



Effect of rearing systems on slaughter and carcass characteristics of turkey (*Meleagris gallopavo*)

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ABSTRACT : The study was conducted to determine the effect rearing systems on carcass quality traits of Beltsville Small White turkey (*Meleagris gallopavo*). Turkeys were reared in intensive system (full confinement), semi-intensive system (partial confinement and partial day scavenging) and free range system (all-day scavenging) of management were used for this study. Turkeys housed in each rearing system were slaughtered by following standard procedures and carcass characteristics were recorded. The mean live weight, carcass weight(g), dressing percentage, blood (%), feathers (%), feet (%), abdominal fat (%), head (%), back (%), thighs (%) and drumstick yield values were significantly ($P>0.01$) higher in turkeys reared under intensive system of management followed by semi intensive system and free range system of management. However, significantly ($P>0.01$) reverse trends were observed in giblets (%), intestines (%), neck (%), wings (%) and breast (%) yield. It is concluded that higher and better slaughter and carcass traits were obtained in intensive system of management followed by semi intensive and free range system of management.

KEY WORDS : Turkey, Rearing, Free range, Semi intensive, Intensive, System, Slaughter, Carcass

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INTRODUCTION

The turkey (*Meleagris gallopavo*) a well known bird in western countries, but in the rest of the world especially in developing countries it is yet to be established on commercial point of view. The bird is quite suitable for upliftment of small and marginal farmers as it can be easily reared with little investment for housing, equipment and management (Anandh *et al.*, 2012). Commercial turkey farming is becoming popular in India and farmers started to show interest in rearing turkey birds. Recently, the consumption of turkey meat is increasing worldwide and a similar trend is also emerging in India. Turkey meat has tremendous commercial viability because of its low

fat and cholesterol content in comparison to red meat and other poultry meat. High cost of production, large body size and less market demand were the major setbacks for its low popularity (Majumdar *et al.*, 2005). Growth performance enhancements have also been accompanied by significant changes in the composition and component yields of turkey carcasses (Lilburn and Nestor, 1991). Meat productivity of turkeys is evaluated not only by the live weight, growth performance, feed conversion, but mainly on the basis of its slaughter traits like slaughter yield, weight of edible parts (Oblakova, 2004). Breed, sex, feeding techniques and slaughtering age influence carcass characteristics of turkeys (Brake *et al.*, 1994; Roberson *et al.*, 2003 and Laudadio *et al.*, 2009). However, different rearing systems on slaughter and carcass characteristics, have received limited consideration. Information on the effect of rearing system

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on slaughter and carcass components of turkeys is also not available in Indian hot humid climatic condition. Since scanty published literature is available on slaughter and carcass characteristics of turkey birds under different rearing systems in India, the present study was conducted to determine the effects of rearing system on the slaughter and carcass characteristics of turkeys as well as to identify the suitable rearing system for better meat production from turkeys under Indian hot humid climatic conditions.

MATERIAL AND METHODS

Experimental design and management :

The study was conducted at Turkey Research Unit of Tamil Nadu Veterinary and Animal Sciences University - Regional Research Centre, Pudukkottai, Tamil Nadu. Beltsville Small White eggs were hatched and hatched turkey poults were brooded in a turkey brooder house and fed on a starter concentrate diet for four weeks. They were then transferred to a deep litter turkey grower house and fed on a grower concentrate diet upto the end of week 8. The poults and growers had free access to diet and clean water. At the start of week 9 and for the purpose of this study, 30 turkey growers were randomly selected and divided into 3 groups (10 birds each) of matching initial body weight. The under treatment group I were reared under intensive system (full confinement), birds under treatment group II were reared under semi-intensive system (partial confinement and partial day scavenging) and birds under group III were reared under free range system (all-day scavenging) of management and the birds maintained under standard management practices (Anandh *et al.*, 2012). Each group was housed in separate experimental houses whose floors were raised

