Current chick health issues and future performance

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The first 7-10 days of life for a bird are crucial to its future performance, whether it is being reared for meat or egg production.

Flocks, which are uniform in size and rate of growth, are much easier to manage and tend to have fewer problems in terms of mortality issues in later life.

The much improved performance in recent years, especially of broiler birds, has made the length of the fattening period shorter with a corresponding improvement in the efficiency of feed conversion.

This can only happen if the base of the growth pyramid is sound and healthy chicks hatch with a good initial body weight. Various factors make the first week crucial for the bird.

Immediately after hatching, a number of changes occur in the bird.

Post hatching, approximately 20% of the chick's bodyweight consists of yolk material.

Though the yolk provides the chick with sufficient nutrients for the first few days of life, the chick has to change from yolk absorption to the digestion of solid feed.

Furthermore, the digestive organs and the liver develop quickly in the first few weeks of life, followed by the muscular and skeletal tissues.

At hatching the intestine is virtually sterile and has to acquire its own native microflora.

Pathogens pose a major challenge as they multiply at a much faster rate compared to normal microflora.

The immune organs are slower to develop and are reliant on the intake of nutrients and vitamins.

All of these factors make the first week of life crucial to the future development and performance of the bird.

When does a chick become an adult bird?

For the sake of this article, I am going to consider the health of birds, including broilers, turkeys, and ducks, for the first 10 days of age.

The various causes of poor performance and mortality will be examined in all of these species, concentrating on problems,

Pasted vents caused by high brooding temperatures.

which have been more common in our practice in recent months.

These causes can be simply divided into the following three areas:

- Management causes.
- Nutritional causes.
- Infectious causes.

The various management causes can include the following:

Brooding temperatures

We are trying to grow increasing numbers of birds in controlled environments.

Unless we control those environments very carefully, the birds could become liable to stress because of variation in temperature and air flow within different parts of the houses.

In larger houses, it is very difficult, even with very sophisticated control systems, to maintain a uniform environment. High brooding temperature causes:

- Dehydration. The bodies of young chicks contain 70% water. Continuous high temperatures causes loss of water from the body. When fluid loss reaches 10%, mortality will follow.
- Pasting. High brooding temperatures cause faeces to accumulate around the vent, causing blockage and death.

Low brooding temperature causes:

- Chilling. Leading to secondary infections with bacteria or respiratory viruses.
- Smothering. At low temperatures, chicks huddle together to maintain body temperature. This can result in smothering and death.

Transport

If conditions within the transport lorry from the hatchery are not carefully controlled, then early losses due to chilling, smothering in boxes or dehydration will be made worse.

The use of electrolytes before and immediately after transport can prevent these problems.

Starve-outs

Small chicks which die during the first 3-5 days of life and are shown not to have eaten any food material and which do not have any signs of infection can be considered to be starve-outs.

We would normally expect a maximum of 1% of these in a flock during the first seven days of life. Levels above this may be caused by a number of factors as discussed above.

Bedding materials

These can play a vital role in maintaining a good temperature within all parts of the house. They should be absorbent if fluids are building up.

There should be a minimum depth of litter (most growers like at least 60mm depth). Sawdust and very fine litter materials can result in choking from dust particles or increase the likelihood of the chicks eating the material and choking or getting gizzard impactions.

Shavings are the commonest bedding material. They are fairly cheap and very absorbent.

Chopped newspaper can also be used but it can be damp and cold and is not very absorbent.

A recent development has been the use of chopped chipboard (not formulated with formaldehyde), which does show promise.

Straw is still commonly used, especially in turkeys and ducks, however levels of fungal spores such as Aspergillus fumigatus can be quite high leading to disease issues. These problems can be prevented by ensuring that the brooding house is set up properly at least 24 hours before placement.

The use of thermometers throughout the house can be very helpful in maintaining a constant house temperature where whole-house brooding is employed.

A good way to reduce smothering is to prevent the accumulation of birds in the corners of the houses by using quarter circles of cardboard.

Humidity

High relative humidity in a brooding house causes damp to increase in the litter material. This can then lead to chilling of birds and also the build up of micro-organisms within the litter.

These can potentially lead to health issues in young birds. Low relative humidity can lead to drying of the airway in the young bird and a susceptibility to respiratory viruses such as infectious bronchitis and avian rhinotracheitis.

