Original Research

Phenotypic Variations of Growth and Reproductive Performances among Turkeys *(Meleagris gallopavo)*

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Rec. Date:	Jun 25, 2018 04:47
Accept Date:	Nov 26, 2018 14:50
DOI	10.5455/ijlr.20180625044701

Abstract

A study was conducted to evaluate the productive and reproductive performance of three varieties of turkey namely, Nandanam turkey I (NT- I), Nandanam turkey II (NT -II) and Non- descript (ND) turkey from day old to 51weeks of age. Birds were reared under deep litter system and standard management conditions were followed throughout the experimental period. The per cent hen-day egg production were collected from 28 to 51 weeks. The mean body weight at 12 weeks of age was significantly (P< 0.01) higher in NT-I, NT-II compared to ND turkey. No significant difference was observed in body weights during 2nd and 8th week. The feed conversion ratios of NT- I, NT- II and ND turkey up to 12th weeks were 3.25, 3.40 and 3.65 respectively. The livability up to 12th week of age was 67.5, 68.0 and 83.33 per cent, respectively for NT- I, NT- II and ND turkey. This study revealed that the overall mean hen day egg production from 28-51 weeks of age was significantly (P<0.01) higher in ND turkey followed by NT- I compared to NT-II. Hence, it is concluded that the body weight gain and feed conversion ratio was high in Nandanam turkey I (NT- I). The livability and egg production was higher in Non- descript (ND) turkey. It can be concluded that body weight gain and feed conversion ratio were better in NT-I followed by NT-II than ND but the livability was better in ND than NT-I and NT-II, the egg production was better in ND turkey compared to NT- I and II from the above study periods.

Key words: Body Weight, Egg Production, Feed Conversion, Livability, Turkey

How to cite: Sangilimadan, K., Premavalli, K., & Omprakash, A. V. (2019). Phenotypic Variations of Growth and Reproductive Performances among Turkeys (Meleagris gallopavo). International Journal of Livestock Research, 9(3), 78-83. doi: 10.5455/ijlr.20180625044701

Introduction

Turkey farming in India has now shifted from backyard farming to scientific intensive farming due to change in market priorities and consumer preference. In many pockets of south India, farmers are rearing

turkeys mostly under the semi- intensive system. Turkey is reared for meat, which is the leanest among other domestic avian species. Turkeys are mostly concentrated in and around major cities of India in small numbers. Indigenous and non- descriptive turkeys are found in good numbers in Kerala, Tamil Nadu, eastern districts of Utter Pradesh and some other parts in India. However, serious efforts are being made at Central Poultry Development Organization Hessarghatta, Bangalore to promote turkey farming. Kerala and Tamil Nadu are the leading states in turkey production in India. The turkey start lay from the 30th week of age and its production period is 24 weeks from the point of lay. Under proper feeding and artificial lightening management turkey hens lay as much as 60-100 eggs annually. Majdood Ahmed *et al*. (2003) reported that turkey will be laid nearly 70 per cent of the eggs in the afternoon. The turkey eggs are tinted and weigh about 85 gms. There are three varieties of turkey developed by Poultry Research Station, Madhavarum, Chennai, namely Nandanam Turkey I, Nandanam Turkey- II and non-descript turkey to supply poults to needy farmers and also to use for various research purposes. They were developed from the base population of nondescript and Beltsville small white turkeys by genetic improvement in all the economic traits such as weekly body weight, feed consumption and feed efficiency and egg production at different ages. The information on production potential of these varieties will help the farmers to select the suitable stock for them. However, limited work pertaining to phenotypic differences among turkeys has been carried out. Thus, the primary objective of the present study was to compare the growth and reproductive performances among three varieties of turkeys.

Materials and Methods

The study was conducted at Poultry Research Station, Madhavaram, and Chennai-51, India. A total of 450 day old poults, 150 poults each for NT-I, NT-II and ND from a two hatch were taken with three varieties of turkey namely Nandanam Turkey I, Nandanam Turkey II and non-descript turkey. The poults were individually weighed, wing-banded and randomly distributed in deep litter system of rearing. Birds were fed pre-brooder mash diet up to four weeks of age, brooder mash diet from five to eight weeks of age. After eight weeks of age, birds were fed grower mash diet up to 12 weeks of age. Feed and water were provided *ad libitum*. Body weight (BW) was measured in kilograms at 2, 4, 6, 8, and 12 weeks of age. Feed intake and mortality were recorded for each variety starting from 0-84 days. Feed Conversion Ratio (FCR) and livability were calculated using standard arithmetic. After 20 weeks the birds belonging to three varieties were divided into five, seven and four number of breeding pens of Nandanam Turkey I, Nandanam Turkey II and non-descript turkey and in a breeding ratio of 1:3; 1:4 and 1:5, respectively were maintained under deep litter system. Daily egg productions were recorded from 28 to 51 weeks of age.

