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Influence of various commercial dietary salts as a mineral source supplementation on performance of broiler

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ABSTRACT: The present study was carried out at SAU- Tandojam during, 2013 where, one hundred twenty (120) day-old Hubbard broiler were kept under study and divided in four groups (A, B, C and D). The treatments were: common salt (CS), rock salt (RS) and black salt (BS) at the rate of 0.3 percent while, the group A was kept as control without addition of salts supplementation. The feed intake was recorded (3700, 3644, 3560 and 3610) g/bird with water intake (7545, 8080, 8120 and 7880) ml/bird and an average live body weight was noted (1680, 1800, 1850 and 1750) g/bird in different groups as; A, B, C and D, respectively. The feed conversation ratio was also recorded (2.20, 2.02, 1.92 and 2.06) and the carcass weight (975, 1080, 1140 and 1030) g/bird whereas, the dressing percentage (58.03, 60.00, 61.62 and 58.85) was recorded in sequenced groups. The heart, liver, gizzard, crop, spleen, intestine and proventriculus weight was found to be non significant in respective groups. Simultaneously, the mortality ratio was observed in which, the higher was found (10.00%) in group-A (control) and the lowest (3.33%) in group-C. Finally, economics of broiler was calculated and net profit (Rs. 13.90, 29.93, 34.48 and 12.16) per bird was taken in sequenced groups. These figures indicated that the birds in group C fed on mash ration contained (0.3%) rock salt had remarkably higher net profit (Rs. 34.48) as compared to broiler in other treated groups. The analysis of variance of feed and water intake, live body weight and carcass weight results found the significantly different ($P<0.05$) whereas, the net profit in group C remarkably higher.

***Keywords*:** Salts, minerals, ration, net profit, poultry

INTRODUCTION

The poultry industry has occupied a leading role among agricultural industries in many parts of the world (Daghir, 2008). During the past half century, chicken meat production has changed with annual production of more than 7 billion broiler and roasters (Khan, 2009). Poultry meat contributes 26.8% of the total meat production in the Pakistan. Poultry sector has shown a robust growth of 7 to 8% annually, which reflects its inherent potential (Farooq, 2013). Broiler industry can be adopted under a wide range of climatic conditions and can generally be combined conveniently with other farm enterprises (Kazi, 2003). Poultry diets are formulated from a mixture of ingredients, which are assembled on a least-cost basis, taking into consideration their nutrient contents as well as their unit prices (Ravindra, 1993). Minerals are naturally occurring elements found in the earth having a characteristic crystalline structure and chemical composition. Animals utilize the minerals found in plants as well as from the water supply, this paradigm continues up the food chain. The most common and sometimes the least expensive form of a mineral is a mineral salt (Ionique, 2012) which is vital that calcium is supplied in adequate

quantities and on a consistent basis to achieve optimum performance and quantity to optimize skeletal structure and growth of broiler. Excessive levels of these minerals results in increased water intake. Shortage of minerals in the body can affect feed intake, growth (Arbor, 2009). Sodium, potassium and chloride are strong ions responsible for the acid-base equilibrium and the pH of blood and tissue, which play a particularly important role under thermal stress (Borges*,* 2003). Sodium is involved in numerous physiological processes, and it is known to affect enzyme activities and tissue protein synthesis (Olanrewaju*,* 2007).

Management and deficiency of macro minerals in ration/feed may cause the disease problems and significantly reduced production, live body weight of poultry (Abbasi*,* 2013). Lower feed consumption, loss of weight and slower growth in broiler are the consequences of salt deficiency in the ration of poultry (Ahmed, 2001). In intensively raised fast-growing chickens an adequate intake of dietary sodium has a beneficial influence on feed consumption and the growth rate of birds (Borges*,* 2004). In many experiments the growth performance of birds was improved when the sodium content of feed was increased (Oviedo-Rondon, 2001). An increase in dietary sodium also found to improve breast muscle yield, and to reduce abdominal fat deposition (Mushtaq, 2005). The negative consequences of an increased dietary intake of sodium chloride include higher water consumption levels (Mushtaq*,* 2007) which increases the risk of many diseases (including foot pad dermatitis - FPD) and other health problems encountered in poultry production (Juskiewicz, 2009). There are two different types of salt (rock salt and evaporated salt) produced essentially equal growth responses and feed utilization in chicks (Dilworth*,* 1970). The dietary sodium intake is often increased in broiler to stimulate their growth (Jankowski*,* 2011a). Higher sodium and chloride requirement is probably due to the faster growing strains of broiler are being used today, the higher energy diets being fed, and the fact that sodium and chloride in drinking water was not taken into account in initial estimates of the requirement (Britton, 1990). On considering the importance of minerals in broiler diet, this study was, therefore, designed to evaluate the influence of intake of various salts on performance of broiler.

