



Jonathan Statham
MA VetMB DCHP MRCVS

Jonathan graduated from Cambridge University Veterinary School in 1996. He is a cattle vet and partner in Bishopton Veterinary Group – a 28-vet practice in Ripon, North Yorkshire – and a director and chief executive of RAFT Solutions. He holds the RCVS Diploma in Cattle Health & Production and is a RCVS-recognised specialist in Cattle Health & Production. Jonathan is a past-president of the British Cattle Veterinary Association (BCVA) and is a past director of the Cattle Health Certification Standards (CHeCS). He is also an external examiner for the University of Liverpool, and currently sits on the steering group for the national AgriTech 'Centre for Innovation & Excellence in Livestock' (CIEL). His veterinary interests include reproductive technologies, nutrition, mastitis control and progressive herd health and production management. He has published a wide range of papers, articles and book chapters, and is a co-author of Dairy Herd Health.

Making the cattle farm a fortress – keeping disease at bay

Disease represents a huge cost to the UK cattle industry. In a world market exposed to the harsh economics of market volatility, reducing disease represents an opportunity to remain profitable. Environmental impacts of livestock farming, such as those from greenhouse gases (GHG) are also hugely mitigated by reducing the waste of disease. Methane contributes most to the global warming impact of milk production (52 per cent of the GHG emissions from both developing and developed countries). Disease reduces production of milk or beef and so increases the impact of cattle farming on the environment relative to food output, as well as threatening food security in an increasingly hungry world.

Disease losses are highly significant economically for cattle farming. The two main categories are major single-agent infectious diseases, which may result in losses independently of management or environment; and multifactorial diseases, such as calf pneumonia, that can be controlled to some extent by management changes.

Major single-agent infectious diseases

The major endemic infectious cattle diseases in the UK include:

- bovine viral diarrhoea virus (BVDv)
- infectious bovine rhinotracheitis (IBR)
- leptospirosis (*Leptospira hardjo*)
- Johne's disease
- *Neospora caninum*
- tuberculosis (TB).

These are all included in the Cattle Health Certification Standards (UK) – abbreviated to CHeCS – which is a self-regulatory body for cattle health schemes in the UK (www.checs.co.uk). It is a non-trading organisation established by the British cattle industry for the control and eradication of non-statutory diseases by using a set of standards to which all licensed Cattle Health Schemes must adhere.

It addresses control of BVD, IBR, leptospirosis, Johne's disease and, recently,

Neospora caninum and bovine TB.

Bovine viral diarrhoea virus

BVDv is caused by a pestivirus and has been estimated to cost the UK industry up to £31 million in direct costs. BVD virus is endemic in cattle herds in the UK and Ireland and is a cause of animal health, welfare and economic losses on infected farms. Many UK herds have been infected with BVD virus – or are at constant risk of re-introduction of disease – as the result of unknowingly moving persistently infected animals, infection from neighbouring farms or contact with infected animals at markets and shows.

National eradication schemes are underway in Ireland and Scotland and a national eradication strategy was published in England and Wales in January 2015.

Infectious bovine rhinotracheitis

IBR is caused by bovine herpesvirus-1 (BoHV1). Incursion into a naïve population of adult dairy cows typically leads to a variety of clinical syndromes that may include respiratory, ocular and nervous signs, accompanied by pyrexia, infertility and abortions and an associated sudden decrease in milk yield.

However, in previously exposed groups with

recrudescence of virus from latently infected cattle, or in new infections of naïve animals, BoHV-1 may instead lead to subclinical disease and insidious production losses, rather than overt clinical signs.

The intractable nature of BoHV-1 contributes to potentially serious economic consequences and an adverse impact on animal welfare. Co-ordinated control and trade restrictions have been implemented at a national level in six European countries to make IBR a notifiable disease and to legislate to cull infected cattle from herds.

Based on the presence of specific antibody in bulk milk, the incidence of dairy herds infected endemically with BoHV-1 in England and Wales has seemingly increased in recent decades and completely naïve UK dairy herds are probably uncommon in cattle dense regions. Estimates of the direct costs of IBR to the UK farming industry have been put at up to £4 million per annum.

Leptospirosis

Leptospirosis caused by *Leptospira hardjo* can generate costs through infertility and reduced milk yield. These have been estimated to be in the order of £70 per cow per year or 0.6p per litre (ppl) in chronically infected herds. The seroprevalence in UK

1.0
hours*

*Suggested Personal & Professional Development (PPD)



herds has been estimated at around 50 per cent, although the pathogenicity of different serovars complicates interpretation.

In addition to cattle costs, this disease is a zoonosis and represents a risk to human health.

