



Carcass characteristics and chemical composition of breast and thigh muscles of native chicken breeds

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(Received on February 4, 2011; accepted for publication on July 23, 2013)

ABSTRACT

Haunshi, S., Sunitha, R., Shanmugam, M., Padhi, M.K. and Niranjana, M. 2013. Carcass characteristics and chemical composition of breast and thigh muscles of native chicken breeds. *Indian Journal of Poultry Science*, 48(2): 219-222.

The present study was conducted to compare the slow growing Indian native chicken breeds viz., *Aseel* and *Kadakhnath* for carcass characteristics and chemical composition of breast and thigh muscles. Live weight, ready to cook (RTC) yield ($P < 0.001$) and RTC percentage ($P < 0.01$) at 10 weeks of age were significantly higher in *Aseel* as compared to *Kadakhnath*. However, abdominal fat percentage, giblet, liver, heart ($P < 0.001$) and gizzard ($P < 0.05$) were significantly higher in *Kadakhnath* than in *Aseel*. At 20 weeks of age also almost similar trend was observed. Live weight ($P < 0.001$), percentage of breast, legs ($P < 0.001$), and neck and back ($P < 0.01$) were significantly higher in *Aseel* than *Kadakhnath* while giblet, gizzard, liver ($P < 0.001$) and abdominal fat percentage ($P < 0.05$) were significantly higher in *Kadakhnath* as compared to *Aseel*. There were no significant differences in chemical composition of breast and thigh muscles among two native breeds except for dry matter percentage.

Key words: *Aseel*, *Kadakhnath*, carcass characteristics, chemical composition

INTRODUCTION

Native chicken breeds of India are gaining importance over the years for utilization and conservation purposes due to their unique attributes. *Aseel* (Peela) and *Kadakhnath* are two prominent native breeds among indigenous chicken germplasm of India. *Aseel* (Peela), a game type native chicken breed with brownish yellow coloured feathers and long legs and neck is commonly used for meat purposes. On the other hand *Kadakhnath* breed having fibromelanosis character is commonly used both for meat and egg production in tribal and rural areas of India besides using it for religious purposes by the tribal communities in its native tract. Among these two native breeds, the growth rate of *Kadakhnath* breed is significantly lesser as compared to *Aseel* breed (Haunshi *et al.*, 2011). However, these native germplasm are known for their hardiness and adaptability to the tropical conditions of India (Rout *et al.*, 1992). Further, consumers in rural/tribal areas perceive that the meat of these native breeds have desirable qualities (Taste and Flavour) as compared to the exotic chickens. Therefore, these native breeds command better price over those of improved chickens such as broiler chickens in

rural and tribal areas of the country. The information on comparative study on various carcass characteristics and muscle chemical composition of these native chickens is lacking in literature although Sachadev *et al.* (1990), Sharma and Narayankhedakar (2005) (*Kadakhnath* breed), Gupta *et al.*, (2000) (*Aseel*) and Bhardwaj *et al.* (2006) studied the carcass characteristics of these native breeds. Therefore, the present study was carried out to compare these native breeds for various carcass characteristics at ten and twenty weeks of age and chemical composition of breast and thigh muscles at twenty weeks of age.

MATERIALS AND METHODS

Location of the experiment : This experiment was conducted at the experimental poultry farm of the Institute (Project Directorate on Poultry) located at Hyderabad (17° 20' N, 78° 30' E).

Experimental animals and conditions : Two native chicken breeds involved in the study were *Aseel* (Peela) and *Kadakhnath* breeds. About 200 chicks each from two genetic groups were hatched and reared on deep litter system of rearing up to twenty weeks of age in open sided house from day one onwards. Both the genetic groups were provided layer chick starter diet in *ad libitum* quantity (2600 Kcal/kg

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M.E. and 18 % C.P. on calculated basis) up to 8 weeks of age. Birds had free access to drinking water round the clock. Grower ration (2500 Kcal/kg M.E. and 16 % C.P. on calculated basis) from nine to 20 weeks of age for *Aseel* and *Kadakhnath* breeds of chicken was provided in *ad lib* quantity. Feed ingredients used in ration formulations were maize, soybean meal, sunflower cake, de-oiled rice bran, salt and vitamin premix, lysine, DL methionine, trace minerals, shell grit and dicalcium phosphate. Management and rearing conditions during the period of experiment were kept similar for both the genetic groups.

Carcass characteristics : The carcass characteristics were studied at 10th week of age in eight birds (male) from each genotype covering all replicates. Various organs and abdominal fat weights and yields were studied and they were calculated in relation to the live body weight. Carcass characteristics were studied in 12 male birds from each native chicken breeds slaughtered at 20th week of age as well in subsequent generation.