MATERIALS AND METHODS

The present study was carried out to investigate the influence of various commercial dietary salts as a mineral source supplementation on performance of broiler during October-November, 2013 at the Poultry experiment Station. Faculty of Animal Husbandry and Veterinary Sciences, Sindh Agriculture University Tandojam. The study was based on 120 broiler, purchased from Hyderabad. The chicks were initially weighed and recorded as day old. The chicks were housed in a hygienically prepared shed. The experimental chicks were divided in a randomized block design into four groups (A, B, C and D) having 30 chicks in each group. Group A was fed on mash ration without adding salt supplementation and considered as control group, while the groups B, C and D were fed on mash ration supplemented with common salt, rock salt and black salt at the rate of 0.3 percent (Table-1). The floor housing system was introduced, in which one square feet space was provided to each chick. The poultry house was entirely cleaned, washed with fresh water and disinfectant. Disinfectant solution was prepared with phenol and potassium permanganate. Entire shed was also coated with limestone and allowed to dry over 24 hours. The recommended temperature and humidity was maintained through trial and recorded.

The wooden dust was used as litter which dried under sunlight over 12 hours and checked and taken out its thick material to maintain litter quality. Litter was used at 4 inches depth for each group of broiler. The lime stone was mixed with litter to check the infection and litter turning was practiced 2-3 times in week to minimize the gas production in the shed. The brooders were test run two days before the arrival of day old chicks, at temperature 95±2ºF. Each group was provided separate brooder. During first week, brooding temperature of 95±2ºF was maintained which was reduced by 5ºF each week till 70±2ºF as house temperature. During brooding 60 watt electric bulbs were fitted in to electric brooder and placed in the centre of each allocated area. One thermometer was placed at the height of 6 inches near the brooder to monitor the brooding temperature. The lighting was provided by using 60 watt bulbs fixed with roof at height of 8 feet. However, florescent tube light/chargers were used at the time of light failure to cover the 24 hours. The following vaccines were purchased and used for vaccination time to time as given in (Table-2).

Table 1. The formulation of various rations used for broiler

Sr. #.	Ingredients (%)	Group-A (Control)		Group-B (Common salt)		Group-C (Rock salt)		Group-D (Black salt)	
		Starter	Finisher	Starter	Finisher	Starter	Finisher	Starter	Finisher
1	Rice	19.00	22.30	18.84	22.00	18.84	22.00	18.84	22.00
2	Maize	30.00	35.00	30.00	35.00	30.00	35.00	30.00	35.00
3	Rice Polish	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
4	S. Bean Meal	28.00	23.00	28.00	23.00	28.00	23.00	28.00	23.00
5	Canola Meal	10.00	8.00	10.00	8.00	10.00	8.00	10.00	8.00
6	C.G F 60%	3.64	2.55	3.50	2.55	3.50	2.55	3.50	2.55
7	Limestone	2.00	1.80	2.00	1.80	2.00	1.80	2.00	1.80
8	DCP	1.73	1.73	1.73	1.73	1.73	1.73	1.73	1.73
9	L – Lysine	0.16	0.18	0.16	0.18	0.16	0.18	0.16	0.18
10	DL.Methionine	0.15	0.12	0.15	0.12	0.15	0.12	0.15	0.12
11	Premix	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
12	Salt	0.00	0.00	0.30	0.30	0.30	0.30	0.30	0.30
Total		100	100	100	100	100	100	100	100
Chemical Analysis of proposed ration %									
Crude protein		22.703	20	22.703	20	22.703	20	22.703	20
Mekcal/kg		2846	2923	2846	2923	2846	2923	2846	2923
Lysine		1.324	1.11	1.324	1.11	1.324	1.11	1.324	1.11
DL-Methionine		0.54	0.46	0.54	0.46	0.54	0.46	0.54	0.46
Calcium		1.1	1.074	1.1	1.074	1.1	1.074	1.1	1.074
Phosphorus		0.47	0.42	0.47	0.42	0.47	0.42	0.47	0.42

