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Research Article

EFFECT OF INORGANIC SULPHATE SUPPLEMENTATION ON THE CARCASS YIELD OF TURKEY BROILERS IN FISH MEAL FREE RATION

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ABSTRACT

One hundred and eighty, day-old turkey poults were subjected to nine dietary treatments up to 16 weeks of age to study the effect of inorganic sulphate supplementation (0.20, 0.30 and 0.40 % level) without lysine (T2, T3 and T4) and with lysine (T6, T7 and T8) on growth response and dressing percentage, giblet, liver, heart, gizzard and ready to cook yield per cent. Diets in treatment T1 – fish meal free without sodium sulphate and lysine, in T5 – fish meal free without sodium sulphate but with lysine and in T9 – without sodium sulphate, without lysine but supplemented with fish meal were given. The dressing percentage, giblet, liver and ready to cook yield percent in T4 and T8 increased significantly ($P<0.05$) as compared to fish meal supplemented group (T9). The heart and gizzard per cent of birds in fish meal fed (T9) and fish meal free sodium sulphate supplemented diets (T2, T3, T4, T6, T7 and T8) were comparable. The study revealed that addition of 0.40% sodium sulphate to vegetable protein based fish meal free ration improved carcass yield of turkey broilers.

Key words: Turkey broiler, sodium sulphate, fish meal, lysine, carcass yield

Poultry meat contributes 27.1 % of total meat production of the world. The demand for turkey meat which hitherto is restricted to Christmas and festival periods has now grown to an all year round feature. A major constraint in its rapid progress is the increasing cost of feedstuffs. Fish meal is commonly used in the poultry ration which provides all essential amino acids including lysine and methionine. Good quality fish meal is scarcely available, is very costly and has problems of storage due to its high oxidizability. To fulfil the requirements of essential amino acid in broiler ration, use of certain substances with possible sparing effect on certain essential amino acids is desired. Sodium sulphate has the ability to spare or replace sulphur containing amino acids (Soarsce *et al.* 1974). Without affecting the growth rate, fish meal can be completely replaced by vegetable proteins if the ration is supplemented with methionine and inorganic sulphate (Aggarwala and Gilmore, 1966).

Growing pullets can be successfully raised on diets containing vegetable protein, preferably supplemented with sulphate alone or with choline (Bhardwaj *et al.*, 1999). Hence, this study was conducted to observe the effect of supplementation of inorganic sodium sulphate in fish meal free ration in terms of growth response and carcass yield of turkey broilers.

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MATERIALS AND METHODS

One hundred and eighty, day-old turkey poults were procured from Hessarghata, Bangalore and reared in the Department under standard management conditions. The poults were wing banded and randomly distributed into nine dietary treatments, each treatment having two replicates of 10 poults each. The birds were reared under deep litter system with uniform floor, feeder and waterer spaces. Standard management conditions were adopted throughout the experimental period.

A basal diet was formulated according to the NRC (1994) specifications (Table 1). The supplements were added over and above 100 % of the ingredient composition. The birds of control group (T1) were fed with basal diet (fish meal free ration) without supplementation of sodium sulphate and lysine. Inorganic sodium sulphate was added in the feed at a level of 0.2% (T2), 0.3% (T3) and 0.4% (T4) alone and in combination with lysine (Table 1) in T6, T7 and T8 at 0.2%, 0.3% and 0.4% levels, respectively. In groups T5

Table 1
Per cent composition of experimental diets (kg/100 kg feed)

Ingredient	Treatment group	Age in weeks 0-4	4-8	8-12	12-16
Soyabean meal	T1-T9	20	-	20	-
	T1-T8	-	20	-	12
	T9	-	13	-	8
Maize	T1-T9	22	29.24	41	40
Rice polish	T1-T9	12.6	12	15	29
GNC	T1-T8	41.4	35	20	14.4
	T9	31.08	31	9.37	9
Fish meal	T9	10	10	10	10
GN oil	T1-T8	1.5	1.26	1.5	2.1
	T9	1.82	2.26	2.13	1.5
Lysine (98%)	T5-T8	0.46	0.41	0.36	0.33
Sodium sulphate	T2 & T6	0.20	0.20	0.20	0.20
(99%)	T3 & T7	0.30	0.30	0.30	0.30
	T4 & T8	0.40	0.40	0.40	0.40
Min. mix.	T1-T9	2.5	2.5	2.5	2.5
Feed supplements and additives (g/100kg of ration)					
Spectromix	T1-T9	10	10	10	10
Spectro BE	T1-T9	20	20	20	20
Cocciwin	T1-T9	50	50	50	50
Choline chloride	T1-T9	1.9	1.8	1.3	1.1