Johne's disease

This disease is caused by *Mycobacterium avium paratuberculosis* (MAP) and it has been estimated to result in losses of around £17 per cow per annum in the beef sector and relatively greater losses of £26 per cow per annum in the dairy sector.

Herd prevalence of MAP was estimated at around 20 per cent in the dairy herd, but may be much higher. Anecdotal evidence indicates that there is a significant problem in beef herds in the UK, particularly pedigree herds, and this is reflected in problems created by stock bulls developing disease after purchase.

Neospora caninum

Clinical disease caused by the protozoan parasite, *Neospora caninum*, has been estimated to cause 6,000 abortions a year in the UK – 12.5 per cent of total infections and

35 per cent of all abortions. Estimates of national dairy herd seroprevalence vary from around six to 10 per cent.

Tuberculosis

Tuberculosis caused by *Mycobacterium bovis* remains hugely challenging. There has been an overall long-term upward trend in the incidence of TB in cattle herds in Great Britain over the last 20 years; although the incidence rate is lower now than it was at its peak in 2008.

An unusual 'spike' in incidence was observed during most of 2001. This was an anomaly caused by the suspension of TB testing during the foot-and-mouth disease (FMD) outbreak of February to October 2001.

The provisional incidence rate for January to February 2015 was 3.8 per cent compared to 4.1 per cent for January to February 2014. The number of cattle compulsorily slaughtered as reactors or direct contacts was 5,931 during January to February 2015, compared with 5,924 during January to February 2014.

In England, there are wide geographical variations in the

incidence of bovine TB (bTB). This is reflected in the division of the country into three different epidemiological areas, with different disease control strategies herd testing regimens applied in each of them.

In the 'low risk area' of the north, east and south east of England, the incidence of bTB is very low and stable and most cattle herds are tested routinely every four years. As is the case in Scotland, the majority of breakdowns in the low risk area can be linked to movements of undetected infected cattle from other areas of Great Britain.

Multifactorial diseases

The multifactorial or management diseases of note include mastitis, lameness, infertility, calf pneumonia and calf scour. Although less commonly associated with the risks of purchasing or straying stock, they represent significant costs for both the dairy and beef industries.

Mastitis

Clinical mastitis incidence was estimated to be at between 41 and 70 cases/100 cows/year in the UK in 2007. The range in financial losses

caused by clinical mastitis is vast, ranging from less than 0.6ppl to greater than 6ppl. Pathogens such as *Staphylococcus aureus* are principally spread by contagious behaviour at milking time and can be introduced to herds through the purchase of chronically infected, carrier cows.

Lameness

The incidence of lameness in the UK dairy industry has been estimated at around 25 per cent – with the top quartile at 5.8 per cent compared with 50.3 per cent in the bottom sector. Lameness represents lost production through poor reproductive performance and reduced feed intake. Lameness may be caused by claw horn lesions, such as solar ulcer and white line disease; or by infectious causes, such as digital lameness, that may be imported via purchased stock.

Calf pneumonia

The cost of a pneumonia outbreak has been estimated at £30 per calf in dairy herds. The total cost of respiratory disease to the UK cattle industry is estimated at £60 million per annum. Although a complex triangle of immunological and environmental factors are associated with pathogens in causing pneumonia, herds are vulnerable to the entry of a new viral or bacterial pathogen introduced with an incoming animal.

Calf scour

Diarrhoea is the commonest disease in young calves and the greatest single cause of death. It affects over 30 per cent of all calves born alive and causes almost 50 per cent of calf deaths. Calf diarrhoea is one of the costliest diseases affecting suckled calf production – average losses may be in the order of £33 per calf at risk.

As is the case with calf pneumonia, multifactorial causes of calf scour include the risk of purchasing carrier animals.

Transmission routes

Two major factors to consider in the context of disease transmission on cattle farms are purchased stock and boundaries. This means that livestock movements are, therefore, one of the biggest factors in the spread of infectious disease in cattle.

All too often, herd-keepers are unaware of the health status of animals being bought and moved. It is challenging to ensure adequate quarantine periods apply, especially in milking cows; although maiden heifers and beef animals can be more easily tested in quarantine to reduce the risks of introducing disease.

Poorly maintained boundaries, however, can allow animals to introduce disease to a herd, often completely unknown to herd-keepers.

Infectious diseases can be introduced and spread by:

- diseased animals
- animals incubating disease
- apparently healthy animals that have recovered from disease but are now carriers
- vehicles, equipment, clothing and footwear of people such as vets, contractors, other farmers and salesmen, who move between herds
- feedstuffs, especially those which could be contaminated with faeces
- contaminated water – from surface water, streams and rivers
- manure handling, especially by outside contractors
- other species such as dogs, cats, wildlife, rodents, birds and insects.

