Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

E-ISSN: 2320-7078
P-ISSN: 2349-6800
www.entomoljournal.com
JEZS 2020; 8(3): 2067-2069

Received: 25-03-2020
Accepted: 27-04-2020

D Desinguraja
Department of Animal Nutrition, College of Veterinary and Animal Sciences, Mannuthy, Thrissur, Kerala, India

K Shyama
Department of Animal Nutrition, College of Veterinary and Animal Sciences, Mannuthy, Thrissur, Kerala, India

Ally K
Department of Animal Nutrition, College of Veterinary and Animal Sciences, Mannuthy, Thrissur, Kerala, India

Corresponding Author:
D Desinguraja
Department of Animal Nutrition, College of Veterinary and Animal Sciences, Mannuthy, Thrissur, Kerala, India

Can betaine hydrochloride supplementation improve the carcass characteristic in broilers

D Desinguraja, K Shyama and Ally K

Abstract
The objective of the study was to evaluate the effect of dietary supplementation of betaine hydrochloride (betaine HCl) on Carcass characteristic in broiler chicken. The study was carried out for a period of six weeks in Vencobb 400 broiler chicks. One hundred – and – ninety two, day-old commercial broiler chicks were allotted to four groups, with four replications of 12 chicks each, randomly. The four groups were allotted to four dietary regimes and each replicate was randomly assigned to one of the four dietary treatments in this study. The experimental feed was formulated according to BIS (1992) [3] specifications and to the control ration (T_1), feed grade betaine HCl at 250, 500, 750 ppm was added respectively to form different rations T_2, T_3 and T_4 for different treatment groups. The carcass characteristics (recorded as percentage of pre-slaughter live weight) *viz.* eviscerated carcass weight, ready-to-cook yield, giblet weight and abdominal fat weight) of birds were also not affected by any level of supplementation of betaine HCl. The percentage weight of cut up parts and internal organs also did not show any significant difference between groups except in the case of gizzard ($P<0.05$).

Keywords: Broiler birds, Betaine hydrochloride, carcass characters

Introduction
Betaine (trimethyl glycine) is a small, biologically active molecule with a number of interesting features. Betaine is a proven osmolyte assisting animal cells to maintain water balance. A chicken has several ways to maintain water balance, such as by the use of ion pumps. However such methods are most effective for dealing with short term stress, and they are energetically very expensive. Under stress conditions, as much as 20% of energy for maintenance is used for osmoregulation (maintenance of water and electrolyte balance). betaine enables effective osmoregulation without the energy cost associated with ion pumps. betaine improves the efficiency of osmoregulation, and in doing so, spares energy for the bird. Betaine for sparing energy in broiler feeds. The mechanism is thought to be related to betaine's osmolyte function, whereby the bird is able to maintain cellular osmotic balance at a lower energy cost. Creswell (2012) [4].

Materials and Method
The betaine HCl supplemented broilers were evaluated based on their carcass characteristic.
Straight run commercial broiler chicks (Vencobb-400) were utilized in the biological trial, from day old to six weeks of age. One hundred – and – ninety two, day-old Vencobb – 400 strain commercial broiler chicks were used as the experimental birds. All the birds were identified with wing bands placed in the wing web of the right wing on each bird on day old, and were weighed individually. The birds were allotted to four dietary treatment groups, with four replications of 12 chicks each randomly in a Completely Randomized Design.
The experimental feed (in mash form) was formulated using corn and soyabean meal as per BIS (1992) [3] specifications. To the control ration (T_1), feed grade betaine HCl was added at 250, 500, 750 ppm to formulate rations T_2, T_3 and T_4 respectively, taking special care for proper mixing of betaine HCl. No growth promoting antibiotics was added to any rations.
Broiler starter ration were fed up to four weeks of age and then switched over to broiler finisher ration for the last two weeks. The birds were provided with feed and water *ad libitum*. Feed consumption by the birds in each replicate, was calculated weekly.
At the end of the experiment (42nd day) four birds (two males and two females) per treatment group were randomly selected, weighed and starved for 12 hours and slaughtered.
The pre-slaughter weight, eviscerated carcass weight, heart weight, liver weight, gizzard

weight and abdominal fat weight of birds belonging to four treatment groups were recorded. The cut up parts yield of breast, back, thigh, neck and wings were also recorded. Percentages of above parameters as well as ready-to-cook yield, total losses and giblet weight percentage were calculated based on pre-slaughter live weight basis.

The data collected on various parameters were statistically analyzed by Completely Randomized Design (CRD) as per the methods of Snedecor and Cochran (1994) [13] and the means of different experimental groups were also tested by using Duncan's Multible Range Test (DMRT) in SPSS Ver. 20.0.

Results

Average live weight of birds belonging to four dietary treatments T_1, T_2, T_3 and T_4 were 2083.50, 2186.50, 2132.50 and 2121.50 g, eviscerated carcass yield percentage were 70.57, 72.26, 72.40 and 73.35, ready-to-cook yield percentage were 77.64, 78.51, 78.82 and 79.49, total percentage of losses were 22.36, 21.49, 21.18 and 20.57 and giblet yield percent were 4.94, 4.21, 4.38 and 4.23 respectively.

The weight of internal organs as percentage of pre-slaughter live weight for T1, T2, T3 and T4 treatment groups were 0.42, 0.38, 0.43 and 0.45 for heart, 1.72, 1.67, 2.06 and 1.98 for liver, 2.80, 2.16, 1.89, and 1.81 for gizzard.

The mean abdominal fat content percentage of birds belonging to birds fed four dietary treatments T_1, T_2, T_3 and T_4 were 2.13, 2.03, 2.04 and 1.9 respectively. The mean yield (calculated as percentage of pre-slaughter live weight) of breast, thighs, wings, back and neck are presented in Table 1.

The percentage of cut up parts for T1, T2, T3 and T4 treatment groups were 28.89, 29.44, 29.15 and 30.34 for breast, 22.10, 22.86, 22.83 and 23.07 for thighs, 6.67, 7.04, 6.76 and 6.93 for wings. 7.40, 7.23, 7.89 and 7.81 for back, 2.79, 3.05, 2.67 and 2.57 for neck. Are presented in Table 2.

Table 1: Carcass characteristics and abdominal fat of birds maintained on four experimental rations'

Treatment[1]	Particulars								
	Pre-slaughter live weight (g)	Eviscerated carcass yield (%)	Ready-to-cook yield (%)	Total Losses (%)	Internal organ (%)			Giblet weight (%)	Abdominal fat (%)
					Heart	Liver	Gizzard		
T_1 (Control)	2083.50 ±85.58	70.57 ±0.49	77.64 ±0.66	22.36 ±0.66	0.42 ±0.04	1.72 ±0.17	2.80 ^{a} ±0.33	4.94 ±0.41	2.13 ±0.18
T_2 (250 ppm betaine HCl)	2186.50 ±66.47	72.26 ±1.01	78.51 ±0.90	21.49 ±0.90	0.38 ±0.04	1.67 ±0.08	2.16 ^{b} ±0.16	4.21 ±0.17	2.03 ±0.24
T_3 (500 ppm betaine HCl)	2132.50 ±157.22	72.40 ±1.25	78.82 ±1.58	21.18 ±1.58	0.43 ±0.03	2.06 ±0.14	1.89 ^{b} ±0.07	4.38 ±0.16	2.04 ±0.37
T_4 (750 ppm betaine HCl)	2121.50 ±106.40	73.35 ±0.84	79.49 ±0.64	20.57 ±0.64	0.45 ±0.02	1.98 ±0.12	1.81 ^{b} ±0.03	4.23 ±0.11	1.9 ±0.19
F value	0.152^{ns}	1.524 ^{ns}	0.567 ^{ns}	0.567 ^{ns}	0.812 ^{ns}	2.036 ^{ns}	5.599*	1.933 ^{ns}	0.133 ^{ns}
P value	0.927	0.259	0.647	0.647	0.512	0.163	0.012	0.178	0.939

[1]Each value is a mean of 4 observations, *ns – non significant* (P>0.05)

