EFFECTS OF DIETARY MANNAN OLIGOSACCHARIDE IN COMPARISON TO OXYTETRACYCLIN ON PERFORMANCE OF GROWING RABBITS

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ABSTRACT

Digestive disorders in rabbits are quite frequent. Therefore feed additives, which can lower the risk of digestive disorders and enhance performance, are useful tools to the rabbit nutritionist and stockman. The aims of the present trials were to compare the effects of mannan oligosaccharide (MOS) and oxytetracycline (OTC) on rabbit health and performance. The trial was set up as a complete randomized design comparing 4 dietary regimes with a total of 633 Hybrid Hyla rabbits in 73 cages. Commercial grower feed was introduced on day 18. Rabbits were weaned on day 28. Starter feed was offered through day 46 and finisher feed from day 47-70. The diets did either contain 2000 ppm of MOS (Bio-Mos™, Alltech Inc.) or OTC (20%) in the grower and 1000 ppm of MOS or OTC in the finisher diet, respectively. The 4 treatments were as follows: Starter-Finisher: MOS-MOS, MOS-OTC, OTC-MOS and OTC-OTC. Rabbit performance and mortality was evaluated. Data were subjected to ANOVA analysis in spit-plot. Overall weight gain was comparable between treatments. However the group receiving OTC throughout the trials tended to eat more feed. Due to the higher feed intake FCR was significantly higher in this group compared to the other 3 groups. Mortality was also being affected by treatment with the lowest losses in the MOS-MOS group. Under the present trial conditions performance with mannan oligosaccharide was similar or superior to performance with oxytetracycline.

Key words: Bio-Mos, mannan oligosaccharide, oxytetracyclin, growth performance.

INTRODUCTION

Growing rabbits are very sensitive to digestive disorders. In any production systems it is therefore critical to keep a stable microbial population in order to optimize rabbit performance, livability and health. Feed additives, which improve gut health, are commonly used in rabbit diets. For the past several decades antibiotic growth promoters have been included in animal feeds worldwide at sub-therapeutic concentrations as a standard practice because of their positive effects on weight gain, feed utilization and mortality (ROSEN, 1996).

Recently however the effects of antibiotics on the development of resistant bacteria in both animals and humans, and associated risks to human health, have been the subjects of controversy. It is well documented that antibiotics included in the diet do select for resistance not only in pathogenic bacteria but also in the endogenous microflora of exposed animals (SCHWAN, 1969; SCAN, 1996; VAN DEN BOGAARD, 1997). A complete ban on antibiotics in poultry feeds by 2006 is contemplated by the European Union. In the U.S. and some other countries there have been voluntary reductions in the levels of antibiotics or production of "antibiotic free" and "organic" meat products in response to consumer demand and pressure from fast-food restaurant chains.

Today, the global demand for safe food has prompted the search for natural, alternative growth promoters to use in rabbit feeds. Mannan oligosaccharide (MOS) derived from the outer cell wall of yeast has been shown to reduce salmonella and *E. coli* colonisation in broilers, turkeys and calves (NEWMAN *et al.*, 1993; JACQUES and NEWMAN, 1994; SPRING *et al.*, 2000; FAIRCHILD *et al.*, 2001). Jacques and Newman did also reported a reduction in respiratory disease with MOS in calves. Through improving gut health and the immune status MOS has been shown to improve animal performance in broilers (HOOGE, 2004a), turkeys (HOOGE, 2004b), piglets (MIGUEL *et al.*, 2002). While extensive information on MOS as a feed additive in available in different animal species, little research has been conducted in rabbits. BERSENYI and GIPPERT (1995) and GIRARD *et al.* (1997) did report improvements in rabbit performance with MOS in smaller scale trials.

The aim of this trial was to compare the effects of dietary mannan oligosaccharide (MOS) and oxytetracyclin (OTC) on growing rabbit performance and health.

MATERIAL AND METHODS

The trial was set up as a split plot design comparing 4 dietary regimes. A total of 633 Hybrid Hyla rabbits in 73 cages (average of 8.7 rabbits per cage) were used in the trial. Litters were equalized in size and randomly assigned to one of the treatment groups. The different treatments are shown in Table 3. Starter feed (with MOS or OTC) was introduced on day 18. Rabbits were weaned on day 28 and maintained in the same groups. Starter feed was offered through day 46 and finisher feed from day 47-70. The finisher diet offered the last 5 days (day 65-70) did not contain a coccidiostat. Diet compositions and analyses are given in Table 1 and 2. Treatment regimes are described in table 3. Both feed and water were offered *ad libitum*.

Table 1: Composition of rabbit starter and finisher diets.

