Advances in Bioresearch
Adv. Biores., Vol 9 (3) May 2018: 54-58
©2018 Society of Education, India
Print ISSN 0976-4585; Online ISSN 2277-1573
Journal's URL:http://www.soeagra.com/abr.html
CODEN: ABRDC3
DOI: 10.15515/abr.0976-4585.9.3.5458

Advances in Bioresearch

ORIGINAL ARTICLE

Effect of Housing Systems and Dietary Protein levels on Carcass characteristics and economics of Native Chicken

Abhale Manoj Bhimraj[1], Dukare Sagar Popat[2], O. P. Dinani[3*], M. Babu[4], Asha Rajani[5], Pram Valli[6]
1, 4 , 5 and 6 Division of Poultry Science, Madras Veterinary collage, TANUVAS, Chennai
2 and 3 ICAR-Central Avian Research Institute, Izatnagar, Bareilly, U.P.
Corrosponding author email ID: dr_dinani@rediffmail.com

ABSTRACT
A biological experiment was carried out to optimize the dietary crude protein level in commercial desi chicken (Aseel) from day old to 14 week of age. Three hundred and sixty numbers of one day old commercial desi chicks were randomly divided into six treatment groups with three replicates of 20 chicks each per group. Out of this 180 chicks were reared under deep litter system and remaining 180 chicks were reared under cage system. The experimental birds were fed with three different levels of dietary crude protein (18, 20 and 22 per cent) with an isocaloric feed of 2800 kcal ME / kg and potable water given ad libitum. Standard management practices were adopted throughout the experimental period in cage and deep litter system. Carcass characteristics were studied at the end of the experiment. Economics were calculated. There was no significant (P≥0.05) difference in carcass characteristics viz dressed weight , eviscerated weight, ready to cook weight and giblets weight of birds reared in deep litter and cage system and fed with varying levels of protein. There was significant (P≤0.05) difference in breast meat yield in birds reared in cage fed 18 per cent protein compared to all other protein levels in cage and deep litter system. Other cut-up yields viz back, thighs, drumsticks, wings and neck showed no significant difference. There was also no significant difference between meat: bone ratio of birds reared in cage and deep litter and fed varying levels of dietary crude protein. The birds reared in cage on an average gave higher net profit per bird compared to those reared in deep litter though the total cost of production per bird was higher in cage than those reared in deep litter. Total return per bird was highest in birds reared in cage fed with 18 per cent protein than all other treatments with net return fetched highest amount in rupees.
Keywords*: commercial desi chicken, Carcass characteristics, net profit, deep litter, cage rearing*

Received 24.11.2017 Revised 08.12.2017 Accepted 27.03.2018

How to cite this article:
A M Bhimraj, D S Popat, O. P. Dinani, M. Babu, A Rajani, P.Valli. Effect of Housing Systems and Dietary Protein levels on Carcass characteristics and economics of Native Chicken . Adv. Biores., Vol 9 [3] May 2018.54-58.

INTRODUCTION

In India Aseel is one of the important native breed that is being reared in its native tract Andhra Pradesh for game and meat purposes. Aseel is recognized for its high stamina, majestic gait, disease tolerance and adaptability to adverse climatic conditions [1].This bird is the base for the population of commercial native chicken. These chickens are being reared under intensive system, usually up to 12 weeks of age. Aseel chicken are slow grower [2] hence, the practice of providing them with standard chick starter (Broiler/layer) diet is neither economical nor suitable to achieve optimum growth performance. Previous studies with indigenous chicken of China had demonstrated that nutrient requirement of native breeds were different compared to those of commercial layer or broiler [3]. Also it has been reported that slow growing birds need lesser dietary crude protein for optimum performance.

Recently, attitude has changed and many farmers prefer native chicken rearing as an assured and potential source of income. In India there are no standards for desi chicken reared in intensive system and no scientific data is available with regards to optimal protein, energy and other macro and micronutrients to get optimum production with better feed efficiency. Native chicken meat market receives a good proportion of intensively reared native chicken which fetch a good price as backyard reared bird. However, the practices adopted and performance of native chicken under intensive system is yet to be documented. In view of escalation of feed price, efficient utilization of feed for optimum

production of native chicken is an essential prerequisite. Therefore it is felt necessary to know the precise nutrient requirements of these germplasm for intensive system of production.

MATERIAL AND METHODS

Chicks were divided in to six treatments with three replicates of 20 birds in each i.e 60 birds in each treatment. First three treatments were reared in cages and remaining three on deep litter. Experiment was designed to study the effect of three different levels of dietary crude protein 18, 20 and 22 per cent with an isocaloric diet containing 2800 Kcal/kg ME on growth performance, all the experimental birds were wing banded and maintained under standard managemental conditions on deep litter and cages. Birds were fed *ad libitum* with known quantity of feed. Clean potable water was provided *ad libitum*.

