

GROWTH PERFORMANCE AND CARCASS YIELDS AS INFLUENCED BY AGE AND SEX IN DIFFERENT TURKEY VARIETIES*

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ABSTRACT

A trial was conducted to study the influence of age and sex on production parameters in three different varieties of Turkeys belonging to Non-descript (V1), Nandanam Turkey-1 (V2) and Beltsville small white (V3) with 54 numbers each in three replicates. Hatch weight, weekly body weights and feed consumption were recorded at weekly intervals up to 16 weeks of age. Parameters on Ready-to-cook yield, giblet yield, meat: bone ratio and cut-up parts were recorded at three age groups in all the three varieties. Beltsville small white variety had significantly higher body weight and the best feed efficiency followed by Nandanam Turkey-1 and Non-descript varieties. Ready-to-cook yield in tom turkeys did not differ significantly between three turkey varieties. Giblet yield percent had gradually declined as age advanced. The giblet percent yield at 12 and 14th weeks of age in Beltsville small white variety showed significantly lower percentage than Nandanam Turkey-1 and Non-descript variety. Significant variation was found in breast yield between ages and as the age advanced, the percent value also increased (16.24 to 19.61 %).

Keywords: Turkey Varieties - Carcass yield - Sexes and Age -Feed efficiency-Giblet

INTRODUCTION

Turkey farming in India has now shifted from backyard farming to scientific intensive farming due to change in market priorities and consumer preference. Considering the future of economic and livelihood potential of practicing Turkey farmers, recently Tamilnadu Veterinary and Animal Sciences University, Chennai has released a new strain, Nandanam Turkey-1 for commercial rearing. It is developed with the base population of Non-descript and Beltsville small white turkeys for the improvements in all the economic traits. Certain traits

such as weekly body weight, feed consumption, feed efficiency, carcass characteristics at different ages will help in understanding the meat qualities and production potential of three varieties of turkey. Unlike chicken, ready to cook turkey meat has to undergo further processing for making products due to its large skeletal structure. Hence there is a need to understand the quality of meat from turkeys. Hence an attempt has been envisaged to study the body weights, feed consumption, feed efficiency, the percent of ready-to-cook yield, giblet yield, meat: bone ratio and cut-up parts in Turkeys

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slaughtered at different ages in three varieties of Turkeys.

MATERIALS AND METHODS

The study was taken up at Institute of Poultry Production and Management, Nandanam, Chennai-35. A total of 162 day-old poults with 54 in each of the Non Descript (V1), Nandanam Turkey-1 (V2) and Beltsville Small White (V3) varieties were obtained from this station, individually weighed, wing-banded and randomly distributed in cages. 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 transferred to the deep litter house and were fed grower mash diet up to 16 weeks of age. The birds belonging to three varieties were divided into three replicates with 18 birds in each replicate. Individual bird body weight was recorded at day one and subsequently on weekly intervals up to 16 weeks of age at one gram accuracy. Daily mortality, weekly feed consumption and feed efficiency were recorded.

At 12th, 14th and 16th week of age, three tom and three female birds from each variety were randomly picked up and slaughtered as per standard procedures. The birds were subjected to starvation of 18 hrs before slaughter without restriction of potable water. Prior to slaughter the individual weights of the birds were recorded.

The parameters on the meat characteristics such as Ready-to-cook yield, Giblet yield, Meat: Bone ratio and Cut up parts of three varieties of turkeys of both sexes were studied at 12th, 14th and 16th week of age. Individual edible organs were removed and their weights were taken at one gram accuracy and recorded. The percent values were transferred to arcsine values before analysis. All

the data were subjected to statistical analyses as recommended by Snedecor and Cochran (1994) to arrive at inferences.

RESULTS AND DISCUSSION

The mean body weight obtained from Tom and Female turkeys of Non Descript (V1), Nandanam Turkey-1 (V2) and Beltsville Small White (V3) from hatch, 4, 8, 12, 14 and 16th weeks of age are presented in Table 1 and 1a.