*Means bearing different superscripts within same column differ significantly (P<0.05)

Table 2: Cut up parts yield of birds maintained on four experimental rations, %

Treatment[1]	Particulars*				
	Breast	Thighs	Wings	Back	Neck
T_1 (Control)	28.89 ±0.60	22.10 ±0.34	6.67 ±0.18	7.40 ±0.28	2.79 ±0.07
T_2 (250 ppm betaine HCl)	29.44 ±0.11	22.86 ±0.24	7.04 ±0.55	7.23 ±0.37	3.05 ±0.08
T_3 (500 ppm betaine HCl)	29.15 ±0.82	22.83 ±0.11	6.76 ±0.26	7.89 ±0.63	2.67 ±0.07
T_4 (750 ppm betaine HCl)	30.34 ±0.81	23.07 ±0.46	6.93 ±0.18	7.81 ±0.32	2.57 ±0.06
F value	0.936^{ns}	1.779 ^{ns}	0.244 ^{ns}	0.569 ^{ns}	8.243 ^{ns}
P value	0.454	0.205	0.864	0.646	0.003

[1]Each value is a mean of 4 observations

ns – non significant (P>0.05)

Discussion

On statistical analysis there was no significant difference between treatment groups with regard to any of the organ weight studied except for weight of gizzard which was significantly lower in the betaine HCl supplemented groups (P<0.05) fed rations T_2,T_3 and T_4 from control group T_1. Statistical analysis of data on carcass characteristics *viz*. pre-slaughter live weight, eviscerated carcass yield, ready-to-cook yield, heart weight, liver weight, giblet weight and cut up parts yield percentage (breast, thighs, wings, back and neck) did not differ significantly between the treatment groups by inclusion of different levels of betaine HCl in broiler diet but the gizzard weight significantly differed (P<0.05) in the betaine HCl supplemented birds than those fed control rations. From the present investigation it may be inferred that there was no major influence on the carcass parameters and cut up parts yield consequent to betaine supplementation.

The results of this study is in agreement with Schutte *et al*., (1997) [12], McDevitt *et al.,* (2000) [10] in broilers, Attia *et al*., (2005) [1] and Hassan *et al*., (2005) [7] in slow growing chicken. Konca *et al.,* (2008) [8] reported that the supplementation of betaine in broiler diet at the levels (0.1 and 0.2 per cent) had little or no positive influence on slaughter weight, carcass weight and yield and carcass part weights. Similarly Baghaei *et al*., (2009) [2] and Srilatha *et al*., (2012) [14] also found that betaine supplementation in the low methionine broiler diet had no significant effect on carcass characteristic and Vasanthakumar (2013) [16] observed no significant difference in weight of hot carcass, liver (as per cent of body weight), heart, gizzard and giblet by two different supplementary levels of betaine HCl at 0.2 and 0.3 per cent in broiler diets.

Contrary to this Sun *et al*., (2008) [15] reported that betaine supplementation with methionine deficient diet in birds

resulted in higher (P<0.05%) carcass yield, Haldar *et al*., (2011) [6] also reported that betaine supplementation at 2g/ kg in broiler diet increasesd dressed carcass yield more than 8.7 per cent compared to positive control group. But Rao *et al*., (2011) [11] reported that that dietary betaine supplementation did not influence the carcass traits except for increased breast meat weight during 21d and 42 d and liver weight was decreased at 42 d of age. Similarly Creswell (2012) [4] also reported that graded levels of diets betaine HCl improved carcass yield compared to negative and positive control groups in broilers.

Conclusion

In conclusion this study found that the betaine HCl had no significant effect on carcass characteristics *viz*. pre-slaughter live weight, eviscerated carcass yield, ready-to-cook yield, losses and giblet yield per cent. However, the (T_4) 750 ppm supplemented group had higher eviscerated carcass yield percentage at sixth week of age. The dietary treatments had no significant effect on abdominal fat percentage of broilers at sixth week of age. However, the T_4 group had lower abdominal fat percentage.

