

This technical note should be read in conjunction with TN 521 'Design of cattle farm steadings for maximum biosecurity'.

T502

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- As margins tighten it becomes more important to improve the efficiency of production through the control of infectious disease.
- Herd Biosecurity is the cornerstone of infectious disease control. A proper risk assessment followed by application of a few basic Herd Biosecurity rules will allow farmers to enjoy the improved productivity that will follow improved health.
- Herd Biosecurity and certification of freedom from specific diseases are desirable for those selling breeding cattle to assure clients that they are buying clean stock.
- Attention to detail and vigilance at all times are vital for success. To this end a written plan for the farm drawn up by the farm's veterinary surgeon is an essential requirement.

Introduction

The 2001 outbreak of Foot and Mouth Disease (FMD) was devastating. It dramatically illustrated the role of animal movement in spreading infection. Furthermore, in some cases infection was spread across farm boundaries and was often spread by people and equipment moving between farms. The name given to the strategy to prevent spread of infection in these ways is **Biosecurity**. Application of strict biosecurity and the slaughter of infected animals and those at risk of becoming infected were grimly accepted as essential to eradicate infection and regain freedom from the disease. These fundamental principles of infectious disease control are not new but they have never before been so open to public scrutiny.

There is an opportunity to learn from the FMD outbreak and apply biosecurity principles at the herd level (Herd Biosecurity) to protect against FMD and many other infectious diseases of cattle in the UK. Amongst the other diseases where biosecurity is an essential part of the approach to control are Bovine Virus Diarrhoea (BVD), Infectious Bovine Rhinotracheitis (IBR) (see technical note T496), Johne's disease (see technical note T467), *Leptospira hardjo* and Salmonellosis. These diseases are commonly spread by cattle contact following the introduction of purchased cattle to a herd or by contact with cattle on neighbouring farms at farm boundaries.

These diseases may go unrecognised as major outbreaks are unusual and the losses that commonly occur are insidious such as poorer fertility, higher



Figure 1: Temporary cleansing and disinfection point at farm entrance during FMD 2001. The tractor powers the pressure washer. (Picture courtesy David Logue)

culling rates and wastage of replacement heifers through mortality, infertility and abortion. If left unchecked every year they will significantly reduce the gross margin of the farm enterprise. For these reasons several mainland European countries are eradicating BVD and IBR. Once FMD and Bovine Spongiform Encephalopathy (BSE) are brought under control in this country to the satisfaction of the European Union, BVD and IBR could potentially become a barrier to the individual breeder seeking to export stock.

Most UK cattle farmers take no health precautions either when introducing purchased animals to their herds or at farm boundaries. As a result the last mentioned infectious diseases are very common and are estimated to cost the industry millions of pounds in less efficient production.

Herd biosecurity for cattle

The role of Herd Biosecurity in the control of infectious diseases.

Herd Biosecurity is a barrier that can be erected to prevent infection or re-infection of the herd. Where particular diseases are present in the herd they can then be eradicated within the barrier. If Herd Biosecurity measures are not applied then disease control can only be attempted by vaccination, culling or treatment strategies that may be expensive, and are usually a recurring annual cost. Application of 'General Herd Biosecurity' measures alone will result in a reduction in the introduction of infectious disease to the farm and in small herds may lead to natural elimination of certain diseases. However, there is also the option to target specific diseases and employ strategies (such as blood testing purchased cattle) to further close the door (see Table 1). For those herds selling breeding stock official 'cattle health schemes'

Implementing Herd Biosecurity for Cattle

At the heart of Herd Biosecurity is a system of risk identification and risk management, which will lead to good protection for the herd from infectious disease. **Farmers and their veterinary advisors should assess the risks in the context of the production objectives for the farm and agree a written Herd Biosecurity Plan.** As risks and objectives may change, a regular review is required (at least annually) to modify each programme. Herd Biosecurity is an essential element of preventive veterinary medicine and should be incorporated in the '*Health Plan*' for the farm. Herd Biosecurity can never be absolute, and, although the advice contained in this document is derived from the best technical knowledge available, it does not offer a complete guarantee of prevention of new infection.

