

Evaluation of a yeast extract product, containing a guaranteed range of β -glucans, on performance in broilers

D. VANCRAEYNEST^{1*}, C. NECMETTIN², M. MARIEN¹ and M. DE GUSSEM¹

¹Alpharma Animal Health, Laarstraat 16, B-2610 Wilrijk, Belgium.

²Ankara University, Faculty of Agriculture, Animal Science, 06110 Diskapi-Ankara, Turkey

*Corresponding author: dieter.vancraeynest@alpharma.com

A trial was run in broilers to evaluate the effect of different yeast cell-wall products, originating from *Saccharomyces cerevisiae* and containing β -glucans and mannan oligosaccharides (MOS). The experimental facilities were new, resulting in a low infection pressure environment.

Four groups were included: 1) negative control; 2) Alphamune®, 500g/ton; 3) Alphamune®, 1000g/ton; 4) yeast cell wall product containing an uncertified β -glucan level, 1000g/ton. At day 14 and day 35, weight, feed intake and bacterial counts in the small intestine were assessed. The birds were vaccinated at day 13 and day 26 with a LaSota strain via drinking water, and at day 35, Newcastle Disease (ND) titres were determined.

Feed conversion rates (FCR) in groups 1, 2, 3 and 4 were 1.836, 1.782, 1.800 and 1.825, respectively, with significant differences between the Alphamune®-treated (500g/ton) group and the control group, indicating a positive effect of Alphamune® on performance. A trend was seen in the ND-titres: titres of 4490, 6339, 6465 and 5145 were found in groups 1, 2, 3 and 4, respectively, strongly supporting the generally accepted idea that β -glucans might have stimulatory effects on the immune system. Furthermore, the bacterial counts demonstrated that beneficial changes had occurred in the intestinal microbiota of the Alphamune®-treated birds.

Keywords: yeast cell wall; β -glucans; broilers; performance

Introduction

A lot of research has been focusing on the development of products that improve the intestinal health of poultry. One of the products that proved to have a beneficial impact on the overall health of the gut of different species, including poultry, is a spray dried and granulated product called Alphamune®. It is produced after autolysis of a food grade yeast (*Saccharomyces cerevisiae*), and it contains a unique combination of (1-3,1-6) β -glucans (within a guaranteed β -glucan concentration range) and mannan oligosaccharides (mannans). The β -glucans, have been shown to be involved in the enhancement of the immune system due to their ability to bind to and activate macrophages (Huff *et al.*, 2007; Solis de los Santos *et al.*, 2007). The mannans on the other hand have a prebiotic effect: they act as a substrate and energy source for *Lactobacillus* spp. and in this way enhance the beneficial gut microbiota. Furthermore the mannans also act as a competitive binding site for certain Gram-negative bacteria such as *Salmonella* spp., prohibiting the attachment of the bacteria to the intestinal wall, helping in disease prevention (Van Immerseel *et al.*, 2004). There are many possible benefits of including Alphamune® in the feed ration, including a reduction in mortality, improvement of weight gain, body weight evenness and feed conversion rate.

Materials and Methods

The trial included four groups of 3,000 Ross 308 broilers, fed on a corn-soy based commercial broiler diet. Group 1 was the control group, group 2 received Alphamune® 500 g/ton, group 3 Alphamune® 1000 g/ton and group 4 alternative feed additive 1000 g/ton.

Weight and feed intake were assessed, and the feed conversion rates (FCR) were calculated for each of the groups. After Newcastle Disease (ND) vaccination (day 13 and day 26, LaSota strain via drinking water), ND-titres were determined at day 35. The total number of aerobic bacteria, enterococci, *Enterobacteriaceae*, coliforms and yeasts was determined in the small intestine at day 14. At day 35, the number of total aerobic bacteria, enterococci, *Enterobacteriaceae*, yeasts and lactobacilli was determined.

Results and discussion

FCR in groups 1, 2, 3 and 4 were 1.836, 1.782, 1.800 and 1.825, respectively, with significant differences between the Alphamune®-treated (500g/ton) group and the control group, indicating a positive effect of Alphamune® on performance.

A trend was seen in the ND-titres: groups 1, 2, 3 and 4 had average titres of 4490, 6339, 6465 and 5145, respectively, strongly supporting the generally accepted idea that β -glucans might have stimulatory effects on the immune system.

The bacterial counts demonstrated that beneficial changes had occurred in the intestinal microbiota of the Alphamune®-treated birds. The number of coliforms at day 14 was significantly reduced in both Alphamune®-treated groups (see *Table 1*). At day 35, the number of *Enterobacteriaceae* was significantly reduced in group 3, whereas the number of lactobacilli was significantly increased. Group 4 demonstrated a significantly higher amount of yeasts (see *Table 2*).

Table 1. Bacterial counts (log 10 cfu/g) in the small intestine at day 14

	Total number aerobes	enterococci	<i>Enterobacteriaceae</i>	Coliform bacteria	Yeast
Control	5.59	4.71	3.60	3.466 ^a	3.33
Alphamune 500 g/ton	5.17	4.42	3.80	2.464 ^b	3.47
Alphamune 1000 g/ton	5.38	4.77	3.60	2.724 ^b	3.95
Alternative feed additive	5.53	4.99	3.60	3.436 ^a	3.55
P	0.874	0.776	0.939	0.024	0.777

a-b: (P<0.05)

Table 2. Bacterial counts (log 10 cfu/g) in the small intestine at day 35

	Total number aerobes	enterococci	<i>Enterobacteriaceae</i>	Yeast	lactobacilli
control	5.08	4.03	5.49 ^a	2.37 ^b	4.18 ^b
Alphamune 500 ppm	5.21	3.46	4.20 ^{ab}	2.82 ^b	4.36 ^b
Alphamune 1000 ppm	5.58	3.84	3.30 ^b	3.31 ^{ab}	5.20 ^a
Alternative feed additive	5.26	3.54	4.21 ^{ab}	4.00 ^a	4.50 ^b
P	0.72	0.44	0.013	0.046	0.014

a-b: (P<0.05)

In conclusion, the main effects were seen on differences in the ND-titres and FCR. The observation that both Alphamune® groups showed the highest ND-titres can be explained by the fact that this product is blended for an optimal and constant β -glucan content. FCR was significantly improved for the 500 g/ton Alphamune® treated group only. These results validate the dose 500 g/ton Alphamune®, in these circumstances, as a good compromise between immune stimulation and performance.

References

HUFF, G.F., HUFF, W.E., RATH, R.C., SOLIS DE LOS SANTOS, F., FARNELL, M.B. and DONOGHUE, A.M. (2007). Influence of hen age on the response of turkey poults to cold stress, *Escherichia coli* challenge, and treatment with a yeast extract antibiotic alternative. *Poultry Science* **86**: 636–642.

SOLIS DE LOS SANTOS, F., DONOGHUE, A.M., FARNELL, M.B., HUFF, G.R., HUFF, W.E. and DONOGHUE, D.J. (2007). Gastrointestinal maturation is accelerated in turkey poults supplemented with a mannan-oligosaccharide yeast extract (Alphamune). *Poultry Science* **86**: 921-930.

VAN IMMERSEEL, F., DE BUCK, J., PASMANS, F., DE GUSSEM, K., HAESEBROUCK, F. and DUCATELLE, R. (2004). Manno-oligosaccharides (Alphamune) in poultry feed decrease colonization of *Salmonella* in chickens, XXIIth World's Poultry Congress, Istanbul, Turkey.