme, a number of stakeholders across the chain were engaged in order to obtain a diverse range of feedback from all relevant parties. Outlined below is the list of stakeholders consulted:

**Farming Representative Groups**
- ICSA – Hugh Farrell
- ICMSA – Lorcan McCabe, John Enright
- Macra – Thomas Duffy
- IFA – Pat Farrell, Tomas Bourke, TJ Maher

**Herdowners**
- Beef farmers – Liam O’Byrne, Thomas Cormican, Hugh Brennan, Stephen Dunne, James Cawley.

**Valuer Representative Groups**
- Valuers Representative Group – Tom Berkery

**Department Officials: Regional Valuation Officers**
- Cork Regional Valuation Officer – Brendan English
- Cavan Regional Valuation Officer – Martin Halpin
- Portlaoise Regional Valuation Officer – Michael Kerr
- Kilkenny Regional Valuation Officer – Geraldine Loughman
- Limerick Regional Valuation Officer – Tom Maloney
- Castlerea Regional Valuation Officer – Martin Freeman

**Veterinary Representative Groups**
- Veterinary Ireland – Conor Geraghty

**Business Representative Groups**
- Meat Industry Ireland – Joe Ryan
- Dairy Industry Ireland – Conor Mulvihill
- Ornua – Joe Collins

**Wildlife Trusts, HSE and Other Professionals**
- UCD – Prof. Simon More
- Irish Wildlife Trust – Pádraic Fogarty
- Agri-Food Business Partners – Michael Cronin
- National Parks and Wildlife Service – Gerry Leckey
- HSE – Dr. Mary O’Meara, Dr. Pasqueline Lyng, Sarah Jackson, Dr. Joan O’Donnell