Mineral mixture (salt free)-Calcium (32%), Copper (100 ppm), Zinc (0.26%), Iodine (0.01%), Phosphorus (6%), Manganese (0.27%), Iron (1000 ppm) and Cobalt (50 ppm); Each gm of Spectromix powder (Ranbaxy Animal Health, New Delhi) contained vitamin A-82,500 IU, vit. D3-12,000 IU, vit. B2-50 mg and vit. K-10mg; Each gm of Spectro BE powder (Ranbaxy Animal Health, New Delhi) contained vit.B1-8 mg, vit.B6-16 mg, vit.B12-80 mg, niacin- 120mg, calcium pentothenate - 80mg, vit. E-160 mg, lysine hydrochloride-10 mg, DL-methionine- 10 mg and calcium – 260mg; Cocciwin: Dinitro-O-Toluamide.

and T9, basal diet supplemented with lysine and basal diet containing 10% fish meal, respectively were fed (Table 1).

A record of feed intake and biweekly weight gain was maintained throughout the 16 week experimental period. At 16 weeks of age, randomly 4 turkey broilers from each group were sacrificed to study the treatment effect on various parameters of carcass yield viz. dressing percentage, giblet, liver, heart, gizzard and ready to cook yield per cent. The remaining birds were reared by the Department for future multiplication and maintenance. The data obtained were analysed statistically by the methods of Snedecor and Cochran (1994) by one way ANOVA. Means were compared by calculating critical difference (C.D.) at $P<0.05$. The animal care and experimental protocol were approved by the Institutional Animal Ethics Committee of the university.

RESULTS AND DISCUSSION

A significant effect ($P<0.05$) of 0.4% sodium sulphate supplemented diet with or without lysine (T4 and T8) was observed on dressing percent, giblet, liver and ready to cook yield in comparison to fish meal added diet (T9) (Table 2). The values of heart and gizzard per cent were found comparable among all the groups (Table 2). Similarly, the body weight gain of turkey broilers at 16 weeks of age in T4 and T8 increased significantly ($P<0.05$) as compared to fish meal supplemented group (T9). The feed consumption and feed conversion ratio (FCR) of birds in fish meal fed (T9) and fish meal free sodium sulphate supplemented diets (T2, T3, T4, T6, T7 and T8) were comparable (Table 2). These findings are consistent with those of Yadav (1994) who also reported increased weight gain, dressing, eviscerated and organ weights of carcass in broilers fed with sodium sulphate having lysine supplemented diet. Ologhobo *et al*. (1998) also observed that body weight and liver weight increased in diets supplemented with different levels of inorganic sulphate. Ahmad *et al.* (2006) in a study reported better carcass and parts yield in sodium sulphate supplemented broiler diets. Similarly, Himanshu *et al.* (2009) reported that slaughtered weight, dressing percent and eviscerated percentage were significantly influenced in diet supplemented with sodium sulphate.

The better carcass traits of the present study may be due to better utilization of inorganic sulphate to meet the sulphur requirement of the body which improved the growth of turkey broilers. It has been reported that feeding of inorganic sulphate supplemented diets increased the taurine content in liver (Martin, 1972). Therefore, heavier weight of organs in T4 and T8 may be due to increased taurine content of these organs.

It may be inferred upon that inorganic sulphate might be better utilized to meet sulphur requirement of the body in comparison to that met by supplementation of sulphur containing amino acid through fish meal. Therefore, addition of 0.4% sodium sulphate to vegetable protein based ration may overcome the deficiency of methionine and can

give better carcass yield than that of fish meal containing diet.

