

Probiotics target poultry performance

These alternatives to the use of antibiotics focus on gut health for better animal production and performance.

Stress and a low tolerance against pathogens from the feed may often lead to bacterial infections of the gut in poultry. Since the intestinal tract in the animal contains a lot of defence mechanisms against the establishment of a pathogenic flora, it is of utmost importance to maintain health and functionality of the gut through nutritional means.

The gastro-intestinal flora in poultry represents a complex ecosystem comprised of many different species of bacteria (Table 1). The more varied the existing flora, the more stable is this system.

The microflora builds a microbial barrier in the gut, which protects the mucosa and prevents the proliferation of pathogenic bacteria (competitive inhibition). The positive bacteria includes bifidobacteria and lactobacilli which produces lactic acid and helps sustain a low pH (Fig. 1).

Young birds have a less complex gut flora compared to adult animals. Even though their bacteria concentration reaches the magnitude of older birds within a few days, the microflora composition is rather basic and contains only few species

Table 1: Different compartments in the poultry gut

	pH-	Passage rate (min)	Microflora
Crop	4,5 – 5,3	45	Streptococci, Coliforms, Lactobacilli
Gizzard	2,0 – 4,5	70	Streptococci, Coliforms, Lactobacilli
Ileum	5,6 – 7,9	160 – 200	Streptococci, Coliforms, Lactobacilli
Caecum	5,8 – 6,8	120	Bacteroides, Bifidob., Peptostreptococci, Clostridia, Propionic acid bacteria, Eubacteria
Colon/Cloaca	6,3 – 7,7	30 – 50	Assortment of ileal and caecal bacteria

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and strains. This deficiency weakens the microbial barrier and makes the chicks susceptible to infections of the gut.

Precisely these facts make the application of probiotics in the first few days for chicks advisable.

Mode of action of probiotics

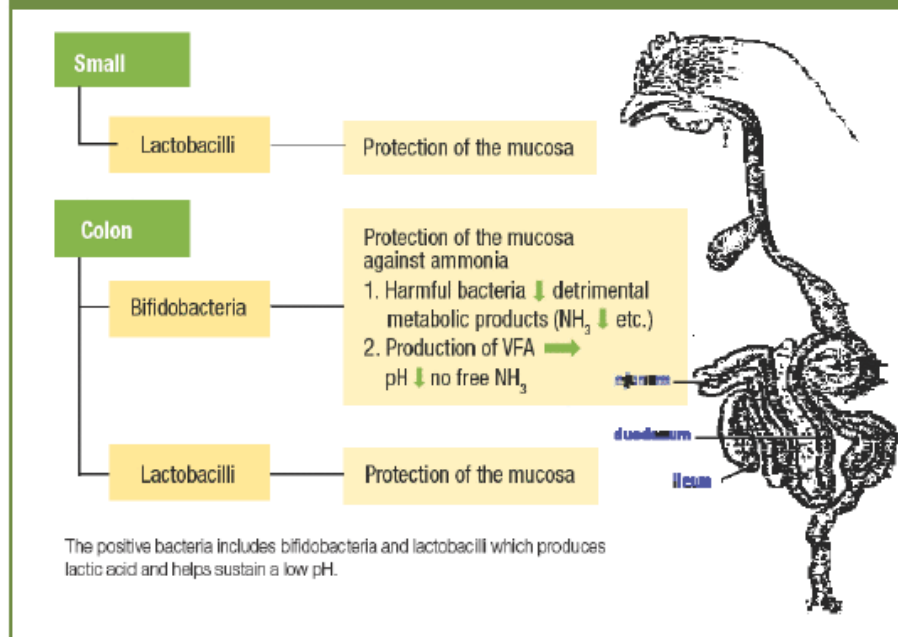
The widespread use of antibiotics as a therapeutic agent or as a growth promoter in animal production has in the past increased the risk of antibiotic resistance and the build up of residues in animal

products. The therapeutic efficacy of antibiotics is consequently lessened.

The turn to application of probiotics and the utilisation of competitive exclusion may lead to an optimised production. By stabilising the natural intestinal flora, colonisation with pathogenic bacteria can be counteracted and the application of antibiotics can be reduced. In addition, the probiotics may stimulate the immune response of the animals by increasing the build-up of antibodies.

The effects of probiotics are specific to special strains. Even closely related strains of the same bacteria species may have different physiological effects. This means that results obtained with a certain strain may not be transferred to another strain. Probiotic cultures, for instance AntaPro EF, have in general been selected from a broad spectrum of lactic acid bacteria and other micro-organisms for their health effects in the host animals. *E. faecium* is a gram-positive coccus that is a part of the digestive flora of birds and mammals. It is also used in the food industry in the production of cheese and for purification or fermentation purposes.

