Biosecurity – getting the basics right

The Greek word 'bios' means 'life' and biosecurity is simply 'the security of life' and so, in the poultry context, this means the life of your poultry.

Thus, biosecurity is all about protecting the lives of your birds. In the broad sense, biosecurity can include terminal cleaning programmes, vaccination and strategic medication, for example with anticoccidials.

More specifically, we tend to look upon biosecurity as all that is involved in keeping diseases and the organisms that cause them out of our flocks and this is what this article will mainly focus on.

First of all, we need to appreciate that biosecurity really only applies to the infectious diseases and so biosecurity is not applicable to non-infectious diseases such as rickets, encephalomalacia and ascites. This is because biosecurity focuses very strongly on preventing the causal infectious agents (bacteria, mycoplasma, viruses, fungi and parasites) from entering our flocks and infecting our birds.

The disease process

To do this we need to understand infectious disease and how the micro-organisms actually cause the disease, leave the bird, spread in the environment and then infect other birds.

The first issue we need to address is the concept of infectious dose.

This basically means that it takes more than one micro-organism to infect a bird and cause disease and the actual number required to infect a bird and cause disease can vary. The number of micro-organisms that are needed to infect a bird are known as the infectious dose.

The infectious dose varies between different micro-organisms and different target species (ducks, broilers, layers and turkeys). This is because different species vary in their ability to be infected. In addition, other bird factors can influence the infectious dose required in a particular situation to set up infection.

Age is important. For example turkeys under 10-12 weeks of age are relatively resistant to being infected by Pasteurella multocida, which is the cause of fowl cholera or pasteurellosis, but older birds can succumb much more readily. This will be a consequence of differences in resistance and immunity and size. As far as the latter is concerned size influences the amount of air inhaled per breath and the dynamics of air found in the wind pipe which is, in part, a function of windpipe or tracheal diameter.

A key facet to biosecurity is isolation.

Some diseases require puberty to have occurred. For example, egg peritonitis will not occur in juvenile birds – it will only occur in mature adult females. Thus, in this scenario sex is also a determining or modifying factor. Conversely, yolk sac infection will only occur in chicks with a yolk sac!

Digestive tract factors

Other factors which come into play are those which interact with the defence mechanisms.

For example, things which interfere with acid production and pH in the proventriculus (and crop) can influence the probability of micro-organisms passing through this part of the digestive tract in a viable state.

The pH and microbial floral balance in the intestines can influence the probability of salmonellosis or necrotic enteritis occurring, as can dietary factors such as fibre type and quantity.

When it comes to respiratory disease factors such as air humidity, ammonia concentration and dust levels all come into play.

Ammonia is an interesting phenomenon in this context as it is capable of reducing the efficiency and effectiveness of the tracheal cilia and it has an 'anaesthetising effect' on those key cells in the defence system – the macrophages.

Concurrent disease

Concurrent disease can facilitate infection. For example a concurrent mild infectious bronchitis infection makes it easier for E. coli infection to become established.

In many of these scenarios the complicating factor is partially neutralising the relevant defence mechanism so that a lower dose of the infecting organism is needed to overcome that defence mechanism and set up infection.

Once an infecting micro-organism is in the bird it infects the target organ(s) and goes through a multiplication phase. This phase invariably results in organ damage and this damage is ultimately manifested in the clinical signs of the disease. The resulting much larger population of micro-organisms are then shed from the bird and become available to infect other birds.

Now a very important feature of this whole process is that the micro-organisms are shed from the infected bird for a couple of days before the clinical signs manifest

themselves. Thus, we have a situation that for a couple of days before a bird is clinically ill it will appear to be perfectly fit, but during those few days it will be shedding micro-organisms that we can inadvertently transfer to other houses, farms or flocks!

That is, we can never assume that because a flock looks healthy that it actually is and, more importantly, that it presents no risk to other birds. In other words, a key cornerstone to the philosophy on biosecurity is we must assume that any (or all) flock(s) could be shedding harmful micro-organisms and plan accordingly.

Stop disease entry

Now let us consider a strategy to keep infectious disease out of our flocks. The basic premise on which this is based is to stop disease causing micro-organisms entering the farm.

To do this we need to define a perimeter boundary around our farm – this can be a real boundary, such as a fence, or an imaginary one. Then we need to consider everything that crosses that boundary because these are the things that will transfer disease causing micro-organisms on to the farm and into our birds.

In larger operations we can do this exercise at three levels – those of the complex, the farm and the poultry house.

Needless to say, if we fail to identify something that comes on to our farm then we will be unable to manage it as a risk!

A real need?