and covered with sawdust litter. At the end of the week 16 of age, 8 birds (4 males and 4 females) from each group were selected slaughter studies by following standard procedures. They were individually weighed after overnight fasting (except for water) and then slaughtered. The turkeys were killed by cutting the jugular vein and carotid artery on one side of the neck near atlanto occipital joint. After bleeding the carcasses were scalded at $58\pm 2^{\circ}$ C for 2 min, handpicked and manually eviscerated. The weight of blood, feathers, head, shank and feet and giblets (liver, heart and gizzard) and eviscerated whole carcass were recorded. The eviscerated carcasses were portioned into commercial cuts *viz.*, breast, thighs, drumsticks, back with ribs, wings, and neck and the cuts are weighed. Dressing percentage was expressed as a percentage of the slaughter body weight and the carcass cuts were expressed as a percentage of the eviscerated carcass weight.

Statistical analysis :

The data generated from each experimental group were analyzed statistically by following standard procedures (Snedecor and Cochran, 1989) for comparing the means and to determine the effect of rearing systems.

RESULTS AND DISCUSSION

The results of the present study as well as relevant discussions have been presented under following sub heads:

Slaughter characteristics :

Effect of rearing systems on slaughter characteristics of turkey are presented in Table 1. The mean \pm SE slaughter and carcass weight in the free range, semi

Slaughter characteristics	Free range system	Semi intensive system	Intensive system	(Mean \pm SE) Overall mean \pm SE
Slaughter weight (g)	4.50 \pm 0.05 ^a	6.65 \pm 0.02 ^b	6.80 \pm 0.04 ^c	5.98 \pm 0.04
Carcass weight (g)	3.32 \pm 0.02 ^a	5.28 \pm 0.05 ^b	5.62 \pm 0.06 ^c	4.71 \pm 0.04
Dressing percentage (%)	71.55 \pm 0.02 ^a	79.40 \pm 0.02 ^b	82.62 \pm 0.04 ^c	77.85 \pm 0.02
Blood (%)	2.63 \pm 0.04 ^a	2.76 \pm 0.04 ^b	2.80 \pm 0.05 ^c	2.73 \pm 0.04 ^c
Feathers (%)	7.30 \pm 0.05 ^a	7.80 \pm 0.02 ^b	7.87 \pm 0.04 ^b	7.65 \pm 0.03
Intestines (%)	6.10 \pm 0.03 ^a	4.99 \pm 0.08 ^b	3.98 \pm 0.06 ^c	5.02 \pm 0.06
Giblets (%)	4.22 \pm 0.02 ^a	3.97 \pm 0.05 ^b	3.21 \pm 0.05 ^c	3.80 \pm 0.04
Feet (%)	3.70 \pm 0.03 ^a	3.78 \pm 0.05 ^a	3.94 \pm 0.06 ^b	3.80 \pm 0.04
Abdominal fat (5)	0.82 \pm 0.04 ^a	0.90 \pm 0.05 ^b	1.82 \pm 0.02 ^c	1.77 \pm 0.03

Means bearing same superscripts row-wise do not differ significantly (P<0.01)

intensive and intensive system were found to be 4.50 ± 0.05 and 3.32 ± 0.02 , 6.65 ± 0.02 and 5.28 ± 0.05 and 6.80 ± 0.04 and 5.62 ± 0.06 , respectively. The average slaughter and carcass weight between each rearing system differ significantly ($P > 0.01$) between them. The highest slaughter and carcass weight was found in intensive system of management followed by semi intensive and free range system. Similar results were also reported by Shamseldin *et al.* (2014). Overall mean for turkey slaughter and carcass weight were 5.98 ± 0.04 and 4.71 ± 0.04 , respectively. At 16 weeks of age, slaughter weights between 4.85 kg to 7.50 kg were also reported in turkeys (Isguzar, 2003). Gibril *et al.* (2013) observed that the body weight and carcass yield in intensive and semi intensive system were significantly better than the extensive system. They attributed the improved slaughter body and carcass weights at the semi intensive systems to less mobility that availed more energy to be converted into body weight. The mean \pm SE dressing percentage in the free range, semi intensive and intensive system were found to be 71.55 ± 0.02 , 79.40 ± 0.02 and 82.62 ± 0.04 and, respectively. The mean dressing percentage in different rearing systems were differ significantly ($P > 0.01$). The highest dressing percentage was found in turkeys reared in intensive system followed by semi intensive system and free range system of management. Overall mean for turkey dressing percentage was 77.85 ± 0.02 . The present dressing of present is in conformity of Roberson *et al.* (2003) who reported 76.6 per cent at 16 week age.