Stocking density

Inadequate stocking density can be just as much of an issue in

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terms of temperature maintenance in a brooding house as too many birds per unit area.

However, overcrowding causes excessive dampness in the litter to build up.

This can then lead to the multiplication of micro-organisms and the rapid increase in numbers of coccidial oocysts. Inadequate feeder and watering space in a house will lead to competition among chicks and potentially starvation, dehydration and death.

Water systems

Water plays a vital and often under-estimated role in maintaining the health and performance of young birds.

Apart from acting as a medium for supplying nutrients, minerals and vitamins, it also helps to maintain body temperature during hot weather.

Unfortunately, the water system can act as a host for the multiplication of unwanted micro-organisms, which do affect the young bird.

A microscopic framework of salts and polysaccharides known as biofilm can attach onto the inner surface of smaller bore pipes. Although harmless in itself, it can act as a shelter for bacteria and viruses. Pseudomonads and coliforms have been implicated in cases of higher chick mortality.

We regard the presence of any pseudomonad organisms in the water going into chicks as potentially a threat to those birds.

Total viable counts (TVC) of greater than 1000 cfu/ml would also indicate that the water is contaminated and needs to be sanitised.

Suitable products to sanitise the water include organic acids (for example Selko pH) and hydrogen peroxide products (for example CID 2000 and Aquaclean).

These should normally be applied to the water system at the recommended concentration during clean out and left for up to 24 hours.

The system can then be flushed to remove biofilm and refilled with clean water. It is also possible to use the sanitising product at a reduced dose for the first few weeks of life.

However, care should be taken when applying live vaccines as these can be killed by sanitising products. Removal of sanitisers 24 hours before vaccine administration should be sufficient to avoid this occurrence.

Use of sanitisers after 21 days of age are probably of limited use as the flow of water is such that bacteria tend to be flushed out of the system anyway. The economics of administering water sanitisers at higher flow rates is also questionable.

The interrupted use of these products can also cause problems in heavily contaminated systems because of blockages within the system especially at the level of the nipple drinkers with loose biofilm. In this situation, it is probably better to use these products continuously for a number of weeks.

Table 1. Signs of vitamin and mineral deficiencies during embryo development and the early life of the chick.

VITAMIN	SIGNS OF DEFICIENCY
Vitamin A	Reduced growth, rough plumage, incoordination, hyperkeratosis of the mucous membranes of mouth and oesophagus.
Vitamin B1 (Riboflavin)	Clubbed down, curly toe paralysis.
Vitamin B5 (Pantothenic acid)	Reduced growth, poor feather development, crusts at corners of beak and eye.
Folic acid	Poor appetite and growth, anaemia, poor growth and development of long bones leading to shortened tibiotarsal bones and enlarged hock joints.
Vitamin B12	Poor hatchability, poor feathering, retarded growth, fatty heart, liver and kidneys.
Vitamin D3	Rickets in long bones and enlarged head of ribs at costochondral junctions, leg weakness and soft claws and beak.
Vitamin E	Central nervous system disturbances, muscle weaknesses and subcutaneous oedema.
MINERALS	
Calcium/phosphorus	Dietary deficiency of these minerals can lead to rickets in young birds. Signs can be similar to those of vitamin D3 deficiency.

A poort start stays with the bird for life.

Nutritional causes

Deficiencies of certain key vitamins during the development of the embryo and the early life of the chick can lead to problems and these are detailed in Table 1.

Infectious causes

Infectious causes can include the following:

● **Yolk sac infection (mushy chick disease).**
This is one of the commonest causes of high levels of mortality in chicks of all types. Generally the chicks start well, however, levels of mortality start to rise from 24 hours of age onwards.

These peak at 3-4 days of age and then start to fall back to normal levels by 5-7 days of age. Mortal-ity levels of between 5 and 10% are very common.

Examination of the chick shows a distended abdomen, usually with discolouration around the navel, an inflamed yolk sac with distended blood vessels and a very offensive odour. This is usually diagnostic in itself.

The lungs are usually congested and the liver and kidneys dark and swollen.

The yolk itself may be yellow and inspissated or brown and watery. Sometimes brown fluid is present throughout the body cavity because of rupture of the yolk sac itself.

A secondary peritonitis and septicaemia with liver discolouration then follows. Bacteria are responsible for the signs described above and can be cultured from the liver or direct from the yolk sac.