DOI 10.5455/ijlr.20180625044701

Results and Discussion

Growth Performance

The data on performance of three varieties of turkey are presented in Table 1. The mean twelfth week body weight of male, female and pooled population. The feed conversion ratios and livability up to 12th week of age on NT –I, NT- II and ND turkey are presented in Table 1.

Table 1: Growth performance of three variety of turkey under farm condition

Production Parameters	Nandanam Turkey I	Nandanam Turkey-II	Non-descriptive
Hatch weight (g)**	$42.50^{b} \pm 0.37$	$47.46^{a} \pm 0.44$	$40.55^{c} \pm 0.30$
2^{nd} week weight (g)^{NS}	87.35± 3.76	85.72 ±3.32	85.32 ±4.33
4^{th} week weight(g)*	163.34^{b} ±8.46	185.00^{a}±9.31	193.55^{a}±6.33
6^{th} week weight (g)*	288.20^{b}±14.13	356.41^{a}±3.20	278.69^{b}±21.87
8^{th} week weight (g)NS	461.26±27.56	507.86±36.49	436.33±48.59
10^{th} week weight (g)**	611.75^{b}±30.46	842.91^{a} ±42.25	647.61^{b} ±65.28
12^{th} Week Weight (g)			
Male^{NS}	1404.72 ±52.62	1347.75±50.89	1173.89±106.53
Female*	1110.00^{a}±16.07	948.20^{a}±151.36	745.62^{b}±28.12
Pooled**	1306.48^{a} ±57.12	1230.24^{a}±64.15	899.80^{b}±57.36
Feed efficiency	3.25	3.4	3.65
Livability (%)	67.5	68	83.33

*Means bearing the same superscript in a column do not differ significantly. * P < 0.05; ** P < 0.01; NS- Non-significant*

The results revealed that the 4^{th} week body weight was significantly (P< 0.05) higher in ND, NT-II than NT-I turkey. The similar results was reported by Ramakrishna *et al.*(2012) who were observed increased body weights in tom turkey of non-descript type at 4 weeks of age. Havenstein *et al*. (2007) compared the change of BW of 1966 vs. 2003 type turkeys at different ages starting from day-old to 84 of age. Body weights in all three variety of turkeys in present are smaller than body weight of 1966 vs. 2003. Laudadio *et al*. (2009) also reported that body weight of Nicholas Large White female turkeys at different ages starting at 30 up to 114 days of age. But, body weight of NT-I, NT-II and non-descript type turkeys in the present study was lower than these of Nicholas large white female turkeys at 86 days of age. Ilori *et al*. (2010) also compared the growth performances of pure and crossbred turkeys at different ages up to 140 days of age. The average body weight of exotic turkeys on 84 days of age were higher than that of pure and crossbred, this similar trend was observed in present study. McCrea *et al*. (2012) compared the body weight at 4, 7, 10, 13 and 17 weeks of ages between commercial and one of the heritage turkeys (Bourbon red, BR) and reported commercial turkey had higher BW than the BR turkeys for each of the age periods evaluated. These observations were similar to present study of NT-I, NT-II turkeys were performed better than non-descript turkey. The study conducted by Ramakrishnan *et al.* (2012) observed the body weight variation of three different

DOI 10.5455/ijlr.20180625044701

genotypes at hatch, 4, 8, 12, 14 and 16 weeks of ages and also reported commercial genotypes performed better than others. However, the values observed were larger than present study. Gibril *et al.* (2013) studied the body weight of one of the commercial turkey (BUT Big 6) at 9 and 16 weeks of age reported heavier values compared to this study which may be due to genotype variation. Sixth week body weight was significantly (P<0.05) higher in NT-II than NT-I and ND turkey. The body weight at 10th week of age was significantly (P<0.01) higher in NT-II than NT-I and ND. The results were in accordance with the report of Roberson *et al*. (2002) that was observed increased body weights in sexes of different commercial strains of turkey. The similar results was reported by Ramakrishna *et al.*(2012), who found that the body weight of Beltsville Small White was significantly higher than the non-descript and Nandanam Turkey-I varieties. But in present study, the body weights of 12 weeks of age were found to be significantly (P< 0.01) higher in Nandanam Turkey- I and Nandanam Turkey -II compared to Non-descript type. The mean body weight at 12 weeks of age obtained in this study is slightly lower to that of the results of Ilori *et al*. (2010) in local, exotic and crossbred turkey at 12 weeks of age. No significant difference was observed in body weight on 2 and 8 weeks of age within the varieties of turkeys in the present study.