Once we have identified what comes on to our farm, we then need to consider whether it really needs to come on to the farm because, if it does not, any risk associated with it will be totally removed.

For example, it is far better to keep a set of tools on the farm than to try and cleanse an engineer's or electrician's tool bag and it is very sensible to have the feed bins by the boundary fence so that lorries do not need to come on to the farm to offload their feed.

Remember lorries have drivers who can so easily walk into a house of birds when looking for someone!

If something has to come on to the farm then we need to consider what procedures we need to put in place to eliminate, or at least, greatly minimise that risk.

Obviously people can shower and change into dedicated clothing that stays on the farm and is chlorinated and pieces of equipment can be cleaned and sanitised or, even, fumigated.

However, for all these processes we need to consider how we know, as managers, that they are always done and done correctly. If there is something we can measure, for example the chlorine level in the water, this gives us another management handle on the procedure.

But, we then need to consider whether this key measurement is always correctly and accurately measured!

Foolproof controls

Our real challenge is to design control procedures that will operate day in, day out throughout the year irrespective of whether or not management is present. To do this we must make procedures simple, effective and foolproof. In addition, they need to be such that they can be easily checked by management.

Let us take as an example brush management. If brushes are taken and used outside the house there is a real danger that their bristles will come into contact with wild bird droppings that will then be conveyed back into the house with potentially disastrous consequences.

So, how as managers do we know that brushes never come out of the house? One approach is to designate a colour to each house and then paint the shaft of each house's brush in that colour and do not paint those brushes that are used outside. Then it is very easy for you to see and know that each brush is exactly where it should be when you do an audit.

Obviously if any coloured brush is outside or, conversely, a non-painted brush is inside a house, something is wrong. Something is also wrong if, for example, the 'blue brush' is in the 'yellow house'!

Needless to say this control approach need not be confined to just the brushes – it can be used for anything which should stay inside a particular house.

Double clothing approach

At breeder level serious consideration should be given to a double clothing approach. By this it is meant than when the worker or visitor enters the site he or she puts on one set of overalls and boots and when they reach the house they are going into they take these off and change into another set of overalls and boots.

This second set of boots and overalls is dedicated to that house and they never leave the house – with the exception of when the overalls go to the on site laundry.

In the entrance area to the lobby a small area just inside the door should be demarcated by a low wall. When entering the house after dipping your boots in the disinfectant foot dip you take off your boots and overalls in this area and leave them there before stepping over the wall.

Once you have crossed the wall you then put on overalls and boots which are dedicated to that house. A similar procedure occurs when leaving the house.

Wild birds can carry poultry diseases so they or their droppings must never get into the poultry house. Keeping wild birds out involves a two stage strategy.

The first stage is to have nothing in the vicinity of the house that could attract wild birds such as spilt feed, fresh water from a dripping tap, roosting places and, in warmer countries, open drains containing stagnant water from which insects are regularly hatching off.

The second stage is to make sure that wild birds can not get into the house. First ensure doors are never left open. For this you should not rely on staff's memory or them reading a reminder notice, it is much better to have doors with self-closing springs.

Then it is important to ensure that there are no holes, for example above or below doors, under the roof sheeting, in the netting or around pipes, for example feed auger pipes through which ingress could occur.

It is prudent to undertake audits solely for this purpose because it is amazing how circumstances change and ingress points appear!

Needless to say, such an audit should also consider ingress points for vermin. Here particular attention should be given to ensuring that bungs in drainage holes that are used when washing down the house are all in place.

Motivation is the key

Irrespective of all the above we have one key aspect of biosecurity to consider and this is our staff and how to keep their attention focused on this key subject that is so critical to the businesses' long term success.

This is best achieved by utilising the proverbial 'carrot' rather than the proverbial 'stick'. Thus, we need to adopt a management approach of working together to try to make things even better rather scolding or reprimanding staff for trivial breeches of biosecurity.

We should do regular biosecurity audits and use these to motivate and not demoralise our staff. ■

- **Perimeter security**
  Check fence is intact and there are no entry points for animals.
  Check procedures for people and vehicles entering site.
- **Wild bird/vermin proofing**
  Check no favourable conditions outside houses.
  Check no ingress points.
  Check control programmes.
- **Feed management**
  Confirm status of supplier.
  Lorry biosecurity.
  On farm bulk bin or bagged feed store biosecurity.
- **Water management**
  Status of supply.
  Chlorination or similar control process.
- **Bedding material**
  Status of supply.|
  Decontamination process.
- **Staff awareness**
  Check staff know about biosecurity, its importance|
  and what they have to do to maintain biosecurity.
- **Equipment management**
  Proper designation, segregation and control of equipment.

Table 1. Key components of the biosecurity audit.