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The Favorite Dosage of Garlic Meal as a Feed Additive in Broiler Chickens Ratios

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Abstract: This experiment carried out as a completely randomized design with six treatments and 3 replicates pens of 100 birds each (total of 1800 birds). Treatments were consisted of a common corn-soybean meal based starter and grower diets supplemented by 0, 0.125, 0.25, 0.5, 1 or 2% garlic meal. At 1-21 days of age, daily feed intake per chicks influences by dietary garlic meal level so that the birds fed diets with 0.125 and 0.25% garlic meal had a significantly higher daily feed intake ($p < 0.05$) than birds fed 0.5% dietary garlic meal. At 22-42 days of age and the whole experimental period (1-42 days of age), garlic meal level didn't affect daily feed intake. No significant difference recorded for daily weight gain of experimentally birds at 1-21 days of age, But at 22-42 days of age and the whole experimentally period (1-42 days of age) the birds fed the control diet (free of garlic meal) and the diet containing the highest garlic meal dosage (2%) had a significantly lower daily weight gain in compare to other birds ($p < 0.05$). At 1-21 days of age the birds fed diet supplemented with 0.5% garlic meal had a lower feed conversion ratio than the control birds ($p < 0.05$) but at 22-42 days of age and the whole experimentally period (1-42 days of age) birds fed the control diet and the diet whit 2% garlic meal supplement showed a higher feed conversion ratios in compare with birds fed diets containing 0.125, 0.5 or 1% garlic meal. No significant differences were detected in carcass percentage and interior organs between birds fed experimental diets. The weight gain reduction in birds fed 2% dietary garlic meal means that herbal additives have their limitations too and needs more investigation.

Key words: Garlic meal, favorite dosage, broiler chickens, performance, carcass traits

INTRODUCTION

At the present time, there is increasing pressure to reduce or eliminate the use of antibiotics in poultry feed due to the negative human health issue of antibiotic resistance. On the other hand, the proposed ban of antimicrobial growth promoters in the European union in 2006 and the voluntary reduction in the use of them in other countries have forced producers to look for alternative growth promoters to be used in poultry feed. Non-conventional growth enhances are utilized in broiler nutrition to improve nutrient digestibility, control of pathogenic microorganisms, facilitate a favorable intestinal microbial balance and enhancing absorption of calorogenic nutrients across the gut wall through increasing its absorption capacity (Al-Harthi, 2002; El-Deek *et al.*, 2003).

Garlic (*Allium sativum*) is widely distributed and used in all parts of the world as a spice and herbal medicine for

the prevention and treatment of a variety of diseases, ranging from infections to heart diseases. Garlic is thought to have various pharmacologic properties. For example, it has been found to lower serum and liver cholesterol (Qureshi *et al.*, 1983), inhibit platelet aggregation (Apitz-Castro *et al.*, 1983), inhibit bacterial growth (Cavallito and Bailey, 1944) and reduce oxidative stress (Horie *et al.*, 1992). Tollba and Hassan (2003) found that garlic as a natural feed additive, improved broilers growth, Feed Conversion Ratio (FCR) and decreased mortality rate.

The aim of this study was to evaluate the favorite dietary dosage of garlic meal in Broiler chickens ratios.

MATERIALS AND METHODS

In this experiment, 101 day old Ross 308 mixed sex broiler chicks were assigned randomly to each of 18 floor pens, creating replicates of 6 experimental treatments.

Chickens had *ad libitum* access to feed during the entire experiment. Study conducted at winter 2006. Birds were managed in accordance with the guidelines of the Ross manual. Tylosin tartrate used prophylactically at 5 to 8 days of age (100 g/200 L drinking water) as the sole antibiotic treatment according to usual veterinary recommendation. Diets (Table 1) were formulated to meet all the nutrient requirements of the birds for starter (0 to 21 days) and finisher (22 to 42 days), phases (National Research Council, 1994). Experiment had a completely randomized design with 6 treatments and 3 replicates pens of 100 birds each (total of 1800 birds). Treatments were consisted of a common corn-soybean meal based finisher diet supplemented by 0, 0.125, 0.25, 0.5, 1 or 2% garlic meal. The ingredients of garlic meal

used in experiment were 70% dried garlic powder and 30% wheat bran as a carrier.

