Feed – is it the root of all evil?

When we consider the management of poultry, feed comes very much to the fore in our thinking as the provider of many of the key things needed by our birds. These include protein, energy, minerals, vitamins and the like, that are a prerequisite to successful poultry production be it of poultry meat or table eggs.

However, we tend to overlook the fact that feed can the 'vehicle' by which problems can be introduced into our birds and this is what this article will focus upon

Introducer of problems

Why should feed have such a role as an 'introducer of problems'? The answer lies in the fact that feed, like water and air, enters the body of every bird in the flock many times a day and so, should there be anything deleterious in it in, it will impact on and adversely affect every bird in the flock very quickly.

This is all well and good in theory but what about in practice? In practice the extent to which this introduction occurs is very much dependent upon two factors.

Firstly, is there an adequate concentration or dose of the deleterious factor present and, secondly, is it evenly or homogeneously spread throughout the feed so that all the birds receive it to a similar degree? Obviously if it is not spread evenly (heterogeneously) then some birds could be adversely affected and others not.

Before getting down to specific scenarios let us review this subject in general terms and consider what type of problems can be introduced into our birds via the feed.

Mineral deficiencies

There are the normal constituents of the feed and if these are present at the wrong level these can adversely affect the birds.

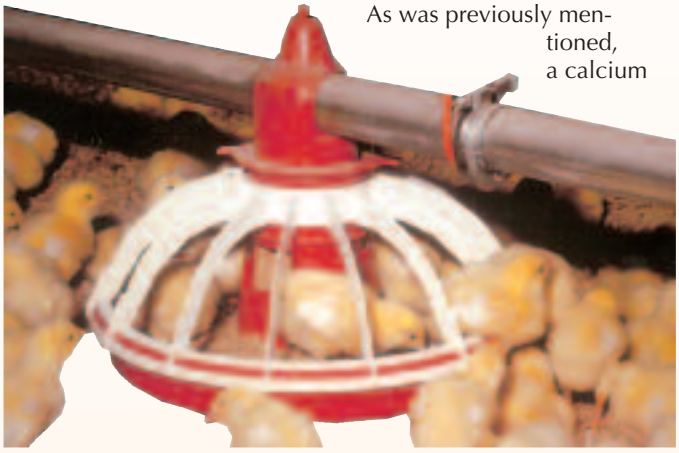
Good examples of this include salt, which in excess can cause serious scour, calcium, which if deficient can induce rickets and vitamin E whose deficiency is associated with avian encephalomalacia, which is also known as 'crazy chick disease'.

Then there are those substances which should not be present and good examples of these are the heavy metals such as lead, pesticides and mycotoxins such as aflatoxin and ochratoxin. Finally, the feed can introduce infectious disease agents into a flock.

Yes, feed can in theory be a fomite (inanimate carrier) for any disease causing agent but in practice we are mainly talking about salmonella.

Let us start by considering natural components of the feed which can be present in excess. The one commonly associated with problems is salt. If excess salt is consumed excessive drinking is induced and, as the extra water can not be retained in the body, it comes out of the other end as a scour. If a sudden vicious scour occurs shortly after the introduction of a new batch of feed this possibility is always worth considering.

In severe cases you can literally see the birds crowding the drinkers to drinker and at the same time scouring! Needless to say, water consumption (or more accurately usage) figures go through the roof.



Digestive tract upsets

Excess protein in the diet can result in a feed which is 'too rich' for the birds and this can induce a digestive tract upset. In some scenarios excess energy is bad news. This is because excess energy is laid down by the bird as fat reserves. Excess fat can be undesirable for a bird that is coming into lay.

Generally excess minerals are not usually a problem in that the bird absorbs that which it requires and the excess passes through the digestive tract and is voided in the faeces.

Thus, such minerals are of little consequence for the birds themselves but we should remember that they may have an adverse environmental impact. Excess calcium in a feed can sometimes depress feed intake.

The converse scenario, namely a deficiency of a key ingredient, is often of much more significance to the bird. Depressed energy and protein intakes depress growth and performance and, in the case of the latter, can impact on the bird's ability to counter disease and infections.

Low sodium and chloride (salt) intake can adversely affect acid base balance and this in turn can impact on key bodily functions like bone formation.

Deficiencies of the sulphur containing amino acids like methionine can adversely affect growth and feather formation.

As was previously mentioned, a calcium deficiency can induce rickets. However, this is not a simple aetiology in that phosphorus and vitamin D3 also come into the equation and rickets can be because of an absolute deficiency of any of these or as a result of a relative deficiency of one of them.

Crazy chick disease

Vitamin E and selenium deficiencies are implicated in crazy chick disease and a deficiency of vitamin K is often associated with poor blood clotting and excess haemorrhaging.

There are numerous deficiency entities associated with the B vitamins. The best know one is probably curled toe paralysis. Biotin deficiency is associated with pododermatitis in young birds, especially, turkey poults.

Many of the minerals have key roles to play in cellular physiology and, although very small amounts are needed, shortages can occur and these tend to be

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reflected as 'poor performance'.

Then we must consider the drugs that can be added to feed. If, for example, an anticoccidial is present at an inadequate level it is reasonable to expect to see coccidiosis. Conversely, drugs that are present in excess can have detrimental effects and good examples of these include the sulphonamides and the nitrofurans.

It should also be remembered that certain drug combinations are undesirable and the classic example of this is the anti-mycoplasmal antibiotic, tiamulin, and one of the monovalent ionophorous anticoccidials such as narasin, monensin or salinomycin.

These anticoccidials are given to the birds via their feed.

It should always be remembered that substances can get into the feed that should not be there.

A good example of this is the mycotoxins or fungal waste products. These products are produced by fungi and they can contaminate a particular ingredient, such as maize. During their growth and multiplication they produce waste products known as mycotoxins and some of these can be quite harmful to the birds.

For example aflatoxin which is a mycotoxin produced by Aspergillus fumigatus can severely damage the liver and can adversely affect the immune system.

However, it should be noted that the fungal contamination can die off but the mycotoxin will remain and persist. This being the case, we can not do a simple mould (or fungal) count and say that because the feed is free of fungi it is free of mycotoxins!

Other deleterious substances that can get into feed include organophosphorus compounds, the biphenyls, pesticides, heavy metals and many more. Invariable their inclusion is a consequence of a human error!

Finally, we need to consider feed as the vehicle that brings an infectious agent into our flock.

Obviously if feed is mishandled then virtually any disease causing agent can contaminate the feed and be introduced into our flock via the feed. A good example of how this can happen is if the feed lorry is also used to ship used poultry litter.

However, the main micro-organism that we associate with feed is salmonella.

This can have entered the feed via a contaminated ingredient or the finished feed can be contaminated by mouse, rat, lizard or wild bird droppings. Be careful not to use cats to control your vermin because they can carry salmonella and also produce faeces!

Salmonella success story

In recent years a lot has been done to remove salmonella from poultry feeds but this will not be considered on this occasion. Let us now consider the subject of how feed can adversely affect poultry in its totality. We have an excellent situation for using the risk management system known as HACCP. Many leading poultry feeds do just that.

However, there are a couple of words of warning. HACCP is not the be all and end all of risk management.

First and foremost, HACCP is not an all encompassing system – for it to manage a risk that risk must first be identified and then the controls for its management must be incorporated into the HACCP. Thus, if you fail to identify a risk your HACCP will not protect you against it and if your control measures are inadequate then your HACCP will be similarly inadequate! Finally, remember that your HACCP is only as good as what you put into it and it is only as good as the people who have to operate it! HACCP will not protect you against the risk that we fail to anticipate and there have been very good examples of this in recent years such as organophosphorus compounds in British pig feeds and biphenyls in Belgian poultry and animal feeds. ■