Chemical composition of meat : Dry matter, crude protein and fat percentage of breast and thigh muscles samples of birds slaughtered at 20th week of age was determined as per AOAC (1998) methods. Dry matter was estimated by drying the tissue samples for 48 hours at 60 - 80 °C in hot air oven. Protein and fat percentage were expressed on dry matter basis.

Statistical analysis : Standard statistical procedure was used to calculate mean and standard errors of various parameters of carcass characteristics of birds slaughtered at 10 and 20 weeks of age and chemical composition of muscles. Student's t test was used to compare the means for statistical significance.

RESULTS AND DISCUSSION

Carcass characteristics (10 weeks) : The results (Table 1) revealed that live weight, RTC yield (P<0.01) and RTC yield percentage were significantly (P<0.001) higher in *Aseel* as compared to *Kadakhnath* breed. However, giblet, liver, gizzard (P<0.05) and heart percentage were significantly (P<0.001) higher in *Kadakhnath* breed as compared to *Aseel*. Abdominal fat percentage was significantly higher (P<0.001) in *Kadakhnath* than in *Aseel* breed. Carcass characteristic traits are influenced by the breed, age, sex, rate of growth, nutrition of birds, etc. In the present study as well there were significant differences in carcass characteristics among age

Table 1. Carcass characteristics of *Aseel*, and *Kadakhnath* breeds of chicken at 10 weeks of age (mean±S.E.)

Parameter	Genotype		
	<i>Aseel</i>	<i>Kadakhnath</i>	P value
Live weight (g)	627.87±27.65 ^a	402.50±24.65 ^b	***
RTC yield (g)	367.57±18.48 ^a	247.62±16.56 ^b	***
RTC yield (%)	58.44±0.52 ^b	61.38±0.80 ^a	**
Giblet (%)	4.88±0.09 ^b	6.23±0.28 ^a	***
Gizzard (%)	2.29±0.07 ^b	2.64±0.12 ^a	*
Liver (%)	2.17±0.04 ^b	3.08±0.20 ^a	***
Heart (%)	0.42±0.01 ^b	0.51±0.02 ^a	***
Abdominal fat (%)	0.13±0.05 ^b	1.94±0.23 ^a	***

^{ab}Mean figures bearing different superscript row-wise differ significantly (***)P<0.001, (***)P<0.01, (*)P<0.05), RTC - Ready to cook yield (Eviscerated carcass excluding skin, head and shanks).

matched native birds with different growth rates under similar rearing conditions. The lesser RTC yield percentage observed in these breeds could be explained by the fact that the native breeds are slow growers and hence had lesser muscle mass as compared to the broilers. Live weight and dressing percentage at tenth week of age of *Aseel* and *Kadakhnath* breeds of the present study were comparable with those reported by Bhardwaj *et al.* (2006). The finding of higher abdominal fat percentage in *Kadakhnath* as compared to *Aseel* could be explained from the fact that slow growing birds tend to accumulate higher abdominal fat. Tang *et al.* (2009) also reported higher abdominal fat percentage in slow growing Chinese native chickens as compared to commercial broilers. *Kadakhnath* is an egg type native chicken breed with slow growth rate while *Aseel* is of game type and are relatively more active as compared to *Kadakhnath* chickens. This difference in growth and activity might be responsible for lesser abdominal fat percentage in *Aseel* as compared to *Kadakhnath* breed.

Carcass characteristics (20 weeks) : Carcass characteristics of male birds of *Aseel* and *Kadakhnath* breeds slaughtered at 20 weeks of age are given in Table 2. The study revealed that the live weight was significantly (P<0.001) higher in *Aseel* as compared to *Kadakhnath* breed. Cut up parts study among two breeds revealed that percentage of breast, legs (P<0.001), and neck and back were significantly (P<0.01) higher in *Aseel* breed. Percent weight of giblets, gizzard, liver (P<0.001) and abdominal fat (P<0.05) were significantly higher in *Kadakhnath* as compared to the *Aseel* breed. On the contrary to the findings at 10 weeks of age, there was no significant difference in RTC

Table 2. Carcass characteristics of Aseel and Kadaknath breeds of chicken at 20 weeks of age (mean±S.E.)

Parameter	Genotype		P value
	Aseel	Kadaknath	
Live weight (g)	1713.92±32.27 ^a	1065.42±25.31 ^b	***
RTC yield (%)	66.47±0.68	64.80±0.72	NS
Breast (%)	15.62±0.20 ^a	13.48±0.32 ^b	***
Legs (%)	22.37±0.28 ^a	17.58±0.51 ^b	***
Neck and Back (%)	15.31±1.45 ^b	19.95±0.21 ^a	**
Wing (%)	7.39±0.12	7.84±0.28	NS
Giblet (%)	4.06±0.09 ^b	5.58±0.11 ^a	***
Gizzard (%)	2.04±0.08 ^b	3.09±0.10 ^a	***
Liver (%)	1.60±0.04 ^b	2.08±0.08 ^a	***
Heart (%)	0.42±0.02	0.41±0.01	NS
Abdominal fat (%)	0.33±0.05 ^b	0.52 ± 0.07 ^a	*

^{a,b} Mean figures bearing different superscript row-wise differ significantly. (***) P<0.001, ** P<0.01), NS- Non significant, RTC - Ready to cook yield (Eviscerated carcass excluding skin, head and shanks).

yield percentage at 20 weeks of age. This might be due to reduction in feather coverage of *Aseel* birds due to feather pecking behaviour which was noticed in this breed on floor rearing during growing period. Higher percentage of cut up parts (breast, legs, and neck and back) observed in the *Aseel* as compared to *Kadaknath* breed is on expected line since *Aseel* is a game type bird and hence it is expected to have stronger breast, legs, neck and back muscles and bones as compared to *Kadaknath* breed. At 20 weeks as well *Kadaknath* breed had higher giblet, liver and gizzard percentage but no difference in heart percentage. It seems that higher giblet percentage as it was observed in both 10 and 20 weeks of age in the present study is specific to *Kadaknath* breed. Percentage of liver, heart and gizzard weight of *Kadaknath* breed observed in this study were comparable with those reported by Sharma and Naryankhedkar (2005) in *Kadaknath* birds slaughtered at 16 weeks of age.

Table 3 Chemical compositions of thigh muscle and breast muscle samples of Aseel and Kadaknath breeds slaughtered at 20 weeks of age (mean±S.E.)

Parameter	Muscle tissue	Genotype		P value
		Aseel	Kadaknath	
Dry matter (%)	Breast	26.85±0.50 ^{a1}	24.98±0.31 ^{b1}	***
	Thigh	24.94±0.43 ^{a2}	22.92±0.36 ^{b2}	***
Protein (%)	Breast	88.28±0.58 ^{a1}	87.65±0.68 ^{a1}	NS
	Thigh	83.35±0.98 ^{a2}	83.75±1.19 ^{b2}	NS
Fat (%)	Breast	3.75±0.18 ^{a2}	3.47±0.54 ^{a2}	NS
	Thigh	7.13±0.54 ^{a1}	7.91±0.64 ^{a1}	NS

Note: ^{a,b} Mean figures bearing different superscript row-wise differ significantly. (***) P<0.001), NS- Non significant, ^{1,2} Mean figures of two consecutive parameters (between types of muscles) bearing different superscript column wise differ significantly (P< 0.001).

Chemical composition of meat (20 weeks) : Chemical composition traits of breast and thigh muscles of cocks of *Aseel* and *Kadaknath* breeds slaughtered at 20 weeks of age are presented in Table 3. No significant difference was observed in crude protein and fat percentage of breast and thigh muscles among native chicken breeds. However, dry matter percentage of both breast and thigh muscles were significantly higher in *Aseel*. This difference may be explained from the fact that *Kadaknath* birds tend to accumulate higher abdominal fat and hence more water retention in thigh and breast muscles. Reports regarding carcass composition of native chicken breeds are little in literature to compare the present findings. Absence of differences in chemical composition of breast muscles among native chicken breeds as observed in the present study was also observed by Intarapichet *et al.* (2008) between different Thai hybrid native chickens. Similar observation was made by Jaturasitha *et al.* (2008) also did not find any significant difference among Thai native breeds of chicken (Black boned and Thai) in chemical composition of breast and thigh muscles. In both *Aseel* and *Kadaknath* breeds, dry matter and protein percentage were significantly higher while fat percentage was significantly lower in breast muscles as compared to the leg muscles. This particular observation is on expected line as breast muscles are known to contain less fat and hence less water percentage.

The study concluded that the native breeds with different growth rate differed in various carcass characteristics traits. Chemical composition of breast and thigh muscle among two breeds was same except for dry matter percentage. *Kadaknath* breed seems to accumulate more abdominal fat as compared to *Aseel* breed.

ACKNOWLEDGEMENTS

Authors would like to place on record the financial support and facilities extended to carryout the present study by the Director of the Project Directorate on Poultry, Hyderabad. Authors also acknowledge the kind help of Mr. Dhanunjaya and his team (Pradeep, Mohan, Lavanya and Narashimha) for helping in carcass characteristics study.

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