Body weights of Toms

At hatch the body weight of Beltsville small white Toms was significantly ($P < 0.01$) higher than that of Non-descript and Nandanam turkey-1 varieties. At 8th, 12th, 14th and 16 weeks of age, Beltsville Small White (V3) recorded significantly higher body weight than the Non-descript and Nandanam Turkey-1 varieties. The results were in accordance with the report of Roberson et al. (2003) who observed increased body weights in sexes of different commercial strains.

Body weights of Female turkeys

The weights of female turkeys at hatch, 4, 8, 12, 14 and 16th week of age are presented in Table 1a. At 4th, 8th, 12th and 16th week of age, body weights of Beltsville small white was significantly higher than that of Nandanam turkey-1 and Non-descript varieties. The body weights of Nandanam turkey-1 and Non-descript varieties were almost same at 4th, 8th and 16th week of age. While the body weights at 12th week of age of Beltsville small white had significantly higher body weight than Nandanam turkey-1 as well as Non-descript birds. The Beltsville Small White had the highest body weight from the hatch onwards than the Non-descript and Nandanam turkey-1 varieties.

Table 1**Mean values of body weights (g) of Tom turkeys belonging to three varieties**

| Body weight(g) | | | | | | |
|---------------------|--------------------------------------|--------------------------|--|--|--|--|
| Variety | HATCH | 4 WEEK | 8 WEEK | 12 WEEK | 14 WEEK | 16 WEEK |
| V1 | 41.44 ^a ±0.78 (27) | 425.70 ±7.66 (27) | 1280.93 ^a ±26.17 (27) | 1809.93 ^a ±47.01 (27) | 2621.54 ^a ±68.93 (24) | 3309.33 ^a ±94.43 (21) |
| V2 | 41.77 ^a ±0.71 (27) | 414.84 ±9.17 (27) | 1299.59 ^a ±24.86 (27) | 1998.41 ^b ±33.45 (27) | 2630.57 ^a ±43.58 (24) | 3352.09 ^a ±47.99 (21) |
| V3 | 45.12 ^b ± 1.08 (27) | 447.37 ±23.80 (27) | 1532.85 ^b ±25.89 (27) | 2454.77 ^c ±49.12 (27) | 3328.83 ^b ±51.42 (24) | 4049.64 ^b ±53.45 (21) |
| Overall mean | 42.78 ±1.17 (81) | 429.32 ±9.55 (81) | 1371.12 ±81.04 (81) | 2087.70 ±191.42 (81) | 2860.31 ±234.27 (72) | 3570.35 ±239.96 (63) |

Means having common superscript within the column do not differ significantly (P<0.01)

Figures given in parentheses indicate the number of birds

Table 1a**Mean values on body weights (g) of Female turkeys belonging to three varieties**

| Body weight(g) | | | | | | |
|---------------------|------------------------|---------------------------------------|--|--|--|--|
| Variety | HATCH | 4 WEEK | 8 WEEK | 12 WEEK | 14 WEEK | 16 WEEK |
| V1 | 42.19 ±0.66 (27) | 367.26 ^{ab} ±7.76 (27) | 1000.30 ^a ±20.36 (27) | 1394.78 ^a ±29.44 (27) | 1913.13 ^a ±35.01 (24) | 2282.05 ^a ±71.34 (21) |
| V2 | 40.60 ±0.65 (27) | 356.21 ^a ±7.82 (27) | 999.06 ^a ±21.28 (27) | 1543.52 ^b ±24.69 (27) | 2052.79 ^a ±36.87 (24) | 2473.72 ^a ±46.58 (21) |
| V3 | 42.44 ±0.70 (27) | 391.09 ^b ±8.12 (27) | 1193.24 ^b ±19.80 (27) | 1787.63 ^c ±55.74 (27) | 2336.31 ^b ±73.51 (24) | 2809.91 ^b ±83.83 (21) |
| Overall mean | 41.74 ±0.57 (81) | 371.52 ±10.29 (81) | 1064.20 ±64.52 (81) | 1575.31 ±114.51 (81) | 2100.74 ±124.49 (72) | 2521.89 ±154.27 (63) |

Means having at least one common superscript within the column do not differ significantly (P<0.01)