Table 2. Vaccination schedule in experimental field during, 2013

Sr. #.	Vaccines	Age of broiler	Route of Administration
1	New Castle + Infectious Bronchitis	3 days	Eye drop (ED)
2	Infectious Bursal Disease	12 days	Drinking water (DW)
3	Hydro Pericardium Syndrome	17 days	Sub cut (SC)
4	Infectious Bursal Disease	22 days	Drinking water (DW)
5	New Castle + Infectious Bronchitis	28 days	Drinking water (DW)

The quantity of feed and water were recorded on daily basis and computed on weekly basis by using following formula of each group. Feed consumed= Feed offered-Feed refused, Water consumed= Water offered-Water refused. At time of arrival of flock, initial body weights of chicks were taken by electric weighing balance and the weight was recorded on weekly basis. After completion of experiment all birds were weighed again for their live body weight. At the end of experiment three birds from each group were slaughtered and their carcass weight was recorded.

$$\text{Dressing \%} = \frac{\text{Carcass weight}}{\text{Live body weight}} \times 100$$

After the completion of six weeks, three broilers were randomly selected and slaughtered from each groups for weighing of edible and non edible parts. Total number of dead birds was recorded and mortality percentage obtained from each group separately by using following formula.

$$\text{Mortality} = \frac{\text{Total number of dead birds}}{\text{Total number of birds reared}} \times 100$$

The economics of ration was computed from income and expenditure and finally profit of each group was calculated: Net returns = income – expenditure.

Statistical analysis

The data so obtained was tabulated and analyzed according to statistical procedure for analysis of variance (ANOVA) and in case of significant difference ,the mean were further computed used least significant difference (LSD) at 5% level of probability through computerized statistical package i.e. student edition of Statistix (SXW), version 8.1 (copyright 2005, analytical software, USA).

RESULTS AND DISCUSSION

RESULTS

Feed consumption

The data on the feed consumption of broiler of different groups were analyzed and results are presented in (Table-3). The results shows that feed consumption of broiler in group-A was higher (3700 g/bird), while the feed consumption decreased to (3644 g/bird) in broiler of group-B. The feed consumption further decreased to (3610 g/bird) in broiler of group-D. The lowest feed consumption of broiler (3560 g/bird) was observed in group-C. However, the results of statistical analysis (ANOVA) showed that the mean of feed consumption of broiler with various salts supplementation in ration of all groups was found highly significant (P<0.05) to each other.

Table 3. Average feed consumption (g/bird) of broiler fed with various salts supplementation in ration

	Groups				
Weeks	A	B	C	D	P. Value
W1	125	118	103	110	0.0000
W2	328	320	312	315	
W3	516	502	492	508	
W4	723	715	700	718	
W5	908	900	888	912	LSD (0.05) = 12.238
W6	1100	1089	1065	1047	SE± = 5.3072
Total	3700[a]	3644[b]	3560[d]	3610[c]	

Water consumption

The data on the water consumption of broiler of different groups were analyzed and results are presented in (Table-4). The result showed that water consumption of broiler in group-C was higher (8120 ml/bird), while the water consumption decreased to (8080 ml/bird) in broiler of group-B. The water consumption further decreased to (7880 ml/bird) in broiler of group-D. The lowest water consumption of broiler (7545 ml/bird) was observed in group-A. However, the results of statistical analysis (ANOVA) showed that the mean of water consumption of broiler with various salts supplementation in ration of all groups was found highly significant (P<0.05) to each other.

Table 4. Average water consumption (ml/bird) of broiler fed with various salts ssupplementation in ration

	Groups				
Weeks	A	B	C	D	P. Value
W1	260	296	300	286	
W2	690	780	785	745	
W3	1098	1243	1255	1190	0.0000
W4	1442	1552	1560	1525	
W5	1845	1950	1955	1905	
W6	2210	2259	2265	2229	LSD (0.05) = 25.540
Total	7545[d]	8080[b]	8120[a]	7880[c]	SE± = 11.075

Live Body Weight (g/bird) of Broiler

The body weight of broiler of different groups was analyzed and results depicted as in the final body weight which was recorded in group A, B, C and D as: 1680, 1800, 1850 and 1750 g/bird in sixth week, respectively and then total was counted (Table-5). It was noted that the body weight of broiler of group C was found to be remarkably (P<0.05) higher than the group A, B, and D. However, the results of statistical analysis (ANOVA) showed that the mean of live body weight of broiler with various salts supplementation in ration of all groups was found highly significant (P<0.05) to each other.

Table 5. Average live body weight (g/bird) of broiler fed with various salts supplementation in ration

	Groups				
Weeks	A	B	C	D	P. Value
W1	96	100	110	82	
W2	250	260	275	229	0.0000
W3	500	511	540	475	
W4	812	870	915	820	
W5	1200	1245	1302	1230	
W6	1680	1800	1850	1750	LSD (0.05) = 11.758
Total	2899[d]	3026[b]	3184[a]	2877[c]	SE± = 5.0990

Feed conversion ratio and Carcass weight (g/bird)

The feed conversation ratio (FCR) of broiler in different groups (A= control, B=0.3% common salt, C=0.3% rock salt and D=0.3% black salt) were calculated. The feed conversation ratio in group A was recorded as 2.20, B: 2.02, C: 1.92 and D: 2.06 groups. The most efficient ratio of feed conversation were recorded in group C (0.3% rock salt) which indicated the 1.92, the broiler in this group consumed 3560 g of feed followed by group-D, B and A, respectively. This indicated that, the broiler in these three groups (A, B and D) consumed higher feed and gained one kilogram of live body weight.

The data on the carcass weight of broiler in different groups were analyzed and results are presented in (Table-6). The results showed that highest carcass weight of broiler was achieved in group-C (1140 g/bird), while the carcass weight decreased to (1080 g/bird) in broiler of group-B whereas, carcass weight further decreased to (1030 g/bird) in broiler of group-D. Moreover, the lowest carcass weight of broiler (975 g/bird) was recorded in broiler of group-A. However, the results of statistical analysis (ANOVA) showed that the mean of carcass weight of broiler with various salts supplementation in ration of all groups was found highly significant (P<0.05) to each other. The results showed that higher dressing percentage of broiler was observed 61.62% in group-C while, the dressing percentage decreased (60.00%) in broiler of group-B, whereas, dressing percentage further decreased (58.85%) in broiler of group-D. The lowest dressing percentage of broiler (58.03%) was recorded in broiler of group-A. It was observed that the dressing percent of broiler of group C was higher than the group A, B, and D.

Table 6. Average feed conversation ratio and carcass weight (g/bird) of broiler fed with various salts supplementation in ration

	Groups				
Particulars	A	B	C	D	P. Value
FCR	2.20	2.02	1.92	2.06	
Carcass weight	975^{d}	1080^{b}	1140^{a}	1030^{c}	0.0000
Live body weight	1680	1800	1850	1750	LSD (0.05) = 14.027
Dressing %	58.03	60	61.62	58.85	SE± = 6.0828

Weight of edible and non edible parts

The data on the weight of edible parts of broiler of different groups were analyzed and results are presented that showed that highest heart, liver and gizzard weight of broiler was achieved in group-C (11.08, 48.40 and 41.40g/bird), while the heart, liver and gizzard weight decreased to (10.63, 47.30 and 40.00 g/bird) in broiler of group-B; whereas, heart, liver and gizzard weight further decreased to (10.59, 47.00 and 39.40 g/bird) in broiler of group-D. Moreover, the lowest heart, liver and gizzard weight of broiler (10.05, 46.40 and 39.30 g/bird) was recorded in broiler of group-A. However statistical analysis (ANOVA) were showed that the mean of edible parts heart, liver and gizzard showed the non significant difference (P>0.05) in all four groups as A, B, C and D, respectively.

The data on the weight of non-edible parts of broiler of different groups were analyzed and results are presented in (Table-7). The results showed that highest crop, spleen, intestine and proventriculus weight of broiler was observed in group-C (77.16, 2.59, 112.0 and 118.0 g/bird), while the crop, spleen, intestine and proventriculus weight decreased to (76.89, 2.52, 110.0 and 114.0 g/bird) in broiler of group-B; whereas, the crop, spleen, intestine and proventriculus weight further decreased to (73.55, 2.44, 106.0 and 111.0 g/bird) in broiler of group-D. Moreover, the lowest crop, spleen, intestine and proventriculus weight of broiler (69.50, 2.26, 103.60 and 109.0 g/bird) was recorded in broiler of group-A. The results indicated that non edible parts such as; crop, intestine, spleen and proventriculus of broiler was found non-significant (P>0.05) within different groups. The mmortality percent was found relatively higher (10.00%) in group-A (control) while, the lowest mortality of 3.33 percent in group-C.

Table 7. Average weight of edible and non edible parts (g/bird) of broiler fed with various salt supplementations in ration

Weight of edible and non-edible parts	Groups				P. Value
	A	B	C	D	
Heart	10.05^{b}	10.63^{ab}	11.08^{a}	10.59^{ab}	0.0719
Liver	46.40^{a}	47.30^{a}	48.40^{a}	47.00^{a}	0.3069
Gizzard	39.30^{a}	40.00^{a}	41.40^{a}	39.40^{a}	0.2205
Crop	69.50^{a}	76.89^{a}	77.16^{a}	73.55^{a}	0.4561
Spleen	2.26^{a}	2.52^{a}	2.59^{a}	2.44^{a}	0.2926
Intestine	103.60^{b}	110.00^{ab}	112.00^{a}	106.00^{ab}	0.1422
Proventriculus	109^{b}	114^{ab}	118^{a}	111^{ab}	0.0822
Mortality %	10.00	6.66	3.33	6.66	

Economics

Economic evaluation of feed containing various salts supplementation were carried out on the basis of series in different variables which accumulated productions such as; total cost of production, total income and net profit. The data so calculated of the experiment are presented in (Table-8). The total cost of production in groups A, B, C and D after accumulation of other costs i.e., cost of day old chicks, total feed cost, cost of various salts and miscellaneous expenditure was Rs. 205.00, 204.57, 206.52 and 215.84 rupees/bird, respectively. Simultaneously, the total generated income per bird of groups A was Rs. 218.90, B: 234.50, C: 241.00 and D: 228.00 rupees/ bird, with a net profit per bird of group A, B, C and D was Rs. 13.90, 29.93, 34.48 and 12.16, respectively. These figures indicated that birds in group C fed on mash ration containing 0.3% rock salt had remarkably higher net profit (Rs: 34.48) as compared to birds in other treated groups.

Table 8. Economics of broiler production with profit or loss statement

Sr. #.	Economic parameters	A	B	C	D
a.	Cost of day-old chicks (Rs: / per bird)	32.00	32.00	32.00	32.00
b.	Total feed cost per bird (Rs: 40.00/kg)	148.00	145.75	142.40	144.40
c.	Cost of salts (Rs:0.3 / percent / 50kg begs)	0.00	1.82	7.12	14.44
d.	Miscellaneous expenditure (Rs: / broiler)	25.00	25.00	25.00	25.00
e.	Total cost of production (Rs: / broiler) (1+2+3+4)	205.00	204.57	206.52	215.84
f.	Average weight of the broiler at 42 days (kg / broiler)	1.680	1.800	1.850	1.750
g.	Income on sale (Rs:120 / kg)	218.40	234.00	240.50	227.50
h.	Miscellaneous income on the sale of empty bags	0.50	0.50	0.50	0.50
i.	Total income (Rs: broiler) (7+8)	218.90	234.50	241.00	228.00
j.	Net profit (Rs: broiler) (9-5)	13.90	29.93	34.48	12.16

Note: cost of light, water and house charges etc. were not included.

DISCUSSION

The results of present study showed that the feed consumption of broiler of group A (control) was increased 3700 g/bird, B (common salt) 3644, C (rock salt) 3560 and D (black salt) 3610 g/bird with the use of supplement (0.3%) to each group, respectively. The results of present findings, showed that the feed consumption of broiler of group C was found to be remarkably ($P<0.05$) lower in which the C group took less feed consume and increased the body weight, respectively. The present findings are in agreement with Murakami*,* (1997a) reported the feed intake was significantly influenced by levels of sodium chloride. Consequently, in a preliminarily study conducted by the (Dilworth, (1970) who observed a significant improvement in feed utilization at 30 days of age due to increased particle size of rock salt. Mahmud*,* (2010) concluded that feed intake in the chickens was positively affected by the increased of sodium supplement and the feed consumption was the independent of dietary sodium treatments.

The water consumption of broiler in group C (rock salt) 8120 increased whereas, it decreased in group B (common salt) 8080, D (black salt) 7880 and A (control) 7545 ml/bird with the use of supplement (0.3%) in each group. It was observed during the study that the water consumption of broiler of group C was found increased which was to be significantly more than the group A, B, and D. Current findings of study are supported by Nagwa and Maghraby, (1995) who recommended that the highest dose of sodium chloride increased water intake of broiler. Vargas, (2005) evaluated the level of sodium chloride in diets of chicks that during 21 to 42 days water intake was higher for broiler. Mahmud*,* (2010) described the water consumption was increased with the increasing level of sodium in diet that water consumption has direct relationship with level of sodium in diet.

