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The effect of probiotics on carcass and internal organs of broilers

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ABSTRACT

In this study, three kinds of commercial probiotics were studied to maximize broiler chickens performance. 160 male broiler plots, commercial strain, 308 vertexes in randomly plan having 4 treatments and 4 replications were divided to 10 groups having similar average weight. Chickens were divided into four groups: 1- control group (without probiotics), 2- experimental group containing Protexin, 3- experimental group containing Primalac, and 4- experimental group containing Calciparine. The effects of probiotics on carcass and some internal organs were measured and results shows that feeding broilers with probiotics have significant effects ($P < 0.05$) on full carcass weight, empty carcass weight, head weight, neck weight, brain weight and also ileum weight, while it appeared insignificant on other results. According to the results, it can be concluded that feeding chicken broilers with these probiotics have positive effects on growth and carcass traits of chicken broilers. Thus, the use of these probiotics for broiler plots, commercial strain, 308 vertexes is recommended.

Keywords: Broilers, probiotics, carcass, commercial strain.

INTRODUCTION

A number of factors affect productivity in animal husbandry, of which nutrition is probably the most important [1]. After the FDA ban on fluoroquinolones from being using in poultry over concerns that it was a driving force behind antibiotic-resistant bacteria, the use of probiotic bacteria has become increasingly popular for improved nutrition. In fact, probiotics are live microorganisms that affect the host animal by improving its intestinal balance. Improve in performance of chicken broiler has been reported with probiotic [2]. Mountzouris et al. [3] evaluated the effect of inclusion levels of a 5-bacterial species probiotic in broiler nutrition and results revealed that probiotic inclusion level had a significant effect on broiler growth responses, apparent digestibility coefficients, and cecal microflora composition. Sojoudi et al. [4] evaluated effect of different Levels of prebiotics on carcass traits of Broiler chickens and results revealed that feeding chicken broilers with these prebiotic have positive effect in some carcass traits. Cavazzoni et al. [5] also evaluated performance of broiler chickens supplemented with Bacillus coagulans as probiotic and found that feeding probiotic supplements increase the growth rate of broilers. Kabir [6] mentioned that probiotic has a beneficial effect on broiler performance because of its effects on intestinal microflora and pathogen inhibition, intestinal histological changes, immunomodulation, some haemato-biochemical parameters, improving sensory characteristics of dressed broiler meat and also effecting microbiological meat quality of broilers, but it is described that the main effect of probiotic is in the gastrointestinal tract and associated with its capacity to stimulate the immune response and to control the growth of pathogenic bacteria [7,8,9,10]. There has been others research by scientists to evaluate probiotics on broilers; however, to date, the data is inconclusive. There is therefore a need for research on probiotics. This study was carried out to evaluate effects of three probiotics include; Premalac, Calciporin, and Protexin on broilers performance.

MATERIALS AND METHODS

This study was conducted in 2012 as a portion of Animal Science Research Program in Agricultural and Animal Science Research Center of Azad University, Rasht Branch in north of Iran. 160 chickens broiler were used for this experiment. The ratios were prepared according to need of chicken broilers for three periods include: day 1 to day 14 of the experiment, day 14 to day 28 of the experiment, and day 28 to the end of experiment when chickens slaughtered. The animals were housed in experimental pens and fed two times a day with a basal diet include corn and soybean. Food was offered in the morning and evening and that refused from the previous day was removed before the new meal was given on the following morning. However, for this research four rations were used. The ratios include: (1) basal diet, (2) basal diet+ Premalac, (3) basal diet+ Calciporin, (4) basal diet+ Protexin.

A completely randomized design of 4 diets in a 4x4 factorial design was replicated four times. The model was:

$X_{ij} = M + T_i + E_{ij}$

Where:

X_{ij} = Observations
M = Treatment average
T_i = Effect of the treatment
E_{ij} = Experimental error

