

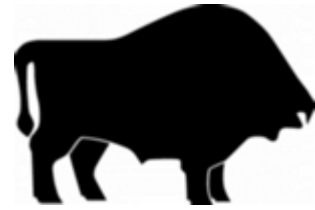


The economic and social impact of the Institute for Animal Health's work on Bluetongue disease (BTV-8)



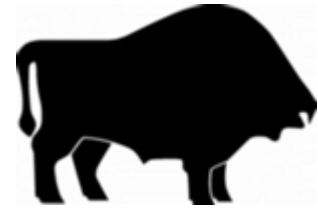
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1. Introduction

DTZ was commissioned by the Institute for Animal Health (IAH) to conduct a case study investigating the impact of IAH's work on bluetongue disease (BTV). This short report offers a brief description of the disease's characteristics and effects, a review of IAH's activities, and an assessment of the resulting economic impacts.

2. Bluetongue disease: overview

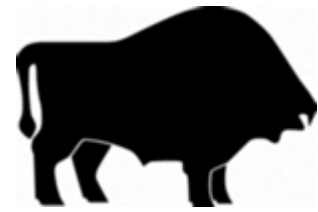
The virus

BTV-8 is a non-contagious disease, which spreads mainly via midges, although transmission between animals on-farm through lack of hygiene (use of hypodermic needles for example) cannot be excluded. The virus affects ruminants such as cattle and sheep, although cattle do not always show signs of disease.

The clinical symptoms of a bluetongue infection are broadly similar for sheep and cattle: nasal discharge, fever, ulceration of the mouth and tiredness¹. The disease affects productivity and can potentially lead to the animal's death.



¹ <http://www.defra.gov.uk/animalh/diseases/notifiable/pdf/bluetongue0707.pdf>



Recent outbreaks

BTV having been observed in several parts of Southern Europe, made a significant outbreak in Northern Europe in 2006, affecting mainly the Benelux countries of Netherlands, Belgium and, to a lesser degree, the North of France.

The serotype causing BTV infections in northern Europe (BTV-8) is different from the one previously observed in Southern Europe, and of particular concern, a proportion of animals infected actually died from the disease.

The discovery of infected cattle and sheep in East Anglia in September 2007 triggered a response from the British authorities, and in turn, one of their main partners in terms of scientific research and agricultural policy recommendations, the Institute for Animal Health (IAH).

Following arrival of the virus in the UK in autumn 2007², the Government immediately enforced a protection zone and surveillance zone, controlled by EU regulation. Measures include the prohibition of animal movements of susceptible animals, confinement, insecticide treatment of animals, etc³. IAH is actively advising government on the spread of the disease and on measures to mitigate its effects.

The impacts of previous BTV outbreaks in Europe have been characterised by substantial losses of livestock: in Belgium, 42% of infected sheep and 18% of infected cattle succumbed from the disease. Weight loss of surviving animals, reduced milk yields and abortions were also commonly observed.

On top of these direct effects on productivity, further trade impacts result through export restrictions on animals and animal products, as well as a sudden need to import what is usually produced home.

3. The activities of IAH

3.1 'Market failure' approach

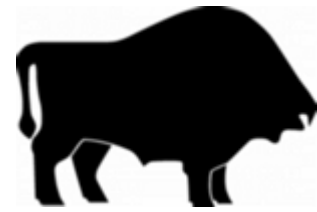
IAH is a publicly financed research centre, which receives funding from two Government bodies, Defra and BBSRC. The institute is seeking to address what is known as a 'market failure'.

The OECD defines a **market failure** as a "*situation in which market outcomes are not optimal. Market failures provide a rationale for Government intervention*"⁴. The activities of IAH address market failure, since they produce outcomes that the market alone would not deliver, for the following reasons:

² <http://www.defra.gov.uk/animalh/diseases/notifiable/bluetongue/index.htm>

³ <http://www.defra.gov.uk/animalh/diseases/notifiable/pdf/bluetongue-control-strategy0807.pdf>

⁴ <http://stats.oecd.org/glossary/detail.asp?ID=3254>



- There is an **information** failure associated with the fact that farmers may lack the skill to detect the virus affecting their livestock, be aware of the potential consequences of their animals' infections, or address the problem in the most efficient way. By providing timely information and making it public, IAH provides an information service that the market does not deliver.
- There is a positive **externality** associated with IAH's activity which would not be captured through the market. It is in everyone's interest that vital scientific information, such as how to spot BTV-8, or how to stop it from spreading is known widely. Private individuals or organisations would keep this kind of information confidential, and sell it to whoever pays the highest price. IAH, by making this information free for everyone, therefore ensures that the information is spread as widely as possible.

