

Detecting health problems early through effective monitoring

Broiler breeders are the foundation for meat production birds, and due to their capacity for laying and the value of their progeny, they are estimated at being worth USD\$5.50 or more each during peak production (23-32 weeks of age; Virginia Tech, USA, 2009).

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The health of the flock is important, as this dictates how well the birds lay, as well as controlling transmission of disease to their progeny. In practice, breeder farms have strict biosecurity systems in place, which extend to any personnel on-site, whereby visitors have to shower and change clothing before entry.

Faecal samples to show absence of major disease-causing bacteria, such as salmonella and campylobac-



ter, may also be requested in advance of the visit.

Such measures are in place to limit any exposure of the birds to potential pathogenic threats that could risk the health and productivity of the breeder flock and cause contamination of eggs produced for hatching.

The continuous screening and monitoring of breeder flocks for health purposes is a measure required in order to determine any exposure to disease and to isolate and treat affected birds immediately.

The front-line defence to achieve this is typically vaccination. Once vaccination has been administered, the site of injection should be monitored a week after application to ensure a reaction has occurred.

According to guidelines issued by breeder companies, regular audits of vaccine programmes and their administration and responses are required to maintain success rates.

Feeding strategies

There are feeding strategies, which can be used to improve the success of vaccination. The specialist mannan-rich fraction (MRF), Actigen (Alltech), has been shown to influence immunoglobulin production and hence improve vaccine uptake in young birds. This is due to its ability to prime the immune system due to its 'presenting' ability of potential pathogens via sampling cells within the gut wall.

Trials in Romania examining Newcastle disease vaccination showed a significant increase in titre in 21- and 49-day-old birds (Table 1)

Table 1. Impact of feeding specialised yeast cell wall materials on the efficacy of Newcastle disease vaccination in poultry.

Treatment	Titre 21 days	Titre 48 days
Control	59.6 ^a	218.9 ^a
Yeast cell wall preparation (1kg/t)	76.4 ^b	404.0 ^b
P Value	0.044	0.009

^{a,b} means with different superscripts are significantly different

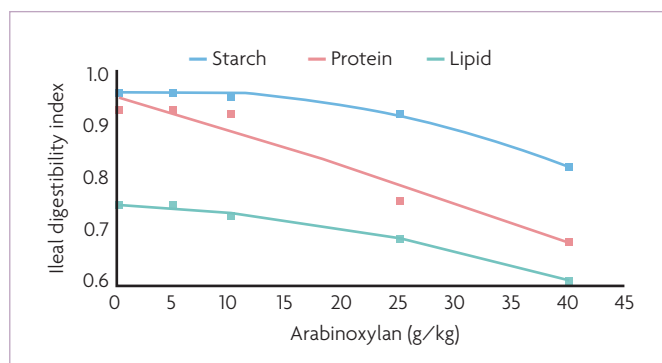


Fig. 1. Influence of ANFs on digestibility in poultry (Annison and Choct, 1994).

when analysed by IHA-ND methods.

Research conducted in 2002 by Shashidhara and Devegowda examined the impact of vaccination against infectious bursal disease and showed that birds receiving such yeast cell wall products had significantly higher antibody titres for both caged and deep litter kept breeder hens.

As vaccination represents a major cost and its effectiveness is important in expensive breeder flocks, supplementing diets with these types of zootechnical ingredients is a useful strategy.

Geliot (1998) showed an 8-10% improvement in antibody titre against infectious bursitis in broilers, which resulted in a 25% reduction in medication costs in the hatchery and a 69% reduction in medication costs in the resulting broiler flock.

MRF has the added benefit of preventing pathogenic colonisation of the gut by undesirable bacteria. This is achieved by their ability to bind fimbriae present on the surface of

common disease organisms, which disables the ability of bacteria to attach to the gut wall.

Sub-clinical disease

Control of disease at a sub-clinical level is important, especially in longer-lived animals such as breeders, in which health status of the flock and progeny are of paramount importance.

Much time and money has been spent within the industry to control the transfer of potential bacterial pathogens from breeders to their eggs and progeny.

When monitored on farms, the percentage of birds testing positive for Salmonella spp. presence in digesta sampled from the caeca decreased from 80% to 40% at seven days old, which was reduced to zero at 40 days of age when birds were fed diets supplemented with MRF.

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Table 2. Anti-nutritional factors and digestibility values for common protein feed ingredients used in poultry diets.

Protein seed meal	Crude protein (%)	Protein digestibility (%)	Arabinoxylan (rel. to SBM %)	ANFs
Soyabean	48	85	0	Lectins
Sunflower	35	78	+17	Tannins
Rapeseed	37	72	+30	Pectins
Peas	20	77	+37	Cell wall

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Such reductions are important in preventing the transmission from parent stock to progeny and, hence, for human health within the food chain.

Research conducted on how probiotics with binding activities can promote health in breeder flocks has been published. Sub-clinical gut disease affects breeder performance significantly, causing losses in eggs laid (seven less eggs between 30-50 weeks of age), causing a drop in percentage lay from 73% down to 68%.