Feed intake and body weight gain of replicates were measured at 21 and 42 days of age and feed conversion ratio calculated. At 42 days of age, 6 birds (3 male and 3 female) per treatment were randomly sampled and then killed for carcass measurements. Data on daily feed intake, daily weight gain and feed conversion ratios for starter (1-21) and grower (22-42) days of age and the carcass records were analyzed with the ANOVA procedure and differences among treatments means were classified by Duncan's multiple range test (Version 6.12, SAS Institute, Inc., 1997).

RESULTS AND DISCUSSION

Table 2 shows that at 1-21 days of age, daily feed intake per chicks influences by dietary garlic meal level so that the birds fed diets with 0.125 and 0.25% garlic meal had a significantly higher daily feed intake ($p < 0.05$) than birds fed 0.5% dietary garlic meal. At 22-42 days of age and the whole experimental period (1-42 days of age), garlic meal level didn't affect daily feed intake.

No significant difference recorded for daily weight gain of experimentally birds at 1-21 days of age. But at 22-42 days of age and the whole experimental period (1-42 days of age) the birds fed the control diet (free of garlic meal) and the diet containing the highest garlic meal dosage (2%) had a significantly lower daily weight gain in compare to other birds ($p < 0.05$). At 1-21 days of age the birds fed diet supplemented with 0.5% garlic meal had a lower feed conversion ratio than the control birds ($p < 0.05$) but at 22-42 days of age and the whole experimental period (1-42 days of age) birds fed the control diet and the diet with 2% garlic meal supplement showed a higher feed conversion ratios in compare with birds fed diets containing 0.125, 0.5 or 1 garlic meal.

No significant differences were detected in carcass percentage and interior organs between birds fed experimental diets (Table 3).

Table 1: Ingredients and chemical composition of starter and grower basal diets

Ingredients (%)	Starter (1-21 days of age)	Grower (22-42 days of age)
Corn	56.24	600
Soybean meal	34.71	300
Fish meal	40.00	3.50
Soybean oil	2.13	3.25
Dicalcium phosphate	1.19	1.21
Oyster shell	1.00	1.00
Salt	0.20	0.23
Met	0.125	0.09
Minerals and vitamins premix*	0.50	0.50
Garlic meal [†]	0-2%	0-2%
Chemical composition		
Apparent metabolizable energy (kcal kg ⁻¹)	2948	3130
Crude protein	22.25	20.45
Calcium	0.90	0.90
Phosphorous	0.45	0.45
Sodium	0.15	0.15
Methionine	0.40	0.39
Methionine_cysteine	0.80	0.80
Lysin	1.28	1.20
Ether extract	4.13	6.46
Crude fiber	3.71	3.41

[†]Different levels of garlic meal added to balanced starter and grower diets.
*Provided per kilogram: Vitamin A, 4000000 IU; Cholecalciferol 800000 IU; Vitamin E, 14000 IU; Vitamin K₃, 760 mg; Vitamin B₂, 2800 mg; Vitamin B₆, 1520 mg; Vitamin B₁₂, 7.6 mg; Nicotinic acid, 18000 mg; Folic acid, 560 mg; Pantothenic acid, 4400 mg; Choline chloride, 190000 mg; biotin, 45.3 mg; Zinc, 16000 mg; Manganese, 25600 mg; Iron, 12800 mg; Copper, 3200 mg; Selenium, 64 mg; Iodine, 320 mg

Table 2: Effects of dietary garlic meal on feed intake, weight gain and feed conversion ratio of experimental birds