3.2 What IAH does

The research team involved in the work on BTV is part of the Division of Epidemiology, based at the Pirbright campus of IAH, in the South East of England. IAH's activities on BTV-8 cover three aspects⁵:

Research & vaccination activity:

- Research on the virus including fundamental analysis of the virus and elucidation of the disease process
- Development of vaccines

Surveillance & Diagnostic activity:

- Analysis of blood samples collected on suspected animals
- Meteorological activity to forecast and detect movements of midges which carry the disease
- Government advice on establishing surveillance zones

Disease control activity:

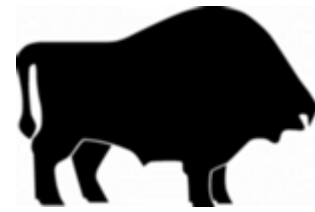
- Information campaigns such as conferences for farmers, and training courses on BTV
- Elaboration of recommendations to policy makers.
- International best practice conferences.

The Institute of Animal Health operates in close partnership with the UK government, Defra, being responsible for control of infectious animal diseases at the national level, and BBSRC being the main funder of research into animal health and welfare.

IAH also works with other laboratories in Europe involved in the study of the BTV including:

- CIDC-Lelystad in the Netherlands,
- CODA-CERVA in Belgium,
- Friedrich-Loeffler-Institute in Germany,
- Afssa-Lerpaz in France.

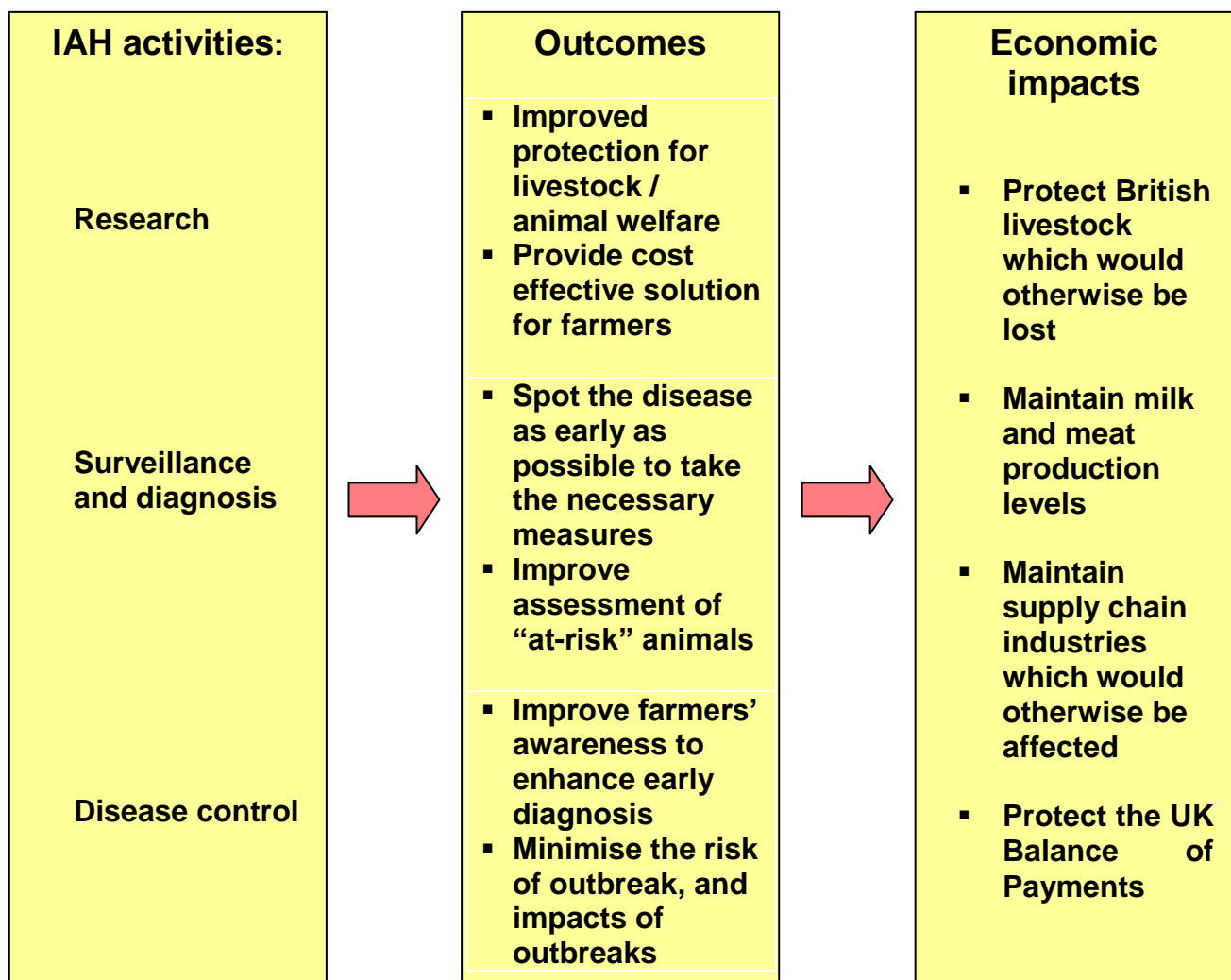
⁵ <http://www.iah.ac.uk/divisions/epidemiology.shtml>