These include E. coli (the commonest by far), pseudomonas, klebsiella, Bacillus cereus and staphylococci.

The reasons for this disease tend to be breeder flock and hatchery related. Poor breeder flock management can lead to dirty eggs being collected. It is possible for bacteria to enter the egg through the shell as the eggs cool following laying.

Obviously, the more dirt that is present on the egg shell at laying will increase the possibility of contamination within the egg developing. Accumulation of gas from high levels of bacteria within the egg during incubation can lead to the explosion of eggs (poppers) within the machine.

This then leads to contamination of the remaining eggs and equipment at hatching.

Poor hygiene within the hatchery involving contamination of equipment such as setters and hatchers can lead to infection entering the incompletely closed navel of the newly hatched chick.

E. coli multiply rapidly in the intestines of the newly hatched chicks and infection spreads rapidly from chick to chick in the hatchery and brooding houses.

Close contact during transport in chick boxes can speed up this process. An environment, which is low in humidity, can be associated with a high incidence of yolk sac infection.

Hygiene conditions in game bird breeding and hatching can be poorer than in more intensive poultry operations in the UK

The laying of eggs in breeder pens outdoors during bad weather (common in the UK!) can be responsible for high levels of contamination of eggs collected. This is made worse if incubation equipment is not kept

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very clean. This can lead to some unacceptably high levels of yolk sac infections in game bird chicks.

Unfortunately, levels of 10-15% mortality, up to 14 days of age, is not uncommon in some game rearing sites.

The use of antibiotics in affected flocks can be beneficial once the appropriate sensitivity pattern has been ascertained. Usually a three to five day course of water based medication is used.

Although affected chicks will usually die anyway, it can be beneficial to treat the remaining birds to limit the spread of infection. Infected birds can release large amounts of bacteria into the house very quickly. It is important to cull affected and smaller birds at once.

One of the consequences of yolk sac infections in a flock is the subsequent development of variable sizes of the remaining chicks. This is often visible to the end of the flock and causes problems at the processing factory. Good culling will help to minimise this.

The use of prophylactic antibiotics has been employed in the UK broiler industry for a number of recent years. This has been in response to variable chick quality from some producers.

Variability often has its origins in the first week.

These are usually administered via the water for the first few days of life, however some have been used in the starter diet.

The advantage of water based medication is the quick response to infection with generally higher serum levels of the antibiotic used.

There is also a lobby within the UK supermarkets to reduce the amounts of in-feed antibiotic used in recent years.

Products, which have been very successfully used include Lincospectin and Apramycin.

The use of enrofloxacin is generally discouraged by supermarkets in the UK even in chicks, because of the risk of antibiotic resistance.

● **Aspergillosis.**
This disease is one of the few diseases caused by fungus, in this case usually by Aspergillus fumigatus. This fungus occurs quite widely in the countryside and therefore birds are commonly exposed to it.

Clinical signs in chicks are pronounced gasping with their mouths open.

Post mortem findings reveal yellow/green plaques and nodules within the lung itself, on the surface of air sacs and also within the bronchus and trachea.

These signs can be confused with a general air sacculitis, however culture in the laboratory will confirm the diagnosis. The fungus needs moist conditions in which to thrive, usually greater than 20% moisture. It can be common if breeders are kept on damp litter or where there is damp, dirty litter in the nests.

The fungus can be transmitted on the surface of eggs to the hatchery quite readily. If the organism is not killed by the fumigation process, very high levels of mortality can be seen in the hatching chicks.

Levels up to 50% mortality are not uncommon.

It is also common to see problems developing from contaminated bedding, usually straw although shavings can be affected. Ducks, which tend to be bedded on straw, are especially susceptible to aspergillus infection. We see mortality in young chicks as well as older birds.

Unfortunately, there is no treatment for these infections and control rests with improving the bedding quality of both young birds and breeders. Hygiene should also be strengthened at the hatchery in the face of suspected transmission via the egg.

● **Streptococcus bovis.**
This bacterium has become more common in infections of young

ducks, often causing an increase in mortality between 7-10 days of age.

Post mortem findings are variable but include an enlarged spleen, which is usually mottled in appearance and an enlarged liver. Diagnosis is confirmed by culture methods. Treatment with amoxycillin is usually very effective in settling down any increased levels of mortality.

Poor standards of hygiene can explain outbreaks of Strep. bovis infection, including contamination of the water system by this organism.