Figures given in parentheses indicate the number of birds

Feed consumption and Feed efficiency

The cumulative feed consumption and feed efficiency data from 4, 8, 12, 14 and 16th weeks of age for Non-descript, Nandanam turkey-1 and Beltsville small white varieties and both the sexes were recorded and presented in Table 2. Beltsville Small White (V3) had the highest feed consumption continuously from hatch followed by Nandanam turkey-1 and Non-descript varieties. At 12th, 14th and 16th week Beltsville small white birds recorded best feed efficiency followed by Nandanam turkey-1. The poorest feed efficiency is due to lower body

weight recorded in Non-descript turkey varieties. The highest feed consumption was noticed in Beltsville small white variety over Nandanam turkey-1 and Non-descript at all ages studied. Higher feed efficiency in Beltsville small white is due to higher body weights and also better utilization of the feed for converting into meat. This report is in accordance with overall findings of Castellini et al. (2001). Havenstein et al. (2007) obtained feed efficiency of 5.41 at 16 weeks of age for 1966 strain of turkey, while for 2003 strain the feed efficiency was 4.49 for female turkeys and 3.70 for toms.

Table 2**Mean cumulative feed consumption (Kg) per bird and feed efficiency per (Kg) body weight of Turkey varieties**

| Variety | 4 week | 8 week | 12 week | 14 week* | 16 week** |
|-------------------------|----------------|----------------|----------------|-----------------|------------------|
| V1 | 0.61 (1.54) | 3.24 (2.84) | 7.37 (4.60) | 10.85 (4.78) | 15.32 (5.48) |
| V2 | 0.63 (1.62) | 3.33 (2.90) | 7.58 (4.28) | 11.12 (4.75) | 15.70 (5.39) |
| V3 | 0.70 (1.67) | 3.54 (2.60) | 7.98 (3.76) | 11.68 (4.12) | 16.48 (4.81) |
| FC Age Mean ±S.E. | 0.64 ±0.28 | 3.37 ±0.90 | 7.64 ±0.18 | 11.22* ±0.25 | 15.84** ±0.34 |
| FE Age Mean ±S.E. | 1.61 ±0.03 | 2.78 ±0.09 | 4.21 ±0.24 | 4.55* ±0.21 | 5.23** ±0.20 |

Feed efficiency is given in parenthesis. All the groups had 54 birds up to 12 weeks of age.

*Each group had 48 birds. ** Each group had 42

Ready-to-cook Yield, Giblet Percent and Meat: Bone ratio

The percent ready-to-cook yield, giblet and meat: bone ratios at 12, 14 and 16th week of age of Tom and Female turkeys are presented in Table 3. The percent ready-to-cook yield between ages and varieties did not show any significant difference in Tom and female turkeys. In general as age increased the percent of ready-to-cook yield also increased. The yield ranged from 65.97 to 74.95 percent and 71.89 to 77.16 per cent in Tom and female turkeys

respectively. The meat: bone ratio among different varieties and ages also did not show any significant difference. It ranged from 1.51 to 1.95. Majumdar et al. (2000) reported progressive increase in ready-to-cook yield from 71.2 at sixth week and 77.9 percent at 14 weeks of age in turkeys. Bilgili et al. (2006) observed that the processing yields of broilers were influenced by strain-cross. Roberson et al. (2003) also reported that the carcass components and meat quality characteristics of three commercial strains of tom turkeys had few differences in carcass components between strains. Difference in the

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findings in the present study also may be due to the variation in strains.

The giblet percent among different varieties and ages in Tom turkeys did not show any significant difference while reverse trend was noticed in female turkeys. Pragati et al. (2005) also observed that the percentage of liver, gizzard, heart and intestine decreased with increasing age. In female turkeys the giblet percent at 12 weeks of age in Beltsville small white showed significantly lower percent than Nandanam turkey-1 and Non-descript.

The percents of Non-descript and Nandanam turkey-1 were not statistically significant. The meat: bone ratio among different varieties and ages did not show any significant difference. It ranged from 1.65 to 2.16. Between sexes there was no significant difference in meat: bone ratios. In contrast to our study, Aggarwal et al. (1982) reported more meat: bone ratio of 4.4 at 18 weeks of age in turkeys. The difference in the ratio may be due to the breed or strain variation or influence of feed or different environment of study.

Table 3

Mean percent of ready-to-cook yield, giblet and meat: bone ratio of Tom and Female turkeys belonging to three varieties

| Sex | Age | Parameters | Variety | | | Overall Mean ± S.E |
|--------|-----------------------|---------------------|-------------------------|-------------------------|-------------------------|--------------------|
| | | | V1 | V2 | V3 | |
| MALE | 12 th Week | Ready-to-cook yield | 73.45±0.59 | 72.62 ±1.19 | 74.29±0.33 | 73.45±0.48 |
| | | Giblet | 4.75±0.20 | 4.27±0.32 | 4.27±0.09 | 4.43±0.16 |
| | | Meat: Bone ratio | 1.51±0.20 | 1.62±0.13 | 1.68±0.20 | 1.60±0.04 |
| | 14 th Week | Ready-to-cook yield | 65.97±4.95 | 71.93±0.60 | 72.72±2.09 | 70.21±2.13 |
| | | Giblet | 4.59±0.42 | 4.50±0.16 | 4.45±0.03 | 4.51±0.04 |
| | | Meat: Bone ratio | 1.74±0.09 | 1.81±0.15 | 1.95±0.11 | 1.83±0.07 |
| | 16 th Week | Ready-to-cook yield | 74.55±1.08 | 74.88±1.96 | 74.95±1.43 | 74.79±0.12 |
| | | Giblet | 4.43±0.21 | 5.13±0.13 | 4.15±0.05 | 4.57±0.2 |
| | | Meat: Bone ratio | 1.68±0.06 | 1.85±0.27 | 1.73±0.14 | 1.75±0.08 |
| FEMALE | 12 th Week | Ready-to-cook yield | 71.96±3.22 | 71.89±1.54 | 75.14±0.67 | 73.00±1.07 |
| | | Giblet | 5.15 ^a ±0.28 | 5.28 ^a ±0.32 | 4.37 ^b ±0.12 | 4.93±0.28 |
| | | Meat: Bone ratio | 1.81±0.05 | 1.65±0.01 | 2.06±0.28 | 1.84±0.11 |
| | 14 th Week | Ready-to-cook yield | 73.09±0.98 | 77.16±7.11 | 73.86±0.84 | 74.70±1.24 |
| | | Giblet | 4.98 ^a ±0.19 | 5.32 ^a ±0.59 | 3.90 ^b ±0.17 | 4.73±0.42 |
| | | Meat: Bone ratio | 1.77±0.22 | 1.84±0.12 | 1.91±0.13 | 1.84±0.04 |
| | 16 th Week | Ready-to-cook yield | 75.75±0.81 | 75.37±1.32 | 75.49±0.91 | 75.54±0.11 |
| | | Giblet | 4.68±0.30 | 4.75±0.07 | 4.07±0.17 | 4.50±0.21 |
| | | Meat: Bone ratio | 2.16±0.11 | 1.94±0.12 | 1.95±0.22 | 2.02±0.07 |

Cut-up parts: The individual weights of cut-up part of tom and female turkeys are presented in Table 4.

Breast: The percent of breast meat yield showed highly significant variation between ages with lowest at 12th week (16.24%) followed by 14th week

(16.89%) and 16th week (19.61%) in Tom turkeys. At 14th and 16th week Beltsville small white had higher breast yields than Nandanam turkey-1 and Non-descript. Majumdar et al. (2000) Young et al (2001) and Pragati et al. (2005) also observed higher meat yield from breast and thighs as age increased.

In Female turkeys also there was no significant variation on breast yields. There was no variation between the varieties and sexes on breast yield studied. Werner et al. (2008) also reported that breast yield of different strains did not show any variation. The range of breast yields was 16.03 to 20.88 percent.

Back: The percent back meat yield in Tom Turkeys showed significant ($P < 0.01$) variation between ages with highest at 12th week (13.83%) followed by 14th week (13.58%) and 16th week (11.07%). The yield of back at 16 weeks was statistically lower than that of 12 and 14 weeks of age in Tom turkeys. Similarly in female turkeys too the back yield showