

Probiotic and Acetic Acid Effect on Broiler Chickens Performance

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Abstract

Probiotics and organic acids are widely accepted as an alternative to in-feed antibiotics in poultry production. We carried the experiment with broiler chickens. In experiment we research effect of probiotic and acetic acids on the performance of broiler chickens. A total number of 200 one day old broiler chickens were distributed to two dietary groups. Broiler chickens in control group were fed with standard feed mixture and experimental group 1% vinegar contained 5% acetic acid used in drinking water and probiotics mixed with feed mixture. Body weight, FCR and GIT pH were recorded. The performance showed no statistically significant increase in body weight ($P>0.05$) in the weeks 1, 2, 3 and 4 of age. The body weight of broiler chickens was significant increase ($P<0.05$) in weeks 5, and 6 of age. In different segments of the GIT was not statistically significant ($P>0.05$) difference of pH between the control and experimental groups.

Keywords: broiler chicken, probiotic, acetic acid, performance, feed mixture.

1. Introduction

Proposed mechanisms of pathogen inhibition by the probiotic microorganisms include competition for nutrients, production of antimicrobial conditions and compounds (volatile fatty acids, low pH and bacteriocins), competition for binding sites on the intestinal epithelium and stimulation of the immune system [1]. The role of probiotic microorganisms as a alternative to antibiotic growth promoters, which beneficially affect the host animal by improving its intestinal microbial balance. So far, a variety of microbial species have been used as probiotics in poultry [2, 3]. Probiotic species belonging to *Lactobacillus*, *Streptococcus*, *Bacillus*, *Bifidobacterium*, *Enterococcus*, *Aspergillus*, *Candida* and *Saccharomyces* have a beneficial effect on broiler performance [4, 5, 6]. Health of the gut is one of

the major factors governing the performance of birds and thus, the economics of poultry production [7]. The key basic principle on the mode of action of organic acids on bacteria is that nondissociated (non-ionised, more lipophilic) organic acids can penetrate the bacteria cell wall and disrupt the normal physiology of certain types of bacteria [8]. Choct [9] reported the wide use of organic acids in Europe to inhibit pathogens like *Salmonella* in both raw materials and feed. The lower pH caused by the organic acids can protect the animal from infection especially at their younger ages. However, the effectiveness of organic acids in diets of broiler chickens may also depend on the composition of the diet and its buffering capacity. So organic acidifiers reduce the growth of many pathogenic or non-pathogenic intestinal bacteria, therefore, reduce intestinal colonization and reduce infectious processes, ultimately decrease inflammatory processes at the intestinal mucosa, which increase villus height and function of secretion, digestion and absorption of nutrients can be appropriately performed by the mucosa [10, 11, 12].

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2. Materials and methods

The experiment was conducted with 200 one day old broiler chicks (Cobb 500) for a period of 42 days. The chicks were randomly distributed into 2 groups (A, B). Complete feed mixtures were used for feeding: starter period (days 0 – 18) HYD-01, growth period (days 19 – 31), HYD-02 and final period (days 32 – 42) HYD-03. Control group (A) was fed with standard feed mixtures and drinking water and experimental group was fed with probiotics feed mixtures and 1% vinegar contained 5% malic acid used in drinking water. Feed and water were supplied *ad libitum* throughout the entire experiment. Body weight, feed conversion ratio were recorded and calculated. At the end of experiment, six birds from each group were randomly selected to record the GIT pH. Body weight was recorded before offering feed on the initial day, and then at weekly intervals up to 6 weeks. To determine the pH, 10 g of gut content from *stomachum*, *intestini* and *cecum* in two parts were collected aseptically in 90 ml sterilized physiological saline (1 : 10 dilution) [13] and pH was determined.

3. Results and discussion

After the completion of our experiment we got the following results: Effect of malic acids and probiotics used in broiler ration on live weight gain, FCR and pH are presented down, in Tab. 1 and Tab. 2. Non significant ($P>0.05$) difference in body weight of birds among the groups were observed from initial age to the 4th weeks. From the 5th to finally part of feeding experiment was significant ($P<0.05$) difference in body weight of final fattening broiler chickens COBB 500. Our results from experiment were compared with results of [14] and [15]. Our results were inconsistent with [14] results. In the results [14] observed slow increase in weight, using organic acid in the diet. Denli et al. [15] reported that live weight and liver weight were not affected significantly by organic acid treatments in broiler chickens, but in our experiment was live weight significant ($P<0.05$) in the 5th and the 6th weeks of age. As is known from the results of our experiment, in Tab. 1, FCR was calculated, which ranged 1.74 in control group and 1.65 in experimental group.

Table 1. Effect of organic acid salts on the performance of broiler chicks

Age (weeks)	Average body weight (g)		SD	P Value	Level of significance
	A	B			
<i>Body weight</i>					
Initial weight	44.40	44.40	1.51	0.3243	($P>0.05$)
1	146.24	149.62	12.64	0.1774	($P>0.05$)
2	373.48	387.04	31.32	0.0655	($P>0.05$)
3	706.40	691.20	51.44	0.1529	($P>0.05$)
4	1098.40	1127.20	97.22	0.1523	($P>0.05$)
5	1503.60	1656.00	159.60	0.0002	($P<0.05$)
6	1689.60	1850.40	178.44	0.0005	($P<0.05$)
<i>FCR</i>					
	1.74	1.65	0.045	-	-

FCR - feed conversion ratio

SD - standard deviation

P Value - statistical significance

Other results from our experiment are focused on effect of organic acid on the performance of broiler chicks. Effect of malic acids on GIT pH in *stomachum*, *intestine* *cecum* 1 and *cecum* 2 are presented in Table 2. From our result it was observed non significant ($P>0.05$) in *stomachum*,

intestini and *cecum* 1 and *cecum* 2, what is consistent with Izat et al. [16] who reported no significant difference in pH of different segments of the gastrointestinal tract due to supplementation of organic acids.

Table 2. pH value of the GIT in dietary groups

GIT	pH		SD	P Value	Level of significance
	A	B			
<i>Stomachum</i>	3.548	3.238	0.64	0.187	(P>0.05)
<i>Intestini</i>	6.418	6.508	0.14	0.375	(P>0.05)
<i>Cecum 1</i>	6.748	6.666	0.31	0.354	(P>0.05)
<i>Cecum 2</i>	6.805	6.828	0.32	0.463	(P>0.05)

GIT - gastrointestinal track

SD - standard deviation

P Value - statistical significance

4. Conclusions

In our experiment we demonstrate statistically significant in the 5th and the 6th weeks of age in body weight of broiler chickens COBB 500. But the other side, not statistically significant (P>0.05) was found from the 1st to the 4th weeks. Feed conversion ratio in control group was 1.74 and 1.65 in experimental group. Not statistically significant (P>0.05) difference of pH between the control and experimental in GIT.

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