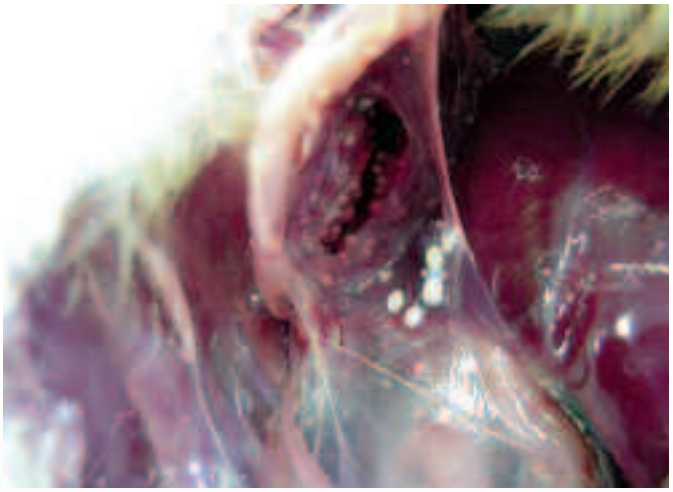
Improved standards of terminal cleanout and disinfection will usually help to eradicate this problem.

● **Salmonella.**
Because of stringent testing of flocks under the Poultry Health Scheme for Salmonella pullorum, this disease has been eradicated from commercial poultry flocks in the UK.

Similarly, awareness of salmonella pathogenesis in chickens, turkeys and other species, and the inter-relationship with human disease, has meant that clinical disease in young chicks is not very common.

Vaccination of parent broiler flocks and commercial egg laying flocks with either live or inactivated vaccines in recent years, has led to a dramatic reduction in levels of certain salmonellas in table eggs and broiler meat.

● **Respiratory viral diseases.**
The combination of respiratory viral diseases such as infectious bronchitis virus or avian rhinotracheitis virus with secondary bacterial invaders such as E. coli can have devastating effects on young chicks including broilers and turkeys. Ducks do not seem to be susceptible to these particular viral challenges.



Air sac and lung lesions of aspergillosis.

Clinical signs include a pronounced 'snick' heard within the poultry house, especially when the lights are off and other noise is reduced.

Individual birds are seen to shake their heads and as the disease progresses, eye watering and nasal discharge can be found.

At that stage the secondary bacterial invaders will tend to have a profound effect on mortality, which can rise to quite high levels.

Post mortem signs include a tracheal discharge with inflammation of the airway and a definite air sacculitis, which can be quite advanced.

Secondary E. coli infections will cause the classical signs of pericarditis and peri-hepatitis.

Treatment of advanced cases complicated by secondary invaders can be successful involving appropriate strategic use of water soluble antibiotics following sensitivity testing.

However, the viral infection itself must be left to run its course, and for birds to develop natural immunity.

These infections can cause quite dramatic stunting of growth and poor performance of the crop.

For this reason, routine vaccination of both parent stock and day-old chicks is routinely carried out in most broiler and turkey companies.

The use of spray cabinets to maximise the uptake of vaccine in a controlled way has greatly improved the protection now given to young birds.

The introduction of combined vaccines at the day old stage has also removed the need for vaccination on farm in some cases.

However, recent work by Jane Cook has shown that a combination of Masachussetts strain of IB vaccine given at the hatchery followed by a variant vaccine given 7-10 days later on farm probably gives the best cross protection against different IB variant strains.

The control of infectious bronchitis continues to be a problem to the UK broiler producer.

Avian rhinotracheitis (ART) is also best controlled by vaccination at the turkey hatchery in the UK.

A combination of type A and type B virus vaccines can be given together and appears to give reasonable protection against this difficult disease.

However, we still see problems with ART between 3-10 weeks of age despite this vaccination programme. The problems appear in a cyclical pattern, although bad weather during the winter months does appear to exacerbate the condition.

● **Chick oedema.**
This condition has appeared in one integrated company in the UK during 2004.

Mortality has risen at the hatchery and during the first few days of life.

Post mortem examination of the birds reveals an accumulation of subcutaneous oedema as well as an increased amount of fluid in the peritoneal cavity. Lung oedema is also present although there is no sign of heart failure.

An increased length of egg storage time during hot weather during the summer months was thought to be initially responsible although this problem has remained since then. ■