Carcass characteristics

At the end of fourteen weeks of age i.e. experimental period 4 birds (two male+ two female) from each replicate were randomly selected for carcass characteristic study. Parameters viz. live weight, New York dressed weight, eviscerated weight; giblet weight and ready-to-cook weight, cut up parts viz. breast, back, thigh, drumstick, neck, and wing were weighed and recorded. The meat was separated from bone and weighed separately to obtain meat: bone ratio.

Economics

Economics of commercial desi chicken reared in two different systems of management (deep litter and cages) and fed three different levels of dietary crude protein (18, 20 and 22 per cent) were calculated.

Statistical analysis

All the data collected from the experiment were subjected to statistical analysis as per Snedecor and Cochran, [4] to find out statistical significance between treatments in each rearing system, using MS-Excel and SPSS.

RESULTS

Carcass characteristics

The carcass characteristics of 14 week old commercial desi chicken reared in cage and deep litter, fed with 18, 20 and 22 per cent dietary crude protein did not vary significantly. The New York dressed weight recorded was 90.26, 91.30 and 90.83 in 18, 20 and 22 per cent protein diet fed desi chicken reared in cage system and for similar protein levels in deep litter system were 91.35, 90.40 and 90.48 per cent respectively. Eviscerated weight of birds reared in cage were 71.29 per cent in 18 per cent protein diet, 71.48 per cent in 20 and 71.66 per cent in 22 per cent protein diet fed. In deep litter system, 18 per cent protein yielded 70.78 per cent, 20 per cent 70.54 and 22 per cent diet 70.43 per cent eviscerated weight in commercial desi chicken in this study. Ready to cook weight recorded in birds fed 18, 20 or 22 per cent dietary protein reared in cage system were 76.23, 76.23 and 76.34 per cent while it was 75.95, 75.39 and 75.64 per cent in 18, 20 and 22 per cent protein diets fed birds reared in deep litter system. Giblet weight ranged between 6.10 to 6.14 per cent in cage reared birds and 6.33 to 6.88 per cent, slightly higher in deep litter birds.

Table 1 showing carcass characteristics at different level of protein and housing systems.

Carcass characteristics (Per cent)	Cage			Deep Litter		
	Dietary crude protein level (per cent)					
	18	20	22	18	20	22
New York dressed Weight	90.26 ± 0.85	91.30 ± 0.74	90.83 ± 0.97	91.35 ± 0.64	90.40 ± 1.19	90.48 ± 1.35
Eviscerated weight	71.29 ± 1.40	71.45 ± 1.00	71.66 ± 0.82	70.78 ± 1.59	70.54 ± 1.05	70.43 ± 1.13
Ready- to–cook weight	76.23 ± 1.50	76.23 ± 0.41	76.34 ± 0.72	75.95 ± 1.67	75.39 ± 0.93	75.64 ± 1.03
Giblet weight	6.13 ± 0.24	6.14 ± 0.42	6.10 ± 0.38	6.82 ± 0.27	6.33 ± 0.35	6.88 ± 0.45

Cut up parts

The rearing system of commercial desi chicken influenced only breast meat yield significantly (P≤0.05). In cage and deep litter system 18 per cent protein fed desi birds had 25.09 and 23.45 per cent respectively and not significantly different. But birds fed 20 per cent protein diet, reared in cage recorded significantly (P≤0.05) heavier breast yield of 24.62 per cent than in deep litter fed the same protein level. However, higher protein level of 22 per cent fed birds had 22.98 and 22.24 per cent breast meat, again non significant. Other cut up parts yield recorded in this study in cage and deep litter at 18, 20 and 22 per cent dietary protein had not influenced significantly. Back yield recorded were 18.79 to 20.33 per cent, thighs

15.26 to 17.03 per cent, drumsticks 15.45 to 16.40 per cent, wings 11.62 to 12.95 per cent and neck 5.52 to 6.33 per cent.

Table2 showing cut up parts at different level of protein and housing systems.

Cut up parts (per cent)	Cage			DEEP LITTER		
	Dietary crude protein levels (per cent)					
	18	20	22	18	20	22
Breast *	25.09[a] ± 0.94	24.62[a] ± 0.64	22.98[ab] ± 0.68	23.45[ab] ± 0.45	23.08[b] ± 0.80	22.24[ab]± 0.29
Back[NS]	20.23 ± 0.834	19.49 ± 0.44	19.35 ± 0.23	19.43 ± 0.77	20.02 ± 0.89	18.79± 0.47
Thighs[NS]	17.03 ± 1.17	16.29 ± 0.56	16.42 ± 0.91	16.25 ± 1.39	15.87 ± 1.12	15.26± 0.71
Drumsticks NS	16.40 ± 0.61	16.21 ± 0.57	16.59 ± 0.61	15.45 ± 0.36	15.51 ± 0.52	15.72± 0.49
Wings [NS]	11.62 ± 0.90	12.25 ± 0.63	12.49 ± 0.48	12.64 ± 0.46	12.83 ± 0.51	12.95± 0.62
Neck [NS]	6.10 ± 0.55	6.33 ± 0.67	6.05 ± 0.45	6.05 ± 0.61	5.52 ± 0.46	5.98± 0.23