RESULTS AND DISCUSSION

Results are shown in Table 1. The results revealed that the treatments had significant effects in full carcass weight and empty carcass weight. However, the chicken broilers feed with Protexin, resulted in the most favorable carcass weight while broilers fed with ratios of Premalac and Calciporin were ranked second and third and broilers in control group were ranked forth. Internal organs means are also provided in Table 1. The results showed that the ratio which includes probiotics was associated with the best outcome. The treatments had significant effects ($P < 0.05$) on head weight, neck weight, brain weight and ileum weight. Probiotics once established in the gut, produce substances with bactericidal or bacteriostatic properties (bacteriocins) such as lactoferrin, lysozyme, hydrogen peroxide as well as several organic acids. These substances have a detrimental impact on harmful bacteria and promote a better flora balance, which is primarily due to lowering of the gut pH. A decrease in pH may partially offset the low secretion of hydrochloric acid in the stomach. In addition, competition for energy and nutrients between probiotic and other bacteria may result in suppression of pathogenic species [11,12]. Besides, probiotics are responsible for production of vitamins and digestive enzymes, and for stimulation of intestinal mucosa immunity, increasing protection against toxins produced by pathogenic microorganisms and and subsequently improve animal health and growth performance [13,14].

Table 1. Effects treatments on broilers carcass and internal organs.

Treaits	Control group	Protexin	Primalac	Calciparine
Full carcass weight (gr)	2276.56±198.93^{b}	2658.25±465.54 ^{a}	2641.25±274.81^{a}	2580.25± 256.58 ^{a}
Empty carcass Wt (gr)	1870.20±180.20^{b}	2250.22±450.21^{a}	2270.30±200.60^{a}	2195.12± 210.10 ^{a}
Head weight (gr)	63.03 ± 4.10 ^{b}	61.50 ± 8.22 ^{a}	62.02 ± 9.40 ^{a}	55.40 ± 3.51 ^{a}
Gizzard (gr)	58.22 ± 5.84	61.27 ± 16.50	55.19 ± 10.55	56.45 ± 9.28
Crop (gr)	7.68 ± 1.16	8.07 ± 1.85	7.65 ± 0.60	7.61 ± 1.93
Lung (gr)	11.01 ± 0.53	11.31 ± 2.09	10.77 ± 1.99	8.40 ± 3.37
Bursa fabricius Wt (gr)	1.94 ± 0.45^{b}	4.87 ± 1.81^{a}	3.53 ± 1.06 ^{ab}	2.78 ± 1.20 ^{b}
Brain weight (gr)	3.19 ± 0.23^{a}	2.84 ± 0.08 ^{ab}	3.13 ± 0.32^{ab}	2.73 ± 0.36^{b}
Testicles weight (gr)	0.800 ± 0.313	0.855 ± 0.318	0.770 ± 0.289	0.635 ± 0.094
Pancreas weight (gr)	6.50 ± 0.57	6.39 ± 1.01	6.26 ± 0.75	6.94 ± 0.73
Duodenum weight (gr)	13.83 ± 0.76	18.52 ± 6.02	15.59 ± 3.02^{a}	14.09 ± 1.60
Ileum weight (gr)	9.20 ± 2.40 ^{b}	17.62 ± 4.85 ^{a}	14.22 ± 3.44^{ab}	12.50 ± 1.73 ^{ab}
Colon weight (gr)	1.96 ± 0.55	1.86 ± 0.48	1.55 ± 0.42	1.63 ± 0.25
Rectum weight (gr)	1.82 ± 0.20	1.98 ± 0.36	2.13 ± 0.58	2.30 ± 0.24

$^{a\,b\,c}$ *Means within rows for different group with different superscripts differ ($P < 0.05$)*

The results of current study are in line with other studies that investigated effect of probiotics on chicken broilers. However, results revealed that feeding broilers with probiotics had no statistically significant effect on some internal organs include gizzard, crop, lung, testicles, pancreas, duodenum, ileum, colon and rectum. Sojoudi et al. [4] measured effect of different Levels of prebiotics on carcass traits of Broiler chickens and results revealed probiotics had no statistically significant effect on some carcass traits. They concluded that using prebiotic is recommendable

from nutrition aspects because this prebiotic had significant effect on some carcass traits include back neck chine weight, gizzard weight and liver weight and even about characteristics which had no statistically significant effect on them, often improved them as numeral. Khalaji et al. [15] also studied the effects of prebiotic on chicken broilers and the results revealed that there is no difference between treatment in carcass and gizzard characteristics. Surely there will be unknown and unpredictable factors that can affect a study, but according to the results, the use of these probiotics for chicken broilers is recommended.

CONCLUSION

The results revealed that using probiotics had significant effects ($P < 0.05$) on full carcass weight, empty carcass weight, head weight, neck weight, brain weight and also ileum weight without having any negative effect on performance of chicken broilers. Therefore, the use of ptobiotics is recommended. The authors also suggest that future research could be done with different breeds of chicken broilers.

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