Table 2
Effect of inorganic sulphate supplementation on growth response and carcass traits of turkey broilers

Treatments	Weight gain (g/bird)	Feed consumed (g/ bird)	FCR	Dressing %	Giblet %	Heart %	Liver %	Gizzard %	Ready to cook yield %
T1 (Control)	$2370.63^{d}\pm56.78$	$7917.81^{b}\pm5.31$	$3.34^{a}\pm0.14$	$71.22^{cd}\pm0.12$	$6.16^{b}\pm0.04$	$0.61^{b}\pm0.01$	$2.32^{bc}\pm0.03$	$3.22^{b}\pm0.02$	$77.38^{cd}\pm0.15$
T2 (0.2% Na2SO4)	$3068.50^{ab}\pm106.76$	$8530.27^{ab}\pm2.5$	$2.78^{bc}\pm0.01$	$71.66^{ab}\pm0.19$	$6.28^{b}\pm0.09$	$0.67^{a}\pm0.01$	$2.25^{c}\pm0.08$	$3.37^{a}\pm0.02$	$77.94^{b}\pm0.21$
T3 (0.3% Na2SO4)	$3260.61^{ab}\pm90.40$	$9031.94^{a}\pm0.84$	$2.77^{bc}\pm0.01$	$71.42^{bc}\pm0.08$	$6.29^{b}\pm0.14$	$0.63^{ab}\pm0.01$	$2.27^{bc}\pm0.15$	$3.39^{a}\pm0.01$	$77.71^{bc}\pm0.20$
T4 (0.4% Na2SO4)	$3297.78^{a}\pm100.09$	$9101.94^{a}\pm1.94$	$2.76^{bc}\pm0.08$	$71.55^{b}\pm0.15$	$6.58^{a}\pm0.12$	$0.65^{ab}\pm0.01$	$2.51^{ab}\pm0.10$	$3.42^{a}\pm0.02$	$78.13^{b}\pm0.23$
T5 (Lysine)	$2763.15^{c}\pm73.05$	$8317.0^{ab}\pm2.0$	$3.01^{b}\pm0.03$	$71.68^{ab}\pm0.08$	$6.25^{b}\pm0.11$	$0.66^{ab}\pm0.02$	$2.18^{c}\pm0.16$	$3.41^{a}\pm0.03$	$77.93^{b}\pm0.18$
T6 (Lysine+0.2% Na2SO4)	$3034.89^{abc}\pm123.46$	$8376.38^{ab}\pm0.84$	$2.76^{bc}\pm0.01$	$71.09^{d}\pm0.04$	$6.23^{b}\pm0.05$	$0.65^{ab}\pm0.02$	$2.17^{c}\pm0.04$	$3.42^{a}\pm0.03$	$77.32^{cd}\pm0.08$
T7 (Lysine+0.3% Na2SO4)	$3233.42^{ab}\pm123.90$	$8884.17^{a}\pm469.16$	$2.75^{bc}\pm0.14$	$71.24^{cd}\pm0.04$	$6.66^{a}\pm0.05$	$0.63^{ab}\pm0.01$	$2.64^{a}\pm0.07$	$3.40^{a}\pm0.03$	$77.90^{b}\pm0.08$
T8 (Lysine+0.4% Na2SO4)	$3329.89^{a}\pm93.83$	$9015.44^{a}\pm473.44$	$2.71^{c}\pm0.14$	$71.94^{a}\pm0.02$	$6.79^{a}\pm0.03$	$0.65^{ab}\pm0.02$	$2.75^{a}\pm0.04$	$3.39^{a}\pm0.04$	$78.73^{a}\pm0.05$
T9 (Fish meal)	$2982.32bc\pm69.36$	$8732.77^{ab}\pm462.77$	$2.93^{bc}\pm0.16$	$71.12^{d}\pm0.09$	$6.13^{b}\pm0.02$	$0.65^{ab}\pm0.02$	$2.10^{c}\pm0.04$	$3.39^{a}\pm0.02$	$77.25^{d}\pm0.07$

Values are mean ±S.E.; Means bearing different superscripts in a column differ significantly ($P<0.05$).

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