Table 1: Summary of the four levels of Herd Biosecurity and infectious disease control: 1 – least, 4 – most.

Strategy	Effect
1) No Herd Biosecurity	Infectious disease common and costly. Control options: vaccination, treatment or culling
2) Herd Biosecurity	General reduction in ingress of infectious disease depending on the extent of measures taken and degree of application.
3) Herd Biosecurity plus targeting of specific diseases.	As 2) plus prevents infection with the disease(s) targeted, which allows their eradication.
4) Cattle Health Scheme (pre-requisites: strict Herd Biosecurity and targeting of specific diseases).	As 3) plus permits structured eradication, monitoring and certification of free status for targeted disease(s).

provide Herd Biosecurity Rules and a testing programme that will lead to certification of disease free status for specific targeted diseases. This option is currently available in the UK for BVD, IBR, *Leptospira hardjo* and Johne's disease through SAC *Premium Cattle Health Scheme*, *Hi-Health* and *Herdcare*. Commercial farms can cost-effectively use 'cattle health schemes' as a means of disease eradication and maintaining freedom from infection. Before considering these additional strategies farmers must find out if their herd is infected or free of the diseases they are interested in. There are well-defined testing strategies for doing this.

General Herd Biosecurity Measures

These are measures applicable to the control of most infectious diseases. They represent good husbandry standards and all farmers conscious of the health of their cattle should consider adoption.

1. Buy in the minimum number of animals possible, preferably none at all. Where it is necessary to acquire stock, including bulls, purchase from herds certified free of specific diseases. Where

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this is not possible the next best option is to acquire homebred cattle directly (i.e. avoiding live markets) from as few farms as possible. It is preferable to transport purchased cattle in the farm's own vehicle, though a reputable haulier should suffice. Vehicles must be thoroughly cleansed and disinfected before use and personnel handling the cattle must take suitable hygiene precautions. The purchased cattle must not be transported with, or contact *en route*, other cattle of unknown health status.

2. Bulls should not be hired under any circumstances. Sharing bulls is likewise a high-risk strategy that can only be considered where bulls are shared between herds of similar proven health status with effective biosecurity in place on both units.
3. All replacement cattle whether purchased from disease-free herds or not, should be quarantined on arrival. Whilst in quarantine they can also undergo laboratory testing for targeted diseases according to the Herd Biosecurity Plan for the farm. During the quarantine period the animals must be inspected regularly for signs of disease.
4. A quarantine period of 28 days suffices for most diseases but where specific diseases are targeted or groups of animals are in quarantine this may need to be extended on veterinary advice.
5. An **isolation facility** is essential for quarantine of incoming animals. This need not be elaborate but must prevent any direct or indirect contact with other stock. A dedicated building separate from other cattle buildings is ideal, but a separate paddock may also suffice. An empty field, river, woods or a road may be sufficient to isolate paddocks from the main herd. No air space, drainage or dung storage should be shared with other cattle. Cattle in the isolation facility should be tended last using dedicated protective clothing for the facility or preferably by someone who has no contact with other cattle. The facility should contain a cleansing and disinfection point.
6. Dung from the isolation facility should not be disposed of onto pasture that is to be grazed by cattle within 12 months. Where a paddock has been used for quarantine, other cattle must

not be allowed to graze it for at least two months where BVD, IBR and *Leptospira hardjo* are targeted. For Johne's disease this period must be extended to 12 months.

7. Pregnant animals or calves aged less than four months (including those at foot) that are positive for antibody to BVD should not be purchased unless there is no possible alternative. In such cases calves may be virus carriers and cannot easily be tested until they are 4 months old. Where such animals are purchased they should be isolated until the calves are aged four months when laboratory testing can begin. The calves and where appropriate their dams should not be released from quarantine until all laboratory tests are clear.
8. Positive test results – if two or more animals are quarantined as a group and one or more of the group give a positive test result, the whole group should be regarded as at risk and kept quarantined and re-tested until the problem is resolved. Where large groups of animals, particularly females intended for breeding, are purchased, veterinary advice should be sought regarding the feasibility of the quarantine and testing procedure since this could be prolonged significantly if positive test results occur.
9. Avoid all contact, either direct or indirect (e.g. dung or urine), with cattle of unknown or infected disease status. **Farm boundaries must prevent cattle straying off or on to the farm and must at minimum prevent nose to nose contact over walls or fences. For BVD and IBR three metre double spaced fencing is the minimum required.**