Acknowledgment

The authors are very much obliged to the Department of Animal Nutrition, College of Veterinary and Animal Sciences, Mannuthy, Kerala for offering appropriate facilities required conducting this research work.

Conflict of Interest

The authors declare that they have no conflict of interest.

Ethical approval

The animal studies for the experiment have been approved by the ethics committee- COVAS, Mannuthy, Kerala and therefore have been performed in accordance with the ethics standards as applicable under institutional guidelines."

References

1. Attia YA, Hassan RA, Shehatta MH, Abd EI-Hady SB. Growth, carcass quality and serum constituents of slow growing chicks as affected by betaine addition to diets containing 2. Different levels of methionine. Int. J Poult. Sci. 2005; 4(11):856-865.
2. Baghaei M, Ashayerizadeh A, Eslami M, Bojarpour M, Roshanfekr H, Mirzadeh KH. Effect of different levels of DL-Methionine replaced with betafin on some of blood parameters on broiler chicken. Res. J Biol. Sci. 2009; 4(9):1037-1040.
3. Bureau of Indian Standards (BIS), *Poultry Feeds Specification.* Fourth revision. Bureau of Indian Standards, New Delhi, 1992, 4.
4. Creswell D. Betaine hydrochloride can reduce broiler feed cost. Proceedings of Poultry feed quality conference, Bangkok, Thailand, 2012.
5. Eila N, Salevati NR, Shivazad M, Zarei A, Motlagh MM. The effect of betaine supplementing on choline choloride and DL-methionine requirement of male broiler chicks. Proceedings of the British Society of Animal Science, Society's Annual Conference in Scarborough, 2008, 263.
6. Haldar S, Ghosh TK, Creswell D. Betaine improves broiler performance during heat stress. Proceedings of Poultry feed quality conferance, Bangkok, Thailand, 2011.
7. Hassan RA, Attia YA, EI-Ganzory EH. Growth, carcass quality and serum constituents of slow growing chicks as affected by betaine addition to diet containing 1. Different levels of methionine. Int. J Poult. Sci. 2005; 4(11):840-850.
8. Konca Y, Kirkpinar F, Mert S, Yaylak E. Effect of betaine on performance, carcass, Bone and Blood characteristics of Broilers During Natural Summer Temperatures. J Anim. Vet. Adv. 2008; **7**(8):930-937.
9. Mailfert RBO, Driver BMF. Potential for improvement of broiler performance, litter and carcass characteristics under tropical heat stress condition with supplental betaine. 23rd World's Poultry Congress, Brisbane, Australia, 2008.
10. McDevitt RM, Mack S, Wallis IR. Can betaine partially replace or enhance the effect of methionine by improving broiler growth and carcase characteristics?. Bri. Poult. Sci. 2000; 41:473-480.
11. Rao RSV, Raju MVLN, Panda AK, Saharia P, Sunder SG. Effect of supplementing betaine on performance, carcass traits and immune responses in broiler chicken fed diets containing different concentrations of methionine. Asian-Aust. J Anim. Sci. 2011; 24(5):662-669.
12. Schutte JB, Jong JD, Smink W, Pack M. Replacement value of Betaine for DL-Methionine in Male broiler chicks. Poult. Sci. 1997; 76:321-325
13. Snedecor GW, Cochran WG. *Statistical Methods*, Iowa State University Press, Ames, I. A, 1994.
14. Srilatha T, Reddy VR, Krishna D, Ramarao SV. Effect of betaine supplementation in diets containing sub-optimal levels of DL-methionine and choline on performance broilers. Int. J Poul. Sci. 2012; 47(2):154-157.
15. Sun H, Yang WR, Yang ZB. Wang Y, Jiang SZ, Zhang GG. Effect of betaine supplementation to methionine deficient diet on growth performance and carcass characteristics of broilers. Am. J Anim. Vet. Sci. 2008; 3(3):78-84.
16. Vasanthakumar P. Performance of broiler fed betaine hydrocholoride supplemented diets. Proc. of 2nd Int. Conf. and Exhibition on Metabolomics & Syst. biol, Hilton Schicago/Northbrook, USA, 2013.