Fig. 1: Function of the positive flora in the gut of poultry



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► **Probiotics**

The maintenance of a correctly functioning digestive system represents a reduction of stress for the animal.

Probiotics used in animal nutrition have to be able to fulfill the following requirements:

- resistant against stomach acids and bile
- resistant against digestive enzymes
- rapid, homofermentative production of lactic acid
- factors that enable a positive influence on the gut flora, for instance, adhesion to the gut wall, viability and proliferation in the gut

Since most probiotic micro-organ-

isms are not able to colonise the gut, they have to be supplied to the animal continuously through the feed or water to reach their full and reproducible effect (Table 2).

The maintenance of a correctly functioning digestive system represents a reduction of stress for the animal. The stabilisation of the physiological digestive condition improves the resorption of nutrients and the feed conversion rate of the animal. Trials have confirmed an improvement of performance in production and health of broilers, piglets, calves and other animal species, by administering feed containing *E. faecium* compared to a negative control. Compared to antibiotic treatment, the trial results indicate at least the same results for the probiotic (Table 3).

Table 2: Effects of lactic acid bacteria in animal nutrition

Direct nutritional effect	Health effects
Reduction of intestinal pH	Barrier effect due to competitive exclusion
Support or competition for amino acids	Support or competition for amino acids
Production of enzymes	Stimulation of localised immunity
Production of hydrogen peroxide	Neutralisation of toxins

Probiotic cultures are chosen from a broad spectrum of lactic acid bacteria and other micro-organisms for their health effects in the host animals.

The regulation of the digestive flora also has a positive effect on the health of the animal. In addition to an improvement in performance, there are reports on the frequency of pathological problems observed during trials. The intensity, the frequency and the duration of diarrhoea, as well as the number of therapeutic treatments can be significantly reduced by the application of AntaPro EF.

The use of probiotics is not only

indicated in prophylaxis of nutritional diarrhoea, but also against dysbiosis. In both human and veterinary medicine, interesting results in these indications are described. Hence, they may also be used for prevention of intestinal disorders of nutritional aetiology in newborn animals, in order to rapidly establish a commensal digestive flora. Stress conditions, such as change of feed, transport and other environmental influences, may also commonly cause digestive disturbances, which can be ameliorated by the application of probiotics.

Probiotic treatment is also indicated against dysbiosis following antibiotic therapy or damage to the intestinal micro-flora populations. In those cases, the administration of *E. faecium* accelerates the reconstitution of the destroyed or damaged intestinal flora. As a result of this reestablishment of eubiosis, the risk of repeated nutritional diarrhoea is reduced.

Performance and microbes


The performance of livestock is closely interrelated with the microbial colonisation of the host animal. Probiotics like *E. faecium* (AntaPro EF) have the potential to produce beneficial effects in farm animals by modification of the intestinal microflora. An important factor is the formation of a microbial barrier in the gut and the influence on pathogenic bacteria. But there is also evidence that probiotics may modulate the immune response as well as the barrier function of the intestinal wall.

Probiotics are, therefore, a reasonable

Table 3: Effect of *E. faecium* compared to antibiotics or a negative control (adapted from Weiss, 2003)

Animal species	Antibiotic treatment	Probiotic treatment	Effect antibiotic	Effect probiotic	Source
Calves	Virginiamycine	<i>E. faecium</i>	3,8 medical therapies	3,1 medical therapies	Hefel (1980)
Calves	Avoparcine	<i>E. faecium</i>	-	16 % less <i>Sarcoptes mänge</i>	Kirchgessner (1985)
Pigs	-	<i>E. faecium</i>	-	15,8 % lower mortality	Moen (1982)
Piglets	-	<i>E. faecium</i>	-	2,7 % better growth	Ettle et al. (2005)
Layer	-	<i>E. faecium</i>	-	3,53 % better FCR	Kumprocht (1985)
Broiler	-	<i>E. faecium</i>	-	4,0 % better growth	Richter & Ochrimenko (1994)
Broiler	-	<i>E. faecium</i>	-	4,9 % better FCR	Günther (1991)

Trials have shown an improvement of performance in production and health of broilers, piglets, calves and other animal species, by administering feed containing *E. faecium*.

alternative for the production of healthy meat products, especially in view of the negative discussion concerning the application of antibiotics as growth promoters in animal nutrition in recent years. 

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