Meat bone ratio

Influence of rearing system and dietary crude protein levels on meat bone ratio of commercial desi chicken at 14 week of age presented in table 19. The results indicated statistically no significant (P≥0.05) difference between different treatments. The rearing system (cage and deep litter), dietary protein level (18, 20 or 22 per cent) has not influenced the meat and bone yield in commercial desi chicken at 14 week of age in this study. The meat yield recorded was 51.47 to 51.93 per cent and bone yield were 41.56 to 42.22 per cent. Irrespective of system of rearing and protein level fed. Hence, the meat bone ratio was also not altered and ranging between 1.22 to 1.

Table3: showing MEAT bone ratio.

Parameter[NS]			Rearing system			
		Cage			Deep litter	
	18	20	22	18	20	22
Meat yield (per cent)	51.55 ± 0.65	51.50 ± 0.19	51.93 ± 0.41	51.47 ± 0.59	51.70 ± 0.56	51.49 ± 0.62
Bone yield (per cent)	51.55 ± 0.65	42.22 ± 0.47	41.79 ± 0.25	41.56 ± 0.72	41.85 ± 0.56	41.61 ± 0.38
Meat bone ratio	1.23 ± 0.03	1.22 ± 0.01	1.24 ± 0.01	1.24 ± 0.04	1.24 ± 0.03	1.24 ± 0.03

Economics

Influence of rearing systems and dietary crude protein levels on economics of commercial desi chicken reared up to 14 week of age is presented in table 20. The economics of commercial desi chicken reared up to 14 week of age in cage and deep litter system, fed 18, 20 or 22 per cent dietary crude protein has been worked out and presented in table 20. The feed cost was highest (Rs. 94.09) in 22 per cent protein fed birds reared in cage and lowest (Rs. 79.20) was in 18 per cent protein fed bird reared in deep litter system. Hence, the total cost of production of desi chicken was the obviously highest (Rs.144.09) in 22 per cent protein fed birds reared in cage and the lowest (Rs.129.20) was in 18 per cent protein fed birds reared in deep litter. Net returns and net profit per desi birds were higher in cage system than deep litter. Net profit per desi bird reared up to 14 week of age was highest (Rs.85.98) in 18 per cent protein, cage system and the lowest (Rs.58.08) was in 22 per cent protein, deep litter system. Desi birds reared in cage or deep litter system fed 20 per cent dietary protein yielded comparable net profit (Rs.64.96 and Rs.65.16). In desi birds reared in cage or deep litter system, the total cost of production in this study was Rs.139.01 and Rs.134.88 respectively. Net profit per bird was Rs.72.55 in cage and Rs.64.30 in deep litter system.

Table 4: showing different variables at different level of protein and housing systems.

	Variables (Rs.)	Cage			Deep litter		
		Dietary crude protein level (percent)					
		18	20	22	18	20	22
1	Chick cost	35.00	35.00	35.00	35.00	35.00	35.00
2	Feed cost/kg	22.50	24.00	25.50	22.50	24.00	25.50
3	Feed Consumption /bird(kg)	3.73	3.71	3.69	3.52	3.56	3.53
4	Feed cost up to 14 week/bird	83.92	89.04	94.09	79.20	85.44	90.01
5	Health cover and other cost/bird	5.00	5.00	5.00	5.00	5.00	5.00
6	Fixed cost/bird	10.00	10.00	10.00	10.00	10.00	10.00
7	Total cost of production/bird	133.92	139.04	144.09	129.20	135.44	140.01
8	Total returns/bird	219.90	204.00	210.80	198.90	200.60	198.90
9	Net gain/bird	85.98	64.96	66.71	69.70	65.16	58.08
			Cage			Deep litter	
10	Total cost of		139.01			134.88	
	production/bird						
11	Net profit/bird		72.55			64.3	

DISCUSSION

Carcass characteristics

Varying dietary protein levels and rearing system has not influenced carcass characteristics of desi chicken reared up to 14 week of age in this study. Similar observation were reported by Magala *et al.* [5] reported no significance difference on dressing percentage of Ugandan local chicken reared under deep litter system and fed varying levels of dietary crude protein (18 and 20 per cent) and energy (2800 to 3000 Kcal ME/kg). Nguyen *et al.* [9] found no significant effect of varying protein levels from 15 to 21 per cent and energy from 3000 to 3200 Kcal ME/kg in Betong chicken at 14 week of age and Smith and Pesti [6] reported that 16, 18 and 20 per cent dietary protein fed indigenous chicken did not affect carcass yield.