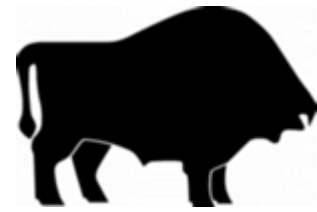
4. Economic impact assessment

4.1 Modelling approach

The approach to modelling impacts of IAH activities is shown in the following diagram. The diagram shows how IAH activities produce outcomes which in turn have economic impact. Most of the economic impacts result from IAH activity preventing or mitigating a BTV outbreak in the UK:



We can measure the value of IAH activities in relation to BTV through society’s willingness to pay for IAH advice and through the estimation of the scale of losses to industry if IAH was not available to provide advice on BTV.



4.2 Willingness to pay for IAH activities on BTV

Society's willingness to pay for IAH activities on BTV can be estimated firstly through:

- Government funding made available
- Vaccine expenditure
- Costs of training and awareness

These areas are considered below.

4.2.1 IAH BTV funding

The awards made to the BTV research team throughout the past 7 years (2000-2007) amount to **£12.8m**, or **£1.6m** a year. In a year when an outbreak is observed, this figure can dramatically increase. For example, **spending reached £5m in 2003**, when an important outbreak occurred in Southern Europe. Government is willing to invest this amount of money to prevent or mitigate a BTV outbreak.

4.2.2 Vaccine expenditures

The total expected bill for doses of vaccine is expected to reach the following total taking into account the vaccine itself (£0.37 each) and the vaccination costs⁶

- England - 22.5 million doses ordered from Intervet - **£20m**
- Scotland likely to order another 12 million doses - **£12.5m**
- Wales **£2.5m**

The total potential expenditure on BTV-8 vaccination in the UK could be **£35m** in the year of an outbreak. The vaccination process would have to be repeated each year for any new born animal, leading to lesser, but still significant costs.

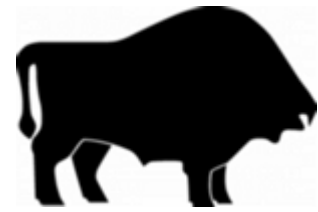
4.2.3 Training and awareness

The BTV-8 team at IAH has been involved in seminars and conferences across the UK and beyond since the first BTV outbreak last August. In addition there have been regular meetings with Defra and farming representatives.