Three-metre double spaced fencing will significantly reduce but will not necessarily eliminate the risk of spread of BVD or IBR across farm boundaries. Herd health security of double fencing can be enhanced by the following:

- Increasing the gap between the fences (i.e. greater than 3 metres)
- Ensuring that the fences on both sides prevent cattle putting their heads over or through them. This can be achieved by the

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physical nature of the fence and by exceeding a critical height dependent on the breed of cattle. Alternatively the use of a scare wire: a single electric fencing wire either along the top of each fence or set about half a metre back from each fence, is recommended.



Figure 2: This double barrier would benefit from the use of a scare wire

- In certain circumstances on veterinary advice vaccination against BVD or IBR (marker vaccine) may need to be considered in addition to the above.

For maximum herd health security the safest option is not to graze health scheme stock in a field adjacent to stock of unknown or infected health status.

For BVD consideration should be given to not allowing breeding/pregnant females to graze in fields adjacent to stock of unknown or infected health status.

10. Where electric fences are used it is recommended that where possible both sides of the fence have an electric wire to keep cattle off the barrier fence. Consideration should also be given to gates onto roads where cattle being moved on the road may be able to make nose to nose contact with the protected cattle. A double gate or an electric wire across the gap should be used. Where contact has occurred, the cattle must be quarantined for the required period and tested by the appropriate test(s) for any targeted diseases.

11. Taking cattle to shows (or sales) and returning them to the herd is a high-risk action and is best avoided. Where this is not possible keep showing to a minimum and keep show teams in isolation when they return to the farm and throughout the show season. They should undergo quarantine and testing as described above, before re-introduction to the herd. Animals that have not been sold at a sale should return to isolation and be retained there until they are sent to another sale or they have completed the quarantine procedure as above.

12. Limit farm access to only those people deemed essential.

13. Take precautions to avoid the introduction of infection on clothing or footwear (e.g. All technician, vet, foot trimmer or neighbours) or on equipment (e.g. vehicles, crushes or dosing equipment). The safest option is to have dedicated clothing, footwear and equipment for the particular farm. A less secure though acceptable alternative is thorough cleaning and disinfection of clothing, footwear and equipment before use on the farm at risk. Single use disposable overalls and disposable foot covers should be provided for occasional visitors. Particular efforts should be made to clean and disinfect any equipment likely to be contaminated with blood (e.g. hoof knives, instruments for castrating, disbudding or dehorning). Injection equipment should never be shared between farms. Veterinary surgical equipment must not be shared between farms unless it is sterilised before use.

14. Limit and control access of vehicles to the farm, particularly those used for moving cattle. Delivery and pick up points should be at a site isolated from other cattle on the farm, preferably at the margins of the farm boundary. The site should have a concrete ground surface to allow effective cleaning and disinfection. Vehicles must be cleaned and disinfected with an appropriate disinfectant before they are used for moving cattle. Where possible, the driver should remain in his cab and should certainly never assist in removing cattle from pens unless using farm dedicated overalls and footwear.

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Figure 3: Permanent cleansing and disinfection point. The pressure washer is inside the building and the hose is detachable from the wall to protect from weather and theft.

15. Use reputable suppliers for purchased feed and bedding to reduce the risk of introducing infection.
16. Control vermin and prevent access of vermin and wildlife to feed and bedding stores and to the cattle whenever possible. Ideally concentrates should be stored in bird and rodent proof hoppers. Ensure that farm dogs and cats are adequately controlled and wormed.
17. Use piped mains water rather than natural water sources whenever possible. Because there is a risk of cattle becoming infected with diseases such as Salmonella, *Leptospira hardjo* or Johne's disease from watercourses, it is preferable that they do not have access to watercourses that have other cattle or sheep grazing upstream.
18. Embryos and semen should be from donors certified free of infectious disease, particularly IBR and BVD.
19. Sheep can harbour some of the diseases that affect cattle and therefore contact between cattle and sheep should be minimised. This is particularly important at housing when cattle should not share the same building with sheep. Ideally cattle and sheep should not graze together, and for the control of *Leptospira hardjo* where cattle follow sheep onto grazing land, there should be a minimum interval of 2 months. The dung from sheep sheds should not be spread onto fields to be used for cattle.

