New natural concept for poultry gut health

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The birds' digestive system is the producer's gateway to transforming dietary nutrients into profit. As a result, the digestive tract is the most important organ of the chicken's body.

One of the major influences on intestinal function is gut disease, caused by imbalances in the gut microflora. A variety of factors can upset the balance of bacteria in the gut and allow proliferation of harmful bacteria, such as E. coli and clostridia.

In chickens the environment and the diet have the greatest influence on the microbial status of the gastrointestinal tract.

Dirty litter and other animal management parameters affect microbial composition of the chicken gastrointestinal tract by providing a continuous source of bacteria.

Dietary factors include sudden changes in feed intake, composition, digestibility and microbial contamination of the feed. In the past deficiencies in management and nutrition, which negatively affect gut health, have been masked by the use of antibiotics in poultry diets.

However, consumer pressure and legislative action preventing the use of non-therapeutic antibiotics has broiler producers worldwide searching for alternatives.

Biomin, an international feed company, has invested a lot of thought and research into finding effective dietary concepts to meet this demand and secure profitable poultry production.

A healthy community

When formulating diets for high health and performance, nutritionists should not only be concerned about the bird's nutrient requirements but also about the requirements of the beneficial gut bacteria.

Bacterial species differ in their substrate preferences and growth requirements. Therefore, the chemical composition and structure of the digesta largely determines the species distribution of the bacterial community in the gastrointestinal tract.

As a consequence, the bacterial community structure is very much dependent upon the diet as the ultimate source of substrates for metabolism. To optimise gut health the formulations of poultry diets should consider the different stages of the development of the gut microflora throughout a bird's productive life.

● **Step 1: Establishing a healthy gut.**
At birth the gut of the chick is sterile and develops a microflora according to factors such as age and exposure to bacteria in the environment as well as in the feed and water.

Therefore, the establishment of a healthy gut microflora can be positively supported by adding beneficial bacteria (probiotics) such as bifidobacteria, lactobacilli or enterococcus faecium to the feed or water.

Probiotics multiply and colonise the gut and will prevent the establishment of pathogenic bacteria and possible infection in the gut.

● **Step 2: Maintaining a healthy gut.**
Once a balanced microflora has been established the aim is to maintain it. Bacteria in the digestive tract derive most of their carbon and energy from dietary compounds, which are either resistant to attack by digestive fluids or absorbed so slowly by the animal that bacteria can successfully compete for them.

Therefore, beneficial bacteria species can be selected for by resistant feed components, which escape digestion by the host, but are readily available for metabolism by target microbes. Among the generally recognised species with beneficial effects are bifidobacteria and lactobacilli which will stimulate gut immune functions, aid the absorption of nutrients and synthesise vitamins.

Furthermore, they will inhibit the growth of potential pathogens in the gut. Substances which cannot be hydrolysed or absorbed by the animal's digestive system in the upper part of the gastrointestinal tract but will selectively feed bifidobacteria and lactobacilli are classified as prebiotics. Since prebiotics feed beneficial bacteria they work hand in hand with probiotics and can be combined for a synergistic effect.

Synergistic effects can also be achieved by combining prebiotics with substances supporting digestion and suppressing the growth of pathogenic bacteria. An improved digestion not only supports nutrient utilisation of the animal but also indirectly helps to control the gut microflora. The better the nutrients in the diet are digested by the animal the fewer nutrients will be available to bacteria residing in the colon to grow and multiply.

Several natural plant extracts and essential oils have shown to increase the release of digestive enzymes and increase digestion in poultry and can thus be added to the diet to increase nutrient utilisation by the animal and reduce the amount of nutrients available for the growth of bacteria.

In combination with prebiotics such products will reduce the amount of pathogenic bacteria and selectively feed for beneficial bacteria.

The growth of pathogenic bacteria can also be affected directly, by the use of antimicrobial substances in the diet such as organic acids. Acids are commonly used as antimicrobial agents in feed preservation and water sanitation, inhibiting growth and killing various bacterial and fungal species.

The beneficial use of organic acids is related to reducing the overall numbers of bacteria either consumed or exposed to, and thus the number of bacteria entering the gut.

Once ingested with the diet organic acids can also have an antimicrobial effect against pathogenic bacteria in the gut.

Application in the diet

Biomin developed feeding concepts optimising the use of natural products, based on probiotics, prebiotics, essential oils and organic acids to manage gut health in poultry and replace antibiotics in poultry diets effectively.

The products can be used in the feed or in the drinking water and their application is tuned to support the different stages of the development of the gut microflora in the bird for a healthy balance.

At the beginning of the bird's productive life the concept ensures the establishment of a healthy gut microflora and supports the unspecific immune system, with the application of a product such as Biomin C-EX, supplying probiotics, prebiotics and immune stimulating substances via the drinking water for at least three days, or a product which is added to the starter diet.

Challenge trials with salmonella have shown that the addition of Biomin C-EX to the young chick's diet will make the chick´s gut more resistant to the invasion of salmonella. This product can also be applied to the drinking water to boost the gut microflora and immune system at times of stress and after antibiotic treatments.

With dietary changes to less digestible raw materials in the grower period, a product based on essential oils aiding digestion is recommended in the diet (Biomin PEP 125 poultry) or in its water soluble form for the drinking water (Biomin PEP sol).

The Biomin PEP product range is based on essential oils selected for improved digestion and stabilisation of the gut microflora. Its application is particularly important to prevent the growth of chlostridia, which strive in the digestive tract if dietary nutrients are not digested and absorbed by the bird.

As a result of the improved digestion the birds will also have improved feed conversion rates. In layers the product is recommended at the beginning of the laying period and around peak egg production, to overcome digestive stress related to changes in housing and diets and maximise performance during the peak laying period.

To complete the concept the acidifier Biotronic is applied to the feed to prevent microbial contamination of the feed and thus protect the gut from the invasion of pathogenic bacteria. Biotronic, which is based on organic acids, will not only effectively kill pathogenic bacteria in the feed, but also in the gut of the animal, reducing the risk of enteric infections.

This will not only secure the performance in the animal, but also increase the safety of the product for the end consumer. ■