Based on IAH sources, we assume 1.5 seminar-conferences every week for the past 6 months, with an average attendance of 80 people, 50% of them farmers, and 50% vets. If we assume that those seminars and conferences require on average a day, then the opportunity cost of attending those seminars can be estimated as the value of output that would have been produced if they had stayed at work. The latter can be derived from the UK input-output tables⁷, which provide data on the annual output produced by each sector of the economy, as well as the number of workers employed in each of those sectors.

⁶ <http://www.fwi.co.uk/Articles/2008/02/19/109482/cost-of-bluetongue-blue-tongue-vaccine-continues-to-worry-livestock-producers.html>

⁷ http://www.statistics.gov.uk/about/methodology_by_theme/inputoutput/



On this basis, we find an opportunity cost of **£1m-£1.5m**. In other words, farmers and vets are willing to sacrifice £1.25m worth of output a year in order to improve their knowledge on BTV-8, its effects, and how to cure it.

On top of that, the agricultural sector spends an annual £7m on inputs from the education sector⁸ (training, seminars...). According to a Defra survey in 2003, 16% of farmers considered the provision of research and advice by the Government as a high priority. While this survey primarily related to organic farming, it is likely to point to a much higher level of interest in BTV. This proportion is likely to increase dramatically during an animal disease outbreak. If we make the assumption that in times of an outbreak such as the one observed last summer, half of the farming industry's expenditures on education deal with training on the disease affecting the country's livestock, another **£3-4m** can be added to the industry's willingness to pay.

In summary, society's willingness to pay for services involved in research, training, prevention and vaccination of the BTV-8 amounts to £45m per year, composed of:

- Public grants awarded to IAH BTV team: **£5m**
- UK expenditures on BTV vaccination: **£35m** on the first year of the outbreak.
- Output given up for BTV training and awareness: **£5m**

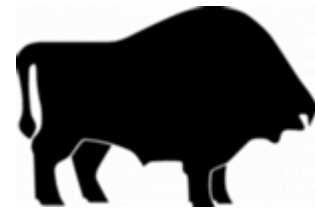
4.3 Wider economic impact of IAH activities on BTV-8

The real value of IAH's work for the economy is the avoidance of potential negative impacts that would occur if IAH activity did not exist. IAH's role is to prevent a massive outbreak of BTV-8 in the UK and its impacts can be measured through assessment of a "do nothing" option. If nothing was done about BTV (research, prevention, vaccination, control), the consequences of a BTV-8 outbreak in the UK could be measured as follows:

- Loss in livestock value
- Loss in milk production
- Restrictions on UK agricultural exports
- Employment impacts

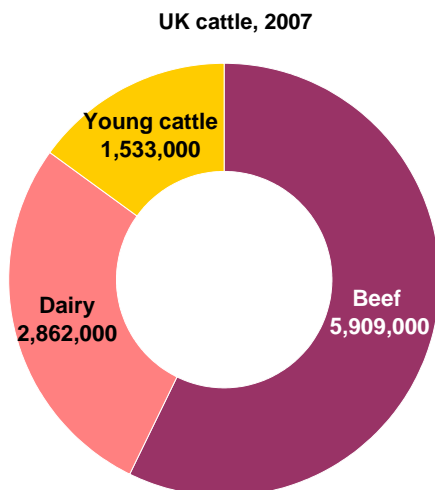
These areas are considered below.

⁸ http://www.statistics.gov.uk/about/methodology_by_theme/inputoutput/

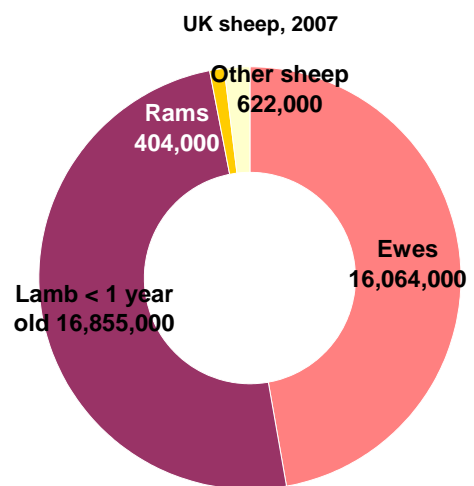


4.3.1 Loss in livestock

The British livestock in 2007 was structured as follows⁹:



Source: DEFRA, 2007



Source: DEFRA, 2007

After having weighted the market value of UK cattle and sheep (taking into consideration the prices and quantities of different types of animals), we find an average market value, in 2007 prices, of £459 per animal for cattle (beef and young cattle), £902 per animal for dairy cattle, £35 per animal for lambs, and £25 per animal for ewes and other sheep.

Basing our study on the Belgian figures in terms of morbidity (probability of being infected) and mortality (probability of dying from the disease), we assume that the potential losses due to animals succumbing to BTV-8 could potentially reach 1% of cattle, and 12% of sheep.

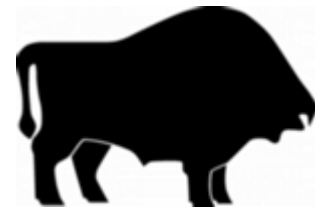
Following this method, the market value of the stock that would die in the event of a massive outbreak of BTV-8 such as the one observed in Belgium in 2006-2007 could reach **£180m**. This mortality would have a knock-on effect on productivity.

4.3.2 Loss in milk production

In 2007, the UK was home to 2.8m dairy cows and heifers. The morbidity rate that prevailed in Belgium during the previous BTV-8 outbreak reached about 7% of national cattle. The potential impact of BTV-8 on milk production has been reported to provoke a drop in milk production up to 5 litres per cow per day¹⁰. This drop takes account of lower milk production and longer calving intervals in affected stock. We know that the small BTV outbreak observed in Germany in 2006 triggered a tiny 0.1% drop in the country's milk production. However a massive outbreak such as

⁹ http://www.defra.gov.uk/esg/work_hm/publications/cs/farmstats_web/2_SURVEY_DATA_SEARCH/COMPLETE_DATASETS/PSM/RegCountUA_06.xls

¹⁰ <http://www.thebeefsite.com/articles/1182/bluetongue-update-disease-continues-to-spread-in-germany>



the one observed in Belgium could easily turn this figure into a 4-5% decrease at the national level.

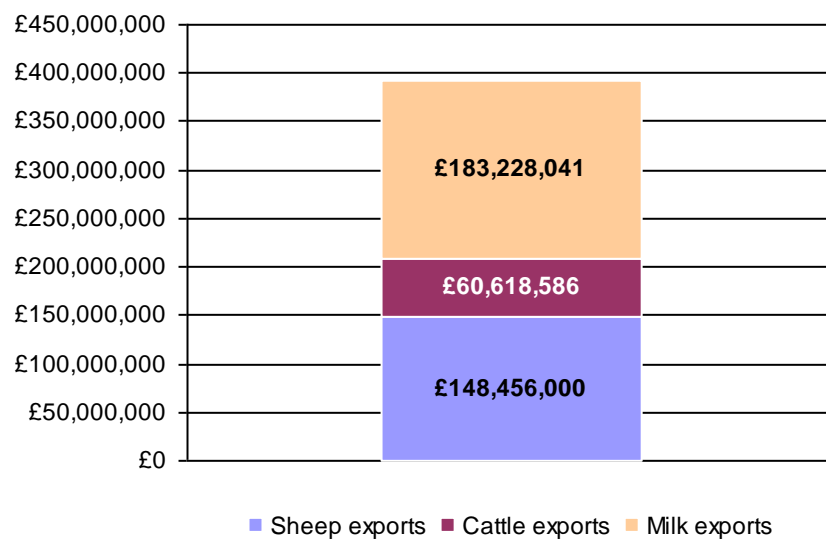
On the basis of those figures, and if we take the January 2008 milk prices of 26p per litre¹¹, the potential impact associated with losses in milk production could well reach **£95m** over a year.

4.3.3 Restrictions on UK agricultural exports

In 2006, according to the 2007 DEFRA statistics, the United Kingdom exported 44,000 tonnes of cattle, 100,000 tonnes of sheep, as well as 627 million litres of milk, to rest of the EU (plus a very tiny proportion of it to rest of the World)¹².

We estimate the value of the UK's exports of cattle in 2006 at £60m, the value of exports of sheep at £150m, and the exports of milk products at £183m, making a total export value of **£393m**.