Specific Herd Biosecurity measures to prevent introduction of targeted infectious diseases

The diseases to target are determined by:

- the financial or practical importance of the disease
- an assessment of the risk of introducing the disease
- the availability of low cost and reliable tests
- whether or not the disease is already present in the herd.

A list of the most important diseases that should be considered in the UK is presented in Table 2 along with a summary of the approach to exclusion for each disease.

If the introduction of specific targeted diseases is to be prevented the Herd Biosecurity measures must be tailored to these diseases. Although most of the security measures required are included in the general section above, different diseases have different routes of spread and extra precautions may be required depending on any disease(s) targeted. For example, airborne spread is much more likely with IBR than Johne's disease. There is therefore a requirement for a minimum of 3 metre spaced double fencing bordering neighbouring farms for IBR but not for Johne's disease. Further instances are highlighted in the general section above. Also different diseases have different quarantine and testing procedures (see Table 3) which should be applied to animals added to the herd or returning from sales or shows.

There are certain diseases that are difficult to exclude by quarantine and testing. This may be due to the biology of the disease or the lack of an effective test to detect carriers e.g. *Leptospira hardjo*, Johne's disease, venereal Campylobacter infection, Salmonella and tuberculosis. Alternatively knowledge of the biology of the disease may be inadequate e.g. *Neospora caninum*.

***Leptospira hardjo* & Johne's disease:** An individual animal carrying either of these diseases can test

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negative. Therefore the safest option is to purchase animals from herds certified free of disease through a health scheme. Where this is not possible the introduced animal should be quarantined and tested (Table 3) and the following additional strategies considered:

Johne's disease: Following introduction to the herd blood test for antibody and culture faeces for the bacterium at least annually. For bulls this is best done a month or so before being joined with cows for mating.

***Leptospira hardjo*:** Under veterinary supervision antibiotic treatment during the quarantine period may reduce the risk of introducing undetected infection.

Venereal *Campylobacter* infection: Laboratory testing of bulls or breeding females for *Campylobacter fetus* is not sufficiently reliable to detect all infected individuals. Where non-virgin bulls have to be purchased they should be treated under veterinary supervision by preputial wash with antibiotic to reduce the risk of introducing *C. fetus*. Females that have been mated naturally cannot be treated and constitute a risk of introducing *C. fetus*. Such animals should not be introduced to the herd unless after their introduction they are **only** bred by artificial insemination for at least 2 years.

Bovine tuberculosis (TB) is becoming increasingly common in South-West England and remains a problem in Ireland. Purchased cattle originating from these areas should be tested for tuberculosis during their quarantine period. This will require permission from the local SEERAD Animal Health Office. However, not all infected animals can be detected by the tuberculin test so a negative test is not a guarantee of freedom from TB.

Salmonella carrier cattle can appear healthy and test negative by faecal culture, particularly those carrying *Salmonella dublin*. Therefore, to reduce the risk of introducing *S. dublin* an adjunct to faecal culture (on 3 occasions at 14 day intervals) is a single blood test for antibody. The safest option is to reject antibody positive animals and view any cattle from the same herd with suspicion.

Neospora caninum infected animals may test antibody negative. Infected animals are most likely to test antibody positive at the end of pregnancy. Therefore antibody positive animals should be excluded, and antibody negative animals should be re-assessed when they calve. Where Neosporosis is targeted, pregnant cattle initially testing negative should be retained in isolation until calving when they can be tested again.

Sound veterinary advice specific for the targeted diseases is an essential requirement for success.

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Table 2: Cattle diseases that should be considered for targeting for Herd Biosecurity and a summary of Herd Biosecurity strategy.