Feed Efficiency

The feed efficiency up to 12 weeks of age is better in Nandanam Turkey -I followed by Nandanam Turkey-II and non- descript type. Gibril *et al.* (2013), reported FCR was 2.82 for commercial turkey (BUT Big 6) between 9 and 16 weeks of age. This value is better than the present study of NT-I, NT-II and non-descript turkeys. According to Case *et al*. (2012), the FCR estimated for the breeder turkey sires was 2.96 between 105 and 133 days of age. This value is better than the present study of three variety of turkeys. Another study was conducted by McCrea *et al*. (2012) compared the FCR at 4, 7, 10, 13 and 17 weeks of ages between commercial and one of the heritage turkeys (Bourbon Red) and reported superior FCR in commercial turkey than BR. The similar findings of NT-I, NT-II was better than non-descript turkeys. In another study, FCR estimated for Nicholas Large White females was 2.98 for the period between 31 and 114 days of age this value also close agreement with the present study of NT-I, II and followed by non-descript turkeys. According to Laudadio *et al*. (2009), studied three different group of protein levels fed from 31-114 days of age and reported that mean FCR vale was 2.98, 3.07 and 2.98 respectively. This value is close agreement with the present study at 12 weeks of age. The values of feed efficiency are in agreement with findings of Ilori *et al.* (2010) reported that 12 week of age local turkey had the highest significant (P<0.05) feed efficiency followed by the exotic and crossbreds turkey. But this observation is in contrast with overall findings of Ramakrishna *et al.* (2012) who have obtained much higher feed efficiency of 4.28 at 12 weeks of age for Nandanam

 DOI 10.5455/ijlr.20180625044701

Turkey -1 and Havenstein *et al.* (2007) was obtained feed efficiency of 5.41 at 16 weeks of age for 1966 strain of turkey.

Livability

The livability up to 12 weeks of age in the present study is better in non- descript type than Nandanam Turkey -I and II. This observation was in contrast with of Havenstein *et al*. (2007) who obtained the livability of 90 per cent in 1966 strain of 1966 male diet at 96 days of aged turkey. Ilori *et al*. (2010) who have reported that exotic, crossbreds and local turkey livability up to 20 weeks of age was 55.18, 64.94 and 66.92 percent respectively. This observation was close agreement with present study.

Egg Production Performance

The data on hen-day egg production performance of three varieties of turkey are presented in Table 2. The overall mean per cent hen day egg production for the period of 28-51 weeks of age were 32.71± 1.32, 25.74 ±1.12 and 35.26 ±1.30 respectively in Nandanam Turkey– I followed by Nandanam Turkey - II and non-descript turkey.

Table 2: Hen day egg production (%) performance of three variety of turkey under farm condition

Periods	Nandanam Turkey- I	Nandanam Turkey - II	Non-descript Turkey
28-31 weeks^{NS}	5.96 ±1.33	5.08 ±0.65	8.54± 1.54
32-35 weeks**	29.87^{b} ±1.60	17.85^{c} ±1.21	35.06^{a} ±1.55
36-39 weeks**	29.85^{b} ±1.99	24.85^{c} ±0.85	38.33^{a} ±1.96
40-43 weeks**	36.25^{b}± 2.32	31.87^{c}± 2.25	42.70^{a} ±2.73
44-47 weeks**	51.68^{a}± 1.82	45.65^{b}± 1.52	52.74^{a} ±1.89
48-51 weeks**	42.63^{a} ±1.69	29.16^{c}± 1.47	34.17^{b} ±1.62
Mean (28-51 weeks**)	32.71^{a}± 1.32	25.74^{b} ±1.12	35.26^{a} ±1.30

*Means bearing the same superscript in a column do not differ significantly. ** P < 0.01; NS- Non-significant*

This study revealed that from 32-51 weeks of age egg production of Non-descript turkey was (P<0.01) significantly better compared to Nandanam Turkey - I and II, but at the early production period of 28-31 weeks, there was no significant difference was observed between these varieties. In the overall mean hen day egg production from 28-51 weeks of age, highly significant (P<0.01) difference was observed in Non-descript turkey compared to Nandanam Turkey - I and II. Siopes (2010) who have studied that large white turkey breeder hen a control group was given 16 L: 8 D continuously from hatch to 60 weeks of age and produced egg production gradually increased to a peak 36 per cent by 35 to 38 week of age. This value is in close agreement with present study at 32-35 weeks of age at non-descript type turkey but other two variety of turkey is lower than the above findings. The present study of 36-39 weeks of age significantly (P< 0.01) higher egg production were observed in non–descript followed by Nandanm Turkey-I and Nandanam Turkey- II. Adikari *et al.* (2016) reported that mean egg production for the periods of 36 and 40

DOI 10.5455/ijlr.20180625044701

weeks among Bourbon Red turkey and Midget white (MW) turkey was ranged from 1.96±3.79 to 24.36±3.28 and 6.85±5.49 to 33.95±4.76 respectively. This value is similar consistent with present work.

Conclusion

It can be concluded that body weight gain and feed conversion ratio was better in Nandanam Turkey – I followed by Nandanam Turkey – II than non-descript where in livability was better in non-descript than Nandanam Turkey – I and Nandanam Turkey- II. The mean hen egg production from 28 to 51 weeks of age of this study were better in non-descript turkey compared to Nandanam Turkey-I and Nandanam Turkey-II under farm condition.

Acknowledgement

Authors are grate thankful to Director, Centre for Animal Production Studies, Tamil Nadu Veterinary and Animal Sciences University, Madhavaram Milk Colony, Chennai, Tamil Nadu, India for the necessary facility provided during this experiment.

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