EFFECT OF DIETARY SUPPLEMENTATION OF PROBIOTICS ON GROWTH PERFORMANCE AND INTESTINAL MICROFLORA IN BROILER

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ABSTRACT

The aim of this study was to investigate the effect of probiotics on growth performance and intestinal microflora in broiler. A total of 360 day-old broilers were randomly allotted into three treatments. There were four pens (replicates) in each treatment and 30 birds in each pen. The chicken in control group were fed with basal diet only, the antibiotics group were fed with basal diet ＋ OTC ＋Bacitracin, and probiotics group were fed with basal diet ＋ *Streptococcus thermophilus*, *Lactobacillus acidophilus*, *Aspergillus awamori*, *Bifidobacterium thermophilum*, *Saccharomyces cerevisiae*, *Corynebacterium acetoglutamicum*, *Bacillus licheniformis* and *Aspergillus oryzae*.. The results showed that feeding diet containing probiotics could enhance the amount of intestinal *Lactobacillus* ($P < 0.05$) and reduce the population of *E. Coli.* compared with control and antibiotics group. In growth performance, probiotics fed group had greatest feed intake than other group ($P < 0.05$). Furthermore, administration of probiotics could significantly increase FE and ADG than control group. . The results indicated that probiotics has the potential to replace antibiotics as a farm animal additive.

KEY WORDS: Broiler, Probiotics, Intestinal microflora, Growth performance.

INTRODUCTION

Dietary supplementation with probiotics benefit the host animal by stimulating appetite (Nahashon *et al*., 1994), improving intestinal microbial balance (Fuller, 1989), and stimulating the immune system (Perdigon *et al*., 1999). Probiotics species also produce the digestive enzyme for utilizing indigestible carbohydrate (Prins, 1977) and produce specific antibacterial compounds such as organic acid (Misra and Kuila, 1992). The European Union has forbidden the use of antibiotics as animal additive in 2006. Therefore, probiotics could fill the gap for a growing demand for an effective alternative to the antibiotics. This study was conducted to investigate the effects of different probiotics complex on growth performance and gastrointestinal microflora in broiler.

MATERIALS AND METHODS

Experimental design

A total of 360 day-old broilers were randomly assigned into three treatments, 30 chicks per replicate（pen）and four replicates per treatment. Treatment 1 fed with basal diet, treatment 2 fed basal diet containing antibiotics (oxytetracyclinе；OTC 10%, 1 kg/ton、Zinc Bacitracin 10%, 1 kg/ton), treatment 3 fed basal diet supplementing probiotics. Feed and water were supplied *ad libitum* throughout the experimental period. The diet was formulated to meet the nutrient requirements of the broiler during the growing phase (0-3 weeks) and finishing phase (4-6 weeks) according to the National Research Council recommendations. Growth performance such as weight gain, feed intake and feed efficiency were determined every week.

Microbiological analysis

For microbiological analysis, intestinal content samples were serially diluted and plated in count agar according to the Bacteriological Analytical Manual for Foods（FDA, 1996）. The microflora enumerations were expressed as $\log_{10}$ colony forming units（CFU）per gram.

Statistical analysis

General Linear Model Procedure（GLM）was used to analyze the data. Duncan multiple range tests were used to test the difference between treatment means. The statistical analysis were using SAS program (1999）. Differences were considered to be significant at $P < 0.05$.

RESULTS

Table 1. Effect of dietary supplementation of probiotics on growth performance in broiler

	Control	Antibiotics	Probiotics
Average daily gain, ADG(g/day)			
0-3 week	30.74 ± 1.88	32.51 ± 0.43	32.93 ± 0.50
4-6 week	70.59 ± 0.96 ^{b}	74.28 ± 1.18 ^{a}	73.91 ± 2.04 ^{a}
0-6 week	50.66 ± 1.27 ^{b}	53.40 ± 0.41 ^{a}	53.42 ± 1.23 ^{a}
Average daily feed intake, ADFI(g/day)			
0-3 week	46.10 ± 0.09 ^{b}	46.51 ± 0.53 ^{b}	48.37 ± 0.61 ^{a}
4-6 week	129.96 ± 0.87 ^{ab}	126.27 ± 1.40 ^{b}	133.58 ± 4.74 ^{a}
0-6 week	88.03 ± 0.39 ^{b}	86.39 ± 0.45 ^{b}	90.97 ± 2.08 ^{a}
Feed efficiency, feed/gain			
0-3 week	1.50 ± 0.09	1.43 ± 0.03	1.46 ± 0.04
4-6 week	1.84 ± 0.03 ^{a}	1.70 ± 0.05 ^{b}	1.81 ± 0.07 ^{a}
0-6 week	1.74 ± 0.05 ^{a}	1.61 ± 0.02 ^{b}	1.70 ± 0.05 ^{a}

^{a,b}Means in the same row with different superscripts are significantly different（$P < 0.05$）

Table 2. Effect of dietary supplementation of probiotics on intestinal microflora in broiler

	Control	Antibiotics	Probiotics
Duodenum			
aerobe	8.01 ± 0.01 [a]	7.36 ± 0.46 [b]	7.48 ± 0.53 [b]
Lactobacillus	6.44 ± 6.44 [b]	6.14 ± 0.26 [c]	7.22 ± 0.06 [a]
E. Coli	6.57 ± 0.19 [a]	6.36 ± 0.03 [b]	6.09 ± 0.04 [c]
Caecum			
aerobe	9.15 ± 0.05 [a]	8.85 ± 0.30 [b]	8.45 ± 0.26 [c]
Lactobacillus	7.88 ± 0.16 [b]	7.51 ± 0.05 [c]	8.50 ± 0.34 [a]
E. Coli	8.47 ± 0.50 [a]	7.45 ± 0.22 [b]	7.23 ± 0.02 [b]

[a,b]Means in the same row with different superscripts are significantly different（$P < 0.05$）

DISCUSSION

The result showed that there was higher ADG in broiler fed diet containing probiotics when compared with control group and higher ADFI compared with others groups(Table 1). However, antibiotics fed group has the greatest FE amomg groups. Jin *et al*. (1996) reported that the weight gain in chickens fed with commercial *Lactobacilli* cultures was significantly higher than the control. On the contrary, researches (Watkins and Kratzer, 1983, 1984) reported that there were no significant differences in weight gain of chicken given diets with *Lactobacillus* cultures. Broilers fed diet containing probiotics had higher amount of *Lactobacillus* and reduced *E. Coli* in duodenum and caecum. Broilers fed diet containing antibiotics could reduce the amount of aerobe and *E. coli*and reduced *Lactobacillus* microflora (Table 2). These results was in agreement with the finding of Francis *et al.*(1978) in which the addition of *Lactobacillus* product in feed significantly decreased the coliform counts in the intestine and ceca of turkeys. A reduction of pathogenic *E. Coli* was also observed in the gastrointestinal tract of gnotobiotic chickens dosed with *L. acidophilus* (Watkins *et al*., 1982) .

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