The body weight of broiler of group A (control) 1680, B (common salt) 1800, C (rock salt) 1850, and D (black salt) 1750 g/bird in which the group C found to be increased with the use of supplement (0.3%) to each group. The sodium and chloride levels significantly influenced 21 day body weight of broiler (Murakami*,* 1997b) in which, the rock salt has better effect on growth of broiler (Dilworth, 1970). Vieira, (2003) and Jankowski*,* (2011b) reported the addition of sodium chloride in ration significantly increased the body weight of chickens. The feed conversation ratio in group A was recorded 2.20, B: 2.02, C: 1.92 and D: 2.06 in which the C group produced among better results. Similar, findings are supported by EL-Deek*,* (2009) recorded the best feed conversion ratio in broiler chickens fed diet supplemented with 0.3% sodium chloride. Koreleski*,* (2010) investigated that feed conversion ratio in the chickens were positively affected by increasing the sodium supplement. Carcass weight of broiler raised under group A, B, C and D was recorded 975, 1080, 1140 and 1030 g/bird, respectively. The results are confirmed by Koreleski*,* (2011) reported that sodium supplementation in broiler significantly increased carcass yield. The results showed that higher dressing percentage of broiler was observed as 61.62% in group-C, while the dressing percentage decreased to (60.00%) in broiler of group-B whereas, dressing percentage further decreased to (85.85%) in broiler of group-D. Moreover, the lowest dressing percentage of broiler (58.03%) was recorded in

broiler of group-A. The findings of present study confirmed by EL-Deek, (2009) who recorded the highest dressing percentages in chickens fed diet containing 0.3% sodium chloride and 0.5% sodium chloride.

The average weight of heart, liver, and gizzard weight of group A was recorded 10.05, 46.40 and 39.30 g/bird, B- 10.63, 47.30 and 40.00 g/bird D- 10.59, 47.00 and 39.40 g/bird. While, group C was recorded highest average weight of heart, liver and gizzard weight 11.08, 48.40 and 41.40 g/bird than other groups. Similarly, the average weight of crop, spleen, intestine and proventriculus weight of group A was recorded 69.50, 2.26, 103.60 and 109.0 g/bird B- 76.89, 2.52, 110.0 and 114.0 g/bird, D- 73.55, 2.44, 106.0 and 111.0 g/bird. The group C was recorded with high average weight of crop, spleen, intestine and proventriculus (77.16, 2.59, 112.0 and 118.0 g/bird) than the other groups. The similar findings were also supported by (Sial, 2007) who observed the average heart, liver and gizzard weight were higher for group C with different levels of sodium chloride which is related to our study. EL-Deek, (2009) reported that non significant differences on heart, liver, spleen and gizzard were seen in broiler feeding sodium chloride supplementation.

The average mortality was recorded 10.00, 6.66, 3.33 and 6.66% in groups A, B, C and D in which the higher was (10.00%) in group-A (control), while the lowest mortality of 3.33% observed in group-C (fed 0.3% rock salt). Similar, findings are well supported by Sial, (2007) who observed the broiler mortality decreased in group B as compared to other groups which observed increased with mortality, respectively. During the entire experiment, no death cases were reported in the group fed a diet with the lowest sodium chloride content, and in the remaining groups mortality rates were low, in the 1.39- 2.78% range (Vieira, 2033). Economic of the broiler was also calculated in the present study, the total cost of group A, B, C and D was Rs. 205.00, 204.59, 206.52 and 215.84/bird, respectively. The net profit generated by group C fed with 0.3% rock salt Rs. 30.48.36 /bird was more ($P<0.05$) than the B- 26.43, D- 9.16 and A- 11.60 / bird. It was observed from the obtained results the better growth performance and remained economics for the production of broiler 0.3% rock salt fed supplementation to broiler were found better as compared to 0.3% black salt and 0.3% common salts. These results are in lined with the results of (Sial, 2007) observed the net return of the ration was better in group B as compared with other treated groups.

On the basis of present study, it was concluded that broiler fed on mash ration containing 0.3% rock salt achieved higher body weight and feed conversation ratio than the broiler fed ration having 0.3% black salt and common salt. The level of rock salt 0.3 percent in feed remained superior in almost all the characters. The broiler farming should be extended on mash ration contains 0.3% rock salt because they gain more body weight, to full fill human consumption. It is suggested that, if 0.5, 0.75 and 1 percent should be used in the broiler ration to get the better results.

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