UK's exports in 2006



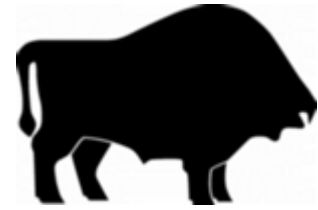
Source: DEFRA

If we assume similar exports restrictions to those applied in Belgium after the BTV outbreak in 2006, ie restrictions on exports of all ruminants and ruminants' meat, the impact could therefore reach **£210m** losses for UK farmers.

A ban on exports of unpasteurised milk could add further negative impacts on the British economy, although data on the proportion of unpasteurised milk in the total milk exports is not available.

¹¹ <http://statistics.defra.gov.uk/esg/statnot/prmlkpn.pdf>

¹² <http://statistics.defra.gov.uk/esg/publications/auk/2006/excel.asp>



4.3.4 Employment impacts

Basing our model on the Input-Output tables published yearly by HM Treasury, we can assess the employment implications of such output losses on the national labour market.

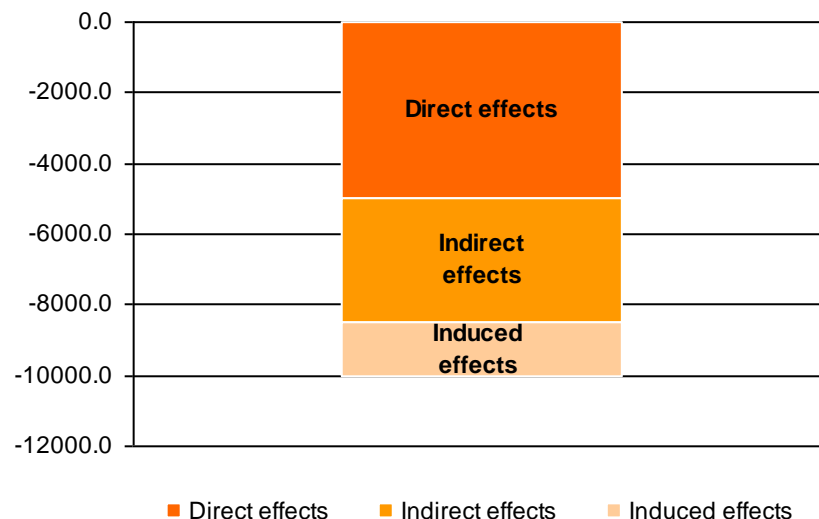
The **direct employment impacts** of such an outbreak, if it was not stopped, would amount to the loss of **5,000 jobs** in the UK Agricultural sector.

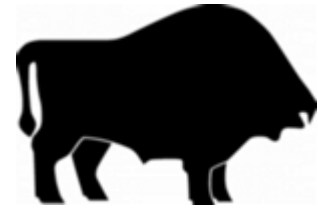
The **indirect employment impacts**, capturing the links between the agricultural activity and the others sectors of the UK economy, would translate into another **3,500 job losses** in the industrial sectors supplying agriculture at the national level in machines, chemical products, animal feeding, etc.

The **induced employment effects**, which are the consequences of the decrease in national consumption, due to the 8,500 job losses mentioned above, and the income losses associated with them, would add another **1,500 job losses** in the UK economy.

The overall employment impacts of such a BTV-8 outbreak in the UK, without the intervention of the IAH and their partners to stop the disease from spreading would therefore represent about **10,000 job losses** throughout the UK economy.

Employment losses from a potential BTV-8 outbreak within the UK economy





5. Summary and Conclusions

While the cost of operating the IAH unit working on the BTV-8 disease amounts to less than £10m, the perceived value of their work, captured through an estimation of the willingness to pay for the services that the IAH provides in terms of research, prevention, training, vaccination and policy recommendations is likely to be at least five times bigger. The perceived value of IAH's work on the bluetongue disease from the British society's viewpoint is **£45m**.

By preventing a major BTV-8 outbreak from affecting the UK's agricultural sector, IAH and its partners contribute to protect British farmers from a potential **£485m** loss in their annual income, as well as to protect **10,000 jobs** throughout the UK's economy that would otherwise be lost.