Cut up Parts

Magala *et al.* (2012b) reported no significant difference in cut up parts of Ugandan local chicken reared under deep litter, fed 18 and 20 per cent crude protein with 2800, 2900 and 3000 Kcal ME/kg diet. Significantly more breast yield was obtained by Mbajiorgu *et al.* [7] in Venda chicken reared under deep litter, fed with different dietary energy and protein ratio. Similar findings observed in this study also. Thighs yield was recorded in this study was lower than reported by Rajkumar *et al.* [8] and Nguyen *et al.* [9].

Economics

Increasing protein level beyond 18 per cent has resulted in decrease in net gain per birds in this study both in cage and deep litter system. The reduction was more in cage than deep litter. Mohammad *et al.* [10] observed that lower levels of dietary crude protein (14 per cent) in desi chicks may significantly lower the cost of rearing during growing phase and this is true in this study also as the total cost of production was higher in 20, 22 per cent protein than 18 per cent protein both in cage and deep litter system. Gardzielewska *et al.* [11] suggested reducing the dietary protein level in native chicken may reduce the feed cost and this is true in this study where the cost of feed was low with 18 per cent protein than 20, 22 per cent protein.

CONCLUSION

This study showed that carcass characteristics *viz* dressed weight , eviscerated weight, ready to cook weight, giblets weight, meat: bone ratio and cut-up yields of deshi birds (Aseel) reared in deep litter and

cage system and fed with varying levels of protein did not differ(P≥0.05) significantly. There was significant (P≤0.05) difference in breast meat yield in birds reared in cage fed 18 per cent protein compared to all other protein levels in cage and deep litter system. The birds reared in cage on an average gave higher net profit per bird compared to those reared in deep litter though the total cost of production per bird was higher in cage than those reared in deep litter. Total return per bird was highest in birds reared in cage fed with 18 per cent protein than all other treatments with net return fetched highest amount in rupees.

REFERENCES

1. Singh Mohan, (2009). Production and other characteristics of Aseel peela desi male under intensive system. *Indian J. Poult. Sci*., **43**(2): 217-219.
2. Haunshi Santosh, (2011). Performance of native chickens of Mizoram under intensive system of rearing. *The Indian veterinary journal.,* **88**(3): 45-47.
3. Zhao J.P., J.L. Chen, G.P. Zhao, M.Q. Zheng, R.R. Jiang and J. Wen, (2009). Live performance, carcass composition and blood metabolite responses to dietary nutrient density in two distinct broiler breeds of male chicken. *Poult. Sci.*, **88** (12): 2575-2584.
4. Snedecor, G.W and W. G. Cochran, 1994. Statisticak methods. The Iowa state University press, 8th Edition, Ames, Iowa. U.S.A.
5. Magala, H., D.R. Kugonza, H. Kwizera and C.C Kyarisiima, (2012b). Studied the influence of varying dietary energy and protein on growth and carcass characteristics of Ugandan local chickens*. J Anim Adv.,* **2**(7): 316-324.
6. Smith, E.R., and G.M. Pesti, 1998. Influence of broiler strain cross and dietary protein on the performance of broilers. *Poult. Sci.,* **77**: 276-281.
7. Mbajiorgu C.A, (2011). Effect of different dietary energy to protein ratio level on growth and production of indigenous Venda chicken. *Asian J. Anim. Vet. Adv*., **6**(4): 344-352.
8. Rajkumar, U., M. R. Reddy, S. V. Rama Rao, K. Radhika and M. Shanmugam, (2011). Evaluation of growth, carcass, immune response and stress parameters in naked neck chicken and their normal siblings under tropical winter and summer temperatures. *Asian-Aust. J. Anim. Sci.,* **24**(4): 509 – 516.
9. Nguyen Tuan Van, (2010). Effect of dietary protein and energy on growth performance and carcass characteristics of Betong chickens (*Gallus domesticus*) during growing period*. International journal of poultry science*., **9**(5): 468-472.
10. Mohammad S.A., H.K. Sohail, (2008). Effect of different energy and protein ratio on the performance of desi native chicken during growth phase. *Asian J. Poult. Sci.,* **2**:42-47.
11. Gardzielewska J., Z. Tarasewicz, A. Danczak, J. Kwiecien, Z. Goluch- Koniuszy, J. Gardzilewska, M. Jakubowska, Z. Tarasewicz, D. Szczerbinaska and M. Ligocki, (2005). Meat quality of broiler fed with different protein content. *Electronic J. Polish. Agric. Uni*., **8:** (1).