Ingredient (%)	Starter	Finisher
Dehydrated alfalfa	21.0	18.5
Sugar beet pulp	6.0	5.5
Citrus pulp	6.0	6.0
Maize gluten	0	3.0
Corn	3.5	0
Wheat by-products	31.0	35.0
Sunflower (whole meal)	22.0	22.0
Ca-carbonate	1.35	2.0
NaCl	0.3	0.3
Fat	0.5	0.5
Sugar cane molasses	7.0	6.0
Premix[A]	1.0	1.0
Lysine-HCl	0.1	0.06
Methionine	0.05	0.04
OCT or MOS	0.2	0.1

[A] per kg final feed: Vit A: 10'000 IU; Vit E: 10 mg; Vit K3: 1 mg; Vit B1: 1mg; Vit PP: 20 mg; Vit B6: 1 mg; Vit B12: 0.015 mg; Co: 0.25 mg, Fe: 40 mg; I: 1.5 mg; Mn: 50 mg; Se: 0.1 mg; Zn: 60 mg; Choline-Cl: 1 mg; Robenidine 6.6%: 100 mg

Table 2: Chemical composition (as-fed) of starter and finisher diet.

Parameter	Starter diet OTC	Starter diet MOS	Finisher diet OTC	Finisher diet MOS
Organic matter %	90.9	91.5	91.5	91.3
Crude protein %	19.2	19.1	18.3	18.1
Fat %	3.4	3.5	3.1	3.2
Ash %	9.2	8.5	8.5	8.7
Crude fiber %	15.6	15.5	15.4	15.3
NDF %	40.5	40.9	38.0	40.3
ADF %	23.2	23.2	22.6	22.4
ADL %	9.2	9.9	9.5	9.0

Table 3: Feeding regimens used.

Treatments	MOS-MOS (n=20)	MOS-OTC (n=19)	OTC-MOS (n=17)	OTC-OTC(n=17)
Starter diet	2000 ppm MOS[A]	2000 ppm MOS	2000 ppm OTC[B]	2000 ppm OTC
Finisher diet	1000 ppm MOS	1000 ppm OTC[2]	1000 ppm MOS	1000 ppm OTC

[A]Bio-MOS™, Alltech Inc. Nicholasville KY
[B]Oxytetracycline 20%.

Feed intake, weight gain, feed conversions and mortality were determined. Cause of mortality was not specified. Feed was analyzed using standard wet chemistry methods.

Data were analyzed with SAS statistical analysis software (SAS INSTITUTE INC., 2001). The data were subjected to a variance analyses in spit-plot.

RESULTS AND DISCUSSION

Performance data are summarized in Table 4. Initial body weight was relatively homogenous and did not differ between treatments. The average final weight (d 70) was 2105 g and was not affected by treatment. However, the group receiving OTC throughout the trials tended to eat more feed. Due to the higher feed intake FCR was higher in this group compared to the other 3 groups. Mortality was also being affected by treatment with the lowest losses in the MOS-MOS group.

Table 4: Effect of MOS and OTC on performance and mortality of rabbits.

Treatment	MOS-MOS	MOS-OTC	OTC-MOS	OTC-OTC	Prob.	RSD
Initial BW (d 18), g	286	300	286	297	ns	
Final BW, (d 70), g	2075	2181	2063	2102	ns	
Daily feed intake, g	103	107	105	117	ns	9.3
Daily weight gain, g/d	35.1	36.9	34.8	35.4	ns	3.7
Feed conversion rate	2.93^{a}	2.90^{a}	3.01^{ab}	3.31^{b}	*	0.28
Mortality, %	6.3^{a}	9.3^{ab}	10.1^{b}	11.9^{b}	**	5.2

** P<0,01 *P<0,05, ns: not significant

BERSENYI and GIPPERT (1995) and GIRARD *et al.* (1997) did report improvements in rabbit performance with MOS compared to non-medicated diets. However, no comparisons have been reported in the literature where MOS was compared to antibiotic growth promoter in rabbits. In the present trial weight gain was similar for all dietary treatments. However, MOS feed in the starter and finisher did show a significant improvement in FCR and a reduction in mortality when compared to the OTC treatment. The performance of the treatments with rotation were intermediate. HOOGE (2004a,b) reviewed MOS data in broilers and turkeys and concluded that bird performance was very similar with MOS and antibiotic growth promoters and that mortality tended to be lower with MOS. Those findings are well in agreement with results reported here in rabbits.

Overall, the present data suggest that MOS could replace OTC in rabbit diets and maintain performance. A reduction in mortality can be expected with MOS.

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