The ability of a breeder hen to produce sufficient numbers of fertile eggs is fundamental to the success of the business.

The same is true for males, which must maintain good fertility. Certain issues regarding the health of both male and female breeding birds are not always immediately apparent, although feeding strategies can be put in place to ensure they do not become a problem.

As hens age, the number of eggs they are able to produce declines and these eggs have lower rates of fertility and hatchability. They may also lose some ability to retain sperm, exacerbating fertility problems.

Research into feeding specialist antioxidant products, especially the organic form of the mineral selenium (Se), have been carried out to evaluate its impact on fertility, especially in older breeder birds.

Organic selenium

In trials on breeding male broilers, feeding organic selenium (Sel-Plex, Alltech) has been shown to increase semen volume significantly at 36 weeks of age, an advantage that remained until 56 weeks old. Sperm concentration was increased from 4.1-4.8 billion sperm/ml.

For hens studied in the trial, supplementing with additional inorganic Se did not affect the number of fertile eggs (168.5 versus 168.6, respectively); however, feeding organic Se increased this parameter to 174.2 settable eggs.

In hens aged 49 weeks or older, feeding organic Se reduced the amount of unsetting (unfertile) eggs from 3.3% in the control and 1.7% for hens receiving inorganic Se down to 0.9% ($P < 0.05$).

Overall, egg production increased from 60% for the control, 61% for the inorganic Se group and up to 68% for those receiving organic Se.

When hatchability was analysed, feeding extra Se increased success rates for hatch from 77.9% up to 83.5%, and the number of unfertile eggs was reduced to levels of less than 10%. It is normal to lose a number of hens during production as they age.

In Renema's work, after 49 weeks, the control group lost 13% of the hens housed, those fed inorganic Se lost 10% but the organic Se fed hens had no loss in hen numbers in production.

From the 36- to 56-week age period, those fed organic Se showed significantly less reduction in shell weight, which is typically seen in eggs from ageing hens.

Preventing common digestive disorders and diseases are important to maintain nutrient availability in broiler breeders, especially in the lead up to breeding and egg production, when tissue reserves must be maximised in readiness for meeting higher requirements.

If nutrients are lacking due to problems at a gut level, whereby digestibility is compromised and disease-causing organisms may be encouraged to colonise, then production and animal welfare can be compromised.

Necrotic enteritis

Many diseases and problems associated with nutrient availability are due to poorly-digested feed ingredients, which can increase the opportunity for certain pathogens to increase to disease causing levels, exuding toxins that can lead to diarrhoea and reduced nutrient absorption.

One example of this is necrotic enteritis, which is initiated by coccidiosis infections and then facilitated by overgrowth of *Clostridium perfringens*, which thrives especially in digesta containing high levels of undigested protein.

The *Eimeria* spp. that causes coccidiosis are ubiquitous and difficult to eradicate from poultry housing. Breeder company guidelines recommend that an effective coccidiosis control is put in place during rearing to prevent such problems. However, using suitable feed enzymes is important to ensure efficient digestion and absorption of nutrients as well as helping to prevent by-pass nutrients entering areas of the gut, where they can promote the growth of undesirable disease-causing bacteria.

Taking the above example of protein, commonly used protein meals for poultry diets have digestibility problems associated with anti-nutritional factors (ANF; Table 2).

Classic experiments, such as Choct and Annison (1994), showed how ANFs such as arabinoxylans alter digestibility of nutrients (Fig. 1).

Trials by Owens et al. (2007) showed that poultry increased liveweight by 12%, and reduced FCR by 9% when suitable enzymes, such as Allzyme, were included in the diet. This was related to the reduction in coliform bacteria and especially *Clostridia perfringens* in the upper ileum in response to better nutrient digestion and more efficient upper tract absorption.

The presence of moulds in feedstuffs has been shown to have an impact on the potential for necrotic enteritis development as well. It is well known that mycotoxins can reduce the capacity of the immune system to respond to threats, but research has shown that the toxin deoxynivalenol (DON) is a predisposing factor in birds for the development of the disease.

Trials reported by Antonissen et al. (2014) demonstrated that birds exposed to DON contamination significantly increased the number in the flock showing sub-clinical symptoms of necrotic enteritis from 20-47%.

This was due to the damage done by DON to the intestinal epithelium, allowing more protein to remain unabsorbed and utilised by the bacteria, stimulating bacterial growth, colonisation and toxin production.

Remain vigilant

Broiler breeders must be vigilant in maintaining good vaccination programmes as well as using appropriate zootechnical feed ingredients and more available forms of nutrients in order to give these valuable birds the best chance of maximising productive performance.

Checking that vaccinations have taken as well as monitoring any issues such as diarrhoea or fungal contamination in feed is important to meet this need. With these strategies in place, breeding operations can be maximised and the welfare of the birds maintained through their production cycle. ■

References are available
from the author on request