- The disease history and status of the herd of origin and the individual animals in question should always be ascertained and the knowledge gained used to help determine disease risk.
- Inspection of animals, preferably on the farm of origin, before purchase should also be carried out where possible. This is particularly useful to detect skin diseases.
- In all situations (including where animals are acquired from herds certified free of specific diseases) quarantine and observation for disease are essential requirements for General Herd Biosecurity.

Disease	Summary of Herd Biosecurity strategy in order of most reliable option [§]
Most important:	
Bovine virus diarrhoea/ mucosal disease (BVD)	1. Purchase from herds certified free of disease. 2. Quarantine and blood test.
Infectious bovine rhinotracheitis (IBR)	1. Purchase from herds certified free of disease. 2. Quarantine and blood test.
Johne's disease **	1. Purchase from herds certified free of disease. 2. Quarantine, observe and blood and faeces test. If negative repeat blood and faeces tests annually.
<i>Leptospira hardjo</i> *	1. Purchase from herds certified free of disease. 2. Quarantine, blood test and consider treatment.
Salmonella *	1. Quarantine, observe and 3 faeces tests at 14 day intervals. 2. Quarantine & observe.
Tuberculosis *	Tuberculin skin test.
Also important are:	
Digital Dermatitis	Quarantine, observe and consider treatment.
Mastitis	Buy young cows. Individual cow somatic cell count history, California mastitis test, bacteriology. Where status unknown or suspicious, milk after clean cows in herd but before known infected cows until status established.
Neospora	Quarantine and blood test. If negative repeat blood test in last month of pregnancy.
Parasitic diseases (liver fluke*, gut roundworms, lung worm, lice, mites*)	Quarantine, observe and treat. Treatment may not remove all parasites present but should at least significantly reduce their numbers.
Ringworm *	Quarantine, observe and consider vaccination.
Udder skin infections	Quarantine & observe.
Venereal Campylobacter infection	1. Only acquire animals that have not mated naturally. 2. Non-virgin bulls: Quarantine, test and/or treat. 3. Naturally mated females: breed by AI only for at least 2 years.

[§] Seek competent veterinary advice for details

* Zoonotic diseases (i.e. transmissible to humans)

** Johne's disease may be linked to Crohn's Disease in humans

N.B. Quarantine may be difficult for lactating dairy cows unless they can be milked in the isolation facility.

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Table 3: Examples of quarantine and testing procedures for added animals (including those returning from sales or shows).

- For Johne's and *L. hardjo* particularly it should be noted that negative laboratory test results do not necessarily mean an individual animal is uninfected. Acquisition of animals from certified disease free herds is the safest option to prevent introduction of disease.
- Johne's disease and cattle returning from shows or sales: A four-month quarantine period and laboratory testing may not be required in many instances. Seek veterinary advice.

	BVD	IBR	Johne's disease	<i>Leptospira hardjo</i>
Minimum Quarantine Period	4 weeks	4 weeks	4 months (negative faecal culture results take at least 4 months)	4 weeks
On Arrival	Blood sample for antibody & virus	\$\$	Blood sample for antibody & faecal culture	\$\$
28 Days Or More After Arrival	Blood sample for antibody & virus (>21 days after 1st sample)	Blood sample for antibody		Blood sample for antibody
Annually After Joining The Herd (optional for animals returning from shows/sales)		Blood sample for antibody #	Blood sample for antibody & faecal culture	
Definition Of A Reactor	One or more of: 1) virus positive* 2) rise in antibody between tests* 3) antibody positive & pregnant. *	Antibody positive ▲	Antibody or faecal culture positive▲	Antibody positive ▲

■ No action required .

* Take veterinary advice as to how to proceed.

▲ Animal must not enter the herd (in calves where the antibody could be maternal in origin veterinary advice should be sought).

\$\$ There is the option to additionally test animals for antibody to IBR and *L. hardjo* on arrival to allow exclusion of antibody positive animals at an early stage. If animals test antibody negative on arrival **they still require to be tested after 4 weeks in quarantine.**

This may not be necessary if the cattle were acquired from a certified IBR free herd.

Authors:

Mark Crawshaw, George
Caldow, George Gunn,
Sheila Rusbridge