

Use of fibre degrading enzymes for a healthier poultry gut

Due to the wide range of different raw materials used to formulate feeds, animals are frequently under nutritional stress and feed additives, such as enzymes, play a key role in the health status and nutrition of high performing birds.

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It is widely accepted that factors like: animal age, diet composition, dietary fibre, feed particle, etc will have a direct impact on animal performance. All these factors will also have an impact on microbial populations in the gastro intestinal tract (GIT).

The complexity of the gut as an organ and its microbiome and all possible interactions and synergies are far from being fully known, which makes the drawing of research conclusions also a complex subject.

Different research work has shown that high performing birds have a different microflora when compared with low performance birds. Moreover, research shows that NSP degrading enzymes alter the microbial populations at GIT and further that microflora shifts done by enzymes are substrate (feed composition) dependent.

Understanding how these shifts in microbial populations affect performance, hormonal response, gut development, etc opens the door for tailored nutritional solutions and gut microflora modulation to achieve optimal animal performance.

Mode of action beyond nutrient digestibility

Research done with broilers fed barley or oat based diets has shown that NSP degrading enzymes increase the amount of SCFA produced in the gut.

Nevertheless, it should be accepted that different enzymes (specifically different xylanases) will hydrolyse arabinoxylan (AX) at different extensions generating different degradation products and that the response on SCFA production is substrate and enzyme

	Trial 1		Trial 2	
	Control group	Enzyme group	Control group	Enzyme group
BWG (g/42d)	2745	2796	2661	2683
FCR	1.591	1.576	1.564	1.548
Total count (log cfu/ml) - caeca	9.15	9.22	9.21	9.56
Lactobacilli count (log cfu/ml) - caeca	8.42	8.53	8.50	8.79
Caecal content pH	6.37	5.85	6.32	5.93

Table 1. Summary results of two broiler trials to evaluate the efficacy of Hostazym X on improving animal performance and its influence on microflora.

dependent leading to a significant variation in the research results.

Some NSP degrading enzymes are able to hydrolyse AX (both soluble and insoluble fractions) and will form AX oligosaccharides (AXOS) and xylan oligosaccharides (XOS), molecules that are recognised for their prebiotic properties. Several studies with mammals showed that AXOS consumption was associated with health promoting effects, such as increased levels of SCFA and higher concentration of bifidobacteria.

Broiler trials

To evaluate the effect of an NSP degrading enzymatic complex, Hostazym X, on animal performance and GIT microbial populations, two broiler trials were conducted and selected microflora populations and zootechnical performance were measured.

The two trials were set as 42 days grow out experiments using wheat, maize, soya based diets and two treatments (with 10 replicates of 10 birds) – a Control group and an

Enzyme treated group (Hostazym X at 1,500 EPU/kg feed). Crop, ileum and caeca contents pH, ileal and caecal selected microbial populations, and standard performance indicators were measured.

Table 1 summarises the results of both trials showing the measured parameters with significant differences (at $p < 0.05$ or $0.05 \leq p < 0.1$). In both trials, the Enzyme treatment, when compared to the Control treatment, decreased pH in the caeca and increased total bacteria counts. Lactic acid producing populations were significantly affected by enzyme treatment. The Enzyme group also showed significantly better zootechnical performance (higher end body weight and lower FCR).

The pH decrease can be explained by fermentation processes, the AXOS and XOS generated by hydrolysis of fibre components are used by the intestinal microflora to produce SCFA (pH decrease), which can be used as an energy source by the bird enhancing its performance and health.

Conclusion

Despite the broiler's microbiome being a complex system influenced by several factors and interactions, possible synergistic effects and biochemical responses are far from being fully understood.

Research supports that beyond improved zootechnical performance NSP degrading enzymes have a positive effect on gut health, by supporting the growth and maintenance of a balanced and positive microflora. ■

