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Effect of Dietary Probiotic, Organic Acid and Antibiotic Supplementation to Diets on Broiler Performance and Carcass Yield

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Abstract: The specific aim of this study was to determine the effects of the supplementation of separate probiotic (protexin), including organic acid combination, plant extracts, mineral salts (genex) and antibiotic (flavomycin) to broiler diets on performance, abdominal fat weight, abdominal fat percentage, liver weight, intestinal weight, intestinal length, intestinal pH, carcass weight, carcass yield of broiler chicks. In this study, 84 one-day old male broiler chicks were used and divided equally into 6 groups. When the control group was fed a diet without supplemented diet probiotic (0.1% protexin), organic acid (0.2% genex), probiotic + organic acid (0.1% protexin + 0.2% genex), antibiotic (0.15% flavomycin) and antibiotic + organic acid (0.15% flavomycin +0.2% genex) were added to the diets of the experimental groups respectively. The experimental period was 42 days. The results obtained in the experiment showed that the group receiving 0.15% flavomycin + 0.2% genex supplemented in the basal diet was exhibited higher body weight gain, feed intake and carcass weight and better feed efficiency respectively than the control and other groups ($P<0.05$). However liver weight, intestinal pH, and abdominal fat weight were not affected significantly by probiotic, antibiotic and organic acid treatments ($P>0.05$).

Key words*:* Antibiotic, broiler performance, carcass yield , organic acid, probiotic

Introduction

The efficiency of a poultry digestion depends on the microorganisms which live naturally in its digestive tract. Dietary certain feed additives are products which are incorporated into animal feed to create favourable conditions in the animal's intestine for the digestion of feed. Growth promoters have been used extensively in animal feeds and water all over world especially in the poultry and pig industries (Charles and Duke, 1978). Antibiotics improve the production results of meat-producing chicks, and the utilization of energy particular is improved. However the use of growth-promoting antibiotics is being placed under more and more pressure as consumers increasingly fear that their use in feed rations of productive live stocks leads to the formation of resistance against bacteria which are pathogenic to humans (Langhout, 2000). Some probiotic microorganisms and organic acid are an alternative to antibiotic to be used exclusively as a growth stimulant and for improvement of the feed conversion rate in farm animals (Esteive *et al*., 1997). Probiotics are organisms and substances which help to improve the environment of the intestinal tract. It may be defined as living microorganism which, given to animals, assist in the establishment of an intestinal population which is beneficial to the animal and antagonistic to harmful microbes (Green and Sainbury, 2001). By producing acids (such as acetic acid and lactic acid) and other compounds which inhibit the growth of "bad" bacteria which produce toxins, lactic acid and other useful bacteria have demonstrated probiotic effects (Honma *et al*., 1987). Studies with broiler chicks was indicated a positive response to dietary supplementation of probiotic (Midilli and Tuncer, 2001; Mohan *et al.,* 1996). Yeo and Kim (1997) observed significant improvements in daily gain and feed intake for broiler chicks fed probiotic. Organic acids reduce production of toxic components by bacteria and a chance in the morphology of the intestinal wall and reduces colonization of pathogens on the intestinal wall, thus preventing damage to the epithelial cells (Langhout, 2000).

The review of literature showed that some probiotics and organic acid components are alternative to the treatment of broiler growth performance, thus to a certain feed additives take over the role of antibiotics. In the present study, probiotic (protexin) and a-well balanced organic acid combination (genex) were compared to flavomycin with respect to live performance of broilers and affects on carcass yields and intestinal characteristics.

Materials and Methods

In this study, totally 84, day-old Ross 308 male chicks were used. The chicks were divided into 6 groups 5 treatment groups and a control group, with 14 chicks in each. Each group was housed separately in individual cages. The chicks were fed standard starter (from 1 to 25 d) and finisher (from 26 to 42 d) diets (Table 3). Groups were randomly assigned to following treatment

Table 1: Microbial content of protexin

Lactobacillus plantarum	*Lactobacillus.bulgaricus*
Lactobacillus.acidophilus	*Lactobacillus rhamnosus*
Bifidobacterium bifidum	*Streptococcus.thermephilus*
Enterococcus faecium	*Aspergillus oryza, Candida pintolopesii*

Table 2: Contents of Genex

Organic acid mixture (propionic, formic acid salts)	*Vegetable esantial oil*
Plant extracts	*Mineral salts*

Table 3: Composition of basal diets of experiment (%)

Ingredients	Feeding periods	
	1 to 25 days	26 to 42 days
Corn	557	650
Sunflower Meal[3]	40	40
Soybean Meal[1]	280	255
Fish Meal[2]	58	-
Sunflower Oil[4]	40	40
DCP	10	5
Ground limestone	10	5
DL-Methionine	1.5	1.5
Vitamin mix	2.5	2.5
Mineral mix	1.0	1.0
ME, kcal/kg	3077	3187

[1]Containing 44% crude protein [2] Containing 65% crude protein [3]Containing 37% crude protein [4]Containing 8800 ME, kcal/kg

groups, (1) Basal diet-no additives (control), (2) Basal diet + 0.1% protexin (Table 2), (3) Basal diet + 0.2% genex (Table 3), (4) Basal diet + 0.1% protexin + 0.2% genex (5) Basal diet + 0.15% flavomycin (6) Basal diet + 0.15% flavomycin + 0.2% genex. Each experimental group was fed *ad libitum* with its own diet for 42 d. Each experimental group was fed *ad libitum* with its own diet for 42 d. The temperature of the room with continuous lighting was maintained at 33 ^{o}C initially, and reduced by 3 ^{o}C/wk until reached 21 ^{o}C, at which the room temperature was maintained for the end of experiment. Light was provided 24 h a day. Body weight gain, feed consumption and feed efficiency (feed:gain) were checked weekly. All chicks were slaughtered when end of 6 weeks and all birds were slaughtered to measure carcass weight, carcass yield, abdominal fat weight, abdominal fat percentage, liver weight, intestinal weight, intestinal length and intestinal pH. The results were calculated using the SPSS 6.0 (1993) program, different between means were determined using one-way analysis of variance.

Results and Discussion

The results are presented in the Table 4. Analyses of variance revealed that body weight gain, feed intake, feed conversion rate, carcase weight, abdominal fat weight, abdominal fat percentage, intestinal weight and intestinal length were affected significantly (P<0.05) by giving organic acid mixture and with antibiotic and other treatment groups showed different values for the variables measured. However carcass yield, liver weight and intestinal pH were not affected by treatment groups (P>0.05). Table 4 shows the results of a study which compared the effect of an antibiotic and organic acid mix. tested in dietary separately or along with a control group. An antibiotic and organic acid significantly (P<0.05) increased 42-day body weight gain and feed consumption of male broiler chicks and feed utilization was improved by addition of organic acid mixture. A similar effect was found when broiler chicks were fed a diet supplemented with organic acid (Kirkpinar *et al.,* 1999). Patten and Waldroup (1988) found that the addition of 1.5% calcium formate in broiler diets reduced weight gain. Besides when given high level of propionic acid in water the acid would strongly decrease palatability and thus intake of water, which reduce feed intake and weight gain (Cave, 1984). The organic acid dietary regimens had no effect (P>0.05) on the carcass yield, abdominal fat pad, abdominal fat percentage and liver weight at end of experiment compared with control and other groups. Skinner *et al.* (1991) compared the effects of dietary fumaric acid supplementation at 0.125, 0.25 and 0.50% on broiler performance from 0 to 49 d. They found similar results in our present study. However intestinal pH was reduced by level of organic acid mix. given this working mechanism, we can assume that organic acid inhibit pathogen bacteria growth in the feed and at the opening of the digestive tract. Supplementing the diet with the antibiotic, probiotic and organic acid did not only result in the intestinal weight but also in the highest intestinal length at day 42. The result was statistically significant from the control groups. The results of the present experiment indicate that organic acid may enhance growth performance and carcass quality of broiler chicks. The results are in agreement with those of Langhout (2000); Mellor (2000); Versteegh and Jongbloed (1999), who observed that when using organic acids is same extent as the antibiotic but still lead to a lower feed conversion and weight gain cold probably be explained by its effect on other populations of the intestinal microflora. This is in support with results obtained later by Kirkpinar *et al.* (1999). Therefore, in addition of organic acid to the diet of broiler

Table 4: Effects of dietary antibiotic, probiotic or organic acid on growth performance, carcass yield and intestinal parameters of broiler chicks

Variables	Groups					
	1	2	3	4	5	6
(BGW,g)	2487±74[a]	2464±49[a]	2583±36[ab]	2505±64[a]	2590±43[ab]	2670±39[b]
(FI,g)	4137±26[a]	4136±47[a]	4224±40[ab]	4158±44[ab]	4209±46[ab]	4276±48[b]
(FI/BWG)	1.679	1.686	1.639	1.674	1.631	1.606
(CW;g/bird)	1827±50[ab]	1824±73[ab]	1872±31[ab]	1802±25[a]	1882±25[ab]	1964±51[b]
(CW/BWG)	73.46[a]	74.03[a]	72.47[a]	72.02[a]	72.66[a]	73.56[a]
(AFW;g/bird)	27.77	26.81	29.02	26.84	29.54	30.02
(AFW/CW)	1.52	1.47	1.55	1.49	1.57	1.54
(LW;g/bird)	53.2±4[a]	53.6±3[a]	58.7±5[a]	64.9±4[a]	56.3±4[a]	58.2±3[a]
(IW;g/bird)	84.7±2[ab]	88.9±2[b]	74.9±3[a]	78.9±4[ab]	83.7±5[ab]	78.0±3[ab]
(IL;cm/bird)	180.0±3[abc]	197.1±7[c]	183.0±4[bc]	183.4±7[bc]	162.0±9[a]	172.8±7[ab]
Intestinal pH	5.1	4.9	5.0	4.7	5.2	4.8

[a,b]Means in row with different superscripts differ significantly (P<0.05). Body Weigh Gain, (BWG) Feed Intake (FI), Feed Conversion Rate (FCR), Carcass Weight (CW), Carcass Yield (%), Abdominal Fat Weight (AFW), Abdominal Fat Percentage (%) (AFW/CW), Liver Weight (LW;g/bird), Intestinal Weight (IW;g/bird), Intestinal Length (IL;cm/bird),

chickens in the present study apparently was caused by a change in the pH within intestine. Similar results were found by Alp *et al*. (1999) and Kahraman *et al*. (1999). As a conclusion, our findings together with others Izat *et al*. (1988) suggest that feed conversion and carcass quality of broiler chicks can be increased by dietary organic acid as alternatives antibiotics. The dietary growth promotants that act on animal as well as humans through the modification of intestinal microflora.

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