The mean \pm SE blood yield percentage in the free range, semi intensive and intensive systems were found to be 2.63 ± 0.04 , 2.76 ± 0.04 and 2.80 ± 0.05 , respectively. Blood yield percentage turkeys differ significantly ($P < 0.01$) between rearing systems and value higher in intensive system of management followed by semi intensive and free range system. Overall mean for turkey

blood yield percentage was 2.73 ± 0.04 . The mean \pm SE feather yield percentage in the free range, semi intensive and intensive system were found to be 7.30 ± 0.05 , 7.80 ± 0.02 and 7.87 ± 0.04 , respectively. Lowest feather yield percentage observed in free range system of management. Feather yield percentage in semi intensive and intensive system did not differ significantly between them but differ significantly ($P < 0.01$). from free range system of management. Overall mean for turkey blood yield percentage was 2.73 ± 0.04 . The mean \pm SE intestines percentages in the free range, semi intensive and intensive system were found to be 6.10 ± 0.03 , 4.99 ± 0.08 and 3.98 ± 0.06 , respectively. Intestine percentage turkeys differ significantly ($P < 0.01$) between rearing systems and value higher in intensive system of management followed by semi intensive and free range system. Overall mean for turkey intestine percentage was 5.02 ± 0.06 . The mean \pm SE giblets yield percentage in the free range, semi intensive and intensive system were found to be 4.22 ± 0.02 , 3.97 ± 0.05 and 3.21 ± 0.05 , respectively. Giblets percentage turkeys differ significantly ($P > 0.01$) between rearing systems. Higher giblets percentage observed in free range system of management and lower giblets percentage observed in intensive system of management. Overall mean for turkey intestine percentage was 3.80 ± 0.04 . The mean \pm SE feet yield percentage in the free range, semi intensive and intensive system were found to be 3.70 ± 0.03 , 3.78 ± 0.05 and 3.94 ± 0.06 , respectively. Lowest feet percentage observed in free range system of management and the value did not differ significantly from semi intensive system of management but differ significantly ($P > 0.01$) from intensive system of management. Overall mean for feet yield percentage was 3.80 ± 0.04 . The mean \pm SE abdominal fat percentage in the free range, semi intensive and intensive system were found to be 0.82 ± 0.04 ,

Table 2: Effect of rearing systems on carcass characteristics of turkeys

Carcass characteristics				(Mean \pm SE)
	Free range system	Semi intensive system	Intensive system	Overall mean \pm SE
Head (%)	2.29 ± 0.02^a	2.33 ± 0.02^b	2.35 ± 0.04^b	2.32 ± 0.02
Neck (%)	6.74 ± 0.04^a	6.66 ± 0.02^b	5.61 ± 0.02^b	6.33 ± 0.02
Wings (%)	12.72 ± 0.02^a	12.32 ± 0.04^a	11.91 ± 0.04^c	12.31 ± 0.04
Beast (%)	31.18 ± 0.06^b	32.28 ± 0.05^c	29.99 ± 0.05^a	31.15 ± 0.06
Back (%)	16.13 ± 0.04^a	17.53 ± 0.02^b	18.65 ± 0.04^c	17.43 ± 0.03
Thigh S (%)	11.46 ± 0.04^a	15.93 ± 0.06^b	16.98 ± 0.06^c	15.79 ± 0.06
Drumstick (%)	12.33 ± 0.06^a	13.57 ± 0.05^b	13.72 ± 0.04^b	13.87 ± 0.05

Means bearing same superscripts row-wise do not differ significantly ($P < 0.01$)

0.90±0.05 and 1.82±0.02, respectively. Higher abdominal fat percentage observed in turkeys reared in intensive system of management followed by semi intensive system and free range system of management. Abdominal percentages of turkeys differ significantly ($P>0.01$) between rearing systems. Overall mean for turkey abdominal fat percentage was 1.77±0.03. Wang *et al.* (1991) reported positive correlations between feed consumption and abdominal fat in broiler sire and dam populations.

Carcass characteristics :

Effects of rearing systems on carcass characteristics of turkey are presented in Table 2. The mean ± SE head yield percentage in the free range, semi intensive and intensive system were found to be 2.29 ±0.02, 2.33±0.02 and 2.35±0.04, respectively. Higher head percentage observed in intensive system of management and lower head percentage observed in free range system of management. Head yield percentage between intensive and semi intensive system did not differ significantly between them. Overall mean for turkey head yield percentage was 2.32±0.02. The mean ± SE neck yield percentage in the free range, semi intensive and intensive system were found to be 6.67 ±0.04, 6.66±0.02 and 6.61±0.02, respectively. Higher neck yield percentage observed in free range system of management and lower head percentage observed in intensive system of management. Neck yield percentage between intensive and semi intensive system of management system did not differ significantly between them. Overall mean for turkey neck yield percentage was 6.63±0.02. The mean ± SE wings percentage in the free range, semi intensive and intensive system were found to be 12.72 ±0.02, 12.32±0.04 and 11.91±0.04, respectively. Higher wings percentage observed in turkeys reared in free range system of management followed by semi intensive system and free range system of management. Wings percentages of turkeys differ significantly ($P>0.01$) between rearing systems. Overall mean for turkey wings percentage was 12.31±0.04. The mean ± SE breast yield percentage in the free range, semi intensive and intensive system were found to be 32.28 ± 0.05, 31.18 ± 0.06 and 29.99 ± 0.05, respectively.

Higher breast yield percentage observed in free range system of management and lower breast yield percentage observed in intensive system of management.

Breast yield percentage between different rearing systems differ significantly ($P>0.01$) between them. Overall mean for turkey breast yield percentage was 31.15±0.06. The yield of breast meat in this study is in agreement with report of Shamseldin *et al.* (2014) for similar body weights at same slaughter age. Lei and Van Beek (1997) found that forcing motor activity due to open air assess increased the breast percentage.

The mean ± SE back and thighs yield percentage in the free range, semi intensive and intensive system were found to be 31.18 ±0.06 and 32.28±0.05 , 17.53 ±0.02 and 18.65±0.04 and 15.93 ±0.06 and 16.98±0.06, respectively. The average back and thighs yield percentage between each rearing system differ significantly ($P>0.01$) between them. The highest back and thighs yield percentage found in intensive system of management followed by semi intensive and free range system. Overall mean for turkey back and thighs yield percentages were 17.43±0.03 and 15.79±0.06, respectively. The mean ± SE drumstick yield percentage in the free range, semi intensive and intensive system were found to be 12.33 ±0.06, 13.57±0.05 and 13.72±0.04, respectively. Higher drumstick yield percentage observed in intensive system of management and lower drumstick yield percentage observed in free range system of management. Drumstick yield percentage between intensive and semi intensive system did not differ significantly between them. Overall mean for turkey drumstick yield percentage was 13.87±0.05. Breast constituted the highest yield followed by back, thighs, drumstick, wings and neck and head regardless of the rearing systems of turkey. This result was in consistent with the findings of Majumdar *et al.* (2005) and Shamseldin *et al.* (2014).

Conclusion :

From these results, it is concluded that, rearing system had a very significant effect on slaughter and carcass characteristics of turkeys. Intensive system of management is more suitable for to obtain better slaughter and carcass traits followed by semi intensive and free range system of management. Slaughter and carcass characteristics of turkeys reared under intensive system of were comparable with semi intensive system of management.

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