Prevention

Biosecurity is the means by which the introduction of new



diseases onto a farm from outside sources is reduced or prevented, and is the first line of defence. It includes both purchased stock controls as well as boundary biosecurity and control of other vectors, such as contaminated vehicles or equipment.

Biocontainment measures aim to limit the spread of disease within a herd if biosecurity has been breached and a new disease has been inadvertently introduced onto the property. Careful stock grouping and building construction can reduce the spread of disease after such a breach.

Principles of biosecurity

Control of disease by means of biosecurity involves four major components:

- incoming stock
- isolation
- boundary control
- hygiene.

Incoming stock

Select all necessary purchased animals from 'known' sources that have a health status equal to – or higher than – the existing herd. Always take steps to 'know' the health history of the herds from which cattle are purchased

and the specific health status of animals brought on to the farm. Never bring in animals without knowing their vaccination history.

Do not use hired bulls from other farms, always limit purchases to maiden heifers and bulls, and do not 'impulse buy' animals from unknown sources at market or dispersal sales – they may bring new and devastating disease onto the farm.

Isolation

Implement strict isolation procedures to prevent contact between animals after their arrival on the farm in order to reduce the risk of the spread of infectious agents. If possible, quarantine all new arrivals for at least 30 days.

Cattle must not share common pastures or communal grazing, including adjacent fence lines with each neighbour's cattle.

Boundary control

Boundary control should encompass all vehicular, animal and people traffic that could introduce infection to the farm. It is a wise precaution to record all visitors to the farm – both

human and domestic animals – and to keep cattle separate between neighbouring farms by means of adequate fencing.

Hygiene

This broadly addresses the disinfection of materials, people and equipment entering the farm and the cleanliness of the people and equipment on the premises.

Key hygiene measures aim to prevent manure from contaminating food and feeding equipment by using different equipment to feed and muck out pens, disinfection between use, and by avoiding driving through – or stepping into – feed areas.

Animals should always be transported in spotlessly clean vehicles and loading areas should be sited at the perimeter of the farm. Disease can be spread by manure brought in from other farms, so avoid unloading muck where cattle will graze.

Other steps to maintain biosecurity include maintaining a closed herd wherever possible by using artificial insemination to introduce new inherited traits, and the control of diseases

by vaccination. Genuine team work between farmers and veterinary practices will make steady progress in keeping disease out.

Herd health and production management

Herd health and production management (HHPM) describes a process of:

- measuring – using good record keeping
- managing – through treatment and prevention strategies
- monitoring of health and reproductive performance – to ensure the welfare of animals and support the profitability of the farm business.

A herd health plan (HHP) is a document that describes HHPM (sometimes known as health planning) on a particular farm. The HHPM process should be dynamic and evidence-based, with its primary purpose being to prevent disease and improve animal health and production by introducing long-term strategies focusing on the whole herd.

Biosecurity is central to HHPM – so planning should be designed to reduce the losses from disease and reproductive failure. This can be achieved for diseases caused by a single pathogen by preventing the entry of the infection into the herd and by controlling and eradicating the disease, where present. Reducing the risk of multifactorial diseases may require changes to the management and the environment and the use of vaccines, where appropriate.

Although the component parts are often familiar clinical procedures, genuine HHPM is differentiated by this long-term, ‘whole herd’ approach, and by taking ownership of the process through an effective ‘vet-farmer’ partnership. HHPM offers an opportunity for veterinary practitioners to

engage with their farm clients in a proactive fashion and to deliver genuinely preventive medicine at the hub of the farm team.

Reducing GHG emissions and climate change impacts both offer another key role for herd health. A holistic herd health programme that incorporates biosecurity is likely to have a significant effect on reducing the environmental impact of milk production.

Improving health and fertility to reduce the environmental impact of cattle farming has the substantial advantage that it is also beneficial for cow welfare and farm financial returns – in this respect it is a potential ‘win-win’ situation. This is an area in which the veterinary herd health adviser can – and should – take a lead. ■



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PPD Questions

1. What are the two main types of disease that challenge UK cattle?
2. What are two main routes of cattle disease transmission?
3. How can disease transmission risks be reduced?
4. What are the four main areas of biosecurity?
5. What concept may be applied to limit the impact of disease in a herd once biosecurity has been breached?

- Answers**
1. Single-agent infectious and multifactorial disease
 2. Purchased stock of unknown health status and failure of boundary fencing
 3. By purchasing animals of known health status from known sources
 4. Incoming stock, isolation, boundary control and hygiene
 5. Biocontainment

Useful reading

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