Dietary garlic meal level (%)	Starter (1-21 days of age)			Grower (22-42 days of age)			Total phase (1-42 days of age)		
	Feed intake (g/bird/day)	Body weight gain (g/bird/day)	Feed conversion ratio	Feed intake (g/bird/day)	Body weight gain (g/bird/day)	Feed conversion ratio	Feed intake (g/bird/day)	Body weight gain (g/bird/day)	Feed conversion ratio
0	45.70ab	24.70	1.85a	161.90	72.50b	2.23a	103.80	48.60b	2.13a
0.125	46.00a	25.90	1.78ab	161.20	77.30a	2.08b	103.60	51.60a	2.01c
0.25	45.90a	26.20	1.75ab	161.80	76.00a	2.13ab	103.80	51.10a	2.03bc
0.5	44.80b	25.90	1.73b	159.50	77.30a	2.06b	102.10	51.60a	1.98c
1	45.80ab	25.10	1.75ab	160.30	76.10a	2.11b	103.10	51.10a	2.01c
2	45.40ab	26.00	1.82ab	158.70	71.20b	2.23a	102.00	48.10b	2.12ab
SEM	0.14	0.21	0.01	0.56	0.41	0.01	0.59	0.54	0.01

^{a,b}Values in the same column in each comparison group, with no common superscript differ significantly ($p < 0.05$)

Table 3: Effects of dietary garlic meal on carcass interior organs of broiler chickens

Dietary garlic meal level (%)	Carcass (%)	Small intestine (%)	Small intestine length (cm)	Proventriculus (%)	Gizzard meal (%)	Liver (%)	Abdominal fat pad (%)
0	71.2	3.65	178.00	0.61	2.16	2.98	1.81
0.125	70.5	3.74	178.50	0.64	2.08	2.73	2.25
0.25	71.5	3.39	176.50	0.56	2.11	2.79	2.10
0.5	71.6	3.56	182.70	0.60	1.97	2.90	1.92
1	70.3	3.45	172.70	0.69	2.02	2.99	2.41
2	70.2	3.72	180.70	0.65	1.97	3.00	2.05
SEM	0.29	0.10	2.19	0.02	0.05	0.06	0.12

^{a,b}Values in the same column in each comparison group, with no common superscript differ significantly ($p < 0.05$)

For the past 4 decades, antibiotics have been used in animal agriculture to improve the growth performance and to protect animals from the adverse effects of pathogenic and non-pathogenic enteric microorganisms. Recently, the use of antibiotics, have come under increasing scrutiny because of the potential development of antibiotic resistant human pathogenic bacteria after long use.

Alliums such as garlic have been studied extensively for their health benefits. More than a thousand publications over the past decade alone reveal the widespread interest in this class of foods. Garlic, in particular, is considered to be one of the best disease-preventive foods because of its potent and widespread effects. The main aim of this research was finding the favorite dietary dosage for garlic meal in broiler ratios.

The data of present study show that a 2% dietary garlic meal can affect adversely the daily weight gain of broiler chickens. Shi *et al.* (1999) fed broiler chickens with diets containing 0.2, 1 or 2% garlic meal and reported that the highest total and individual weights gains were given by supplementation with 1% garlic and feed consumption was also highest with this rate.

The benefit of garlic meal on performance of broiler chickens reported by Dey and Samanta (1993) too. But, Horton *et al.* (1991) fed male broiler chickens on diets containing dried garlic 0, 100, 1000 or 10,000 mg kg⁻¹ and noted that inclusion of garlic in the diet did not improve performance of broiler chickens. Jagdish and Pandey (1994) found a lower feed conversion ratio in cocks fed diets with 0.25% garlic meal in compare to control group and birds fed 0.5% dietary garlic meal.

CONCLUSION

Garlic meal as a valuable feed additive is used in many areas of world but the some what controversial reports about its effects and recommended dosage in commercial diets can be misleading. The weight gains reduction in birds fed 2% dietary garlic meal means that herbal additives have their limitations too and needs more investigation.

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