THE MANAGEMENT OF INFECTIOUS DISEASE IN CATTLE HERDS USING RISK MEASUREMENT AND MANAGEMENT

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Introduction: A novel approach to the control and management of infectious disease at the herd level has been devised and made available to cattle farmers and veterinarians throughout the United Kingdom and Ireland. A web based health management programme establishes the risks of disease entering a herd, the risks of disease spreading within the herd, and the presence of active disease within the herd. The programme then helps create a rational and practical decision tree to manage disease in the herd, including control and eradication as well as prevention of disease in herds that are uninfected.

Methods: A system of measurement and management of biosecurity and bio-containment risks in cattle herds has been developed using an interactive web based health management programme called myhealthyherd.com. Veterinary practitioners and their clients have entered herd specific biosecurity risks for over 1500 beef and dairy herds. A mathematical algorithm has been applied to assess the biosecurity and bio-containments risks for major infectious diseases of cattle herds in the UK and Ireland. The results are used by veterinarians as part of the health management plan for the herd.

Risks are measured by farmers completing an on-line questionnaire with or without professional help. Users are asked to answer specific questions by selecting one of three options. The selections are used within a mathematical algorithm where a score and weighting is applied to each factor being considered. This ensures that major risks such as the introduction of cattle into herds are evaluated as a much higher risks compared to such risks as the sharing of equipment or farm workers visiting other farms.

Specific biosecurity risks for specific diseases are also assessed: data has been collected and included into the algorithm for BVD, Leptospirosis, IBR, Johnes disease, Neospora and Tuberculosis. The scores for each disease are matched against a threshold which then applies an indicator of risk, shown as a red, amber or green icon which demonstrates to users the significance of disease risks and engages farmers in risk management as part of disease control.

The specific risks of disease entering a herd are highlighted by the programme, alerting the veterinarian and farmer to biosecurity risks that can then be managed or modified as part of a herd health management programme. The system offers herd specific risks management strategies for the control and prevention of disease, based on the aspirations of the herd and the resources available.

The management of infectious disease at the herd level is based on principles of biosecurity, bio-containment, surveillance and resilience, all of which can be effectively managed together to control disease in infected herds and prevent disease in uninfected herds. The methodology used in the programme steers users towards infectious disease management at the herd level. Once risks of disease entry are established, the other elements of infectious disease control are considered using a logical and practical progression through the programme.

Where herds cannot be effectively secured against the entry of disease, the other elements of disease control are strengthened as part of the overall herd health management plan. For example, effective vaccination programmes can help increase the resilience of animals within the herd to some infectious diseases, thus mitigating any biosecurity risks that cannot be otherwise controlled. Disease surveillance strategies ensure that the disease status of the herd is properly defined and monitored, such that if disease does manage to enter the herd and become established, it is quickly recognised and action can be taken to control it.

Once the disease status of a herd is properly defined by a robust surveillance programme, infected herds can be directed into a disease control and eradication programme that meets the needs and aspirations of the farmer, and uninfected herds can be appropriately protected to prevent infection entering the herd and becoming established. These latter farms can be introduced to disease accreditation schemes so that their stock can be sold at a premium. This approach creates a practical and effective route for any herd of any disease status to follow, enabling the engagement of farmers in infectious disease management at any level.

Results & Discussion: As at 1st August 2010, 1685 cattle farms had assessed biosecurity risks and analysis of the data held on the myhealthyherd database demonstrates that over 75% if cattle herds introduce stock into their herds with little regard to the disease status of the incoming cattle, with 14% introducing cattle that represented more than 5% of their herd each year. This movement of cattle represents a major risk of disease entry into herds, and may have come about due to the need for rapid expansion of cattle herds as a response to economic pressures of livestock production.

Other high risks that are commonplace are insecure farm boundaries, the movement of cattle between multiple holdings, and visitors entering the animal areas without cleansing and disinfection. Many herds exist in areas of high livestock density, with 24.6% of all cattle farms having more than 3 farms with cattle directly bordering their farms, and 61% bordering 1 - 3 farms with cattle.

The programme re-assesses specific risks for common specific diseases, and generates risk reports for seven classical infectious diseases of cattle. Most herds that have submitted reliable data to the system are shown to be at risk of diseases such as Mycobacterium avian paratuberculosis (Johnes Disease) Bovine Viral Diarrhoea (BVD), Infectious Bovine Rhinotracheitis, Neospora, Leptospirosis, Bluetongue and bovine Tuberculosis.

54% of herds have introduced groups of cattle of unknown Johnes disease status into their herds, and 69% have introduced single animals of unknown status, creating a significant risk for the introduction of Johns disease.
32.5% of herds introduce pregnant females from herds of unknown BVD status, and 47% introduce breeding bulls of unknown BVD status, putting their own herds as high risk of introducing the disease.

Only 29% of herds were situated more than 20km from a herd known to be infected with bovine Tuberculosis, and 84% of herds had the potential for badgers to access to feeding areas.

73% of farms had farm dogs which access to the cattle and the areas where they calve and feed, providing a risk for the introduction and spread of Neospora.

23% of herds were grazed with sheep, or within 4 weeks of sheep grazing pastures, and 51% grazed land that allowed the cattle to drink from watercourses that had passed through another livestock farm, posing significant risks for the introduction of leptospirosis as well as other infectious diseases.

Conclusions: Cattle farms in the UK and Ireland have significant biosecurity risks, some of which can be managed at a local level whilst others are an inevitability of geographical factors and modern commercial farming practice. Although some risks are unavoidable within the constraints of commercial farming systems and the resources available on the farm, they need not be a total constraint on the control and prevention of infectious disease. Those cattle farms geographically situated in high livestock dense areas face particular challenges to keep infectious disease out of their herds, but the results show that the biggest risks to biosecurity that exist on UK cattle farms concern the introduction of cattle of unknown disease status. This risk is manageable and controllable for any herd, with careful planning and the implementation of basic, practical and affordable biosecurity management systems.

The presence of biosecurity risks need not be a barrier to infectious disease management and control, as the risks can often be mitigated. For those herds where risks cannot be effectively controlled other elements of infectious disease control can be strengthened to ensure that the overall health of the herd can be properly managed. Disease is not inevitable for any herd.

Those farms that need to introduce cattle into their herds as part of their commercial operations can source cattle of known disease status from accredited herds, or manage introduced cattle of unknown disease status in a way that reduces or eliminates the risk of introducing infection. Such planning requires expert knowledge and understanding of disease dynamics and epidemiology, but strategies for quarantine, testing, and vaccination can reduce the risks of disease entry to very low levels.

Conclusions: This paper demonstrates the high risks of disease entering cattle herds, most of which can be controlled by good infectious disease management as part of the overall herd health plan.

Keywords: Biosecurity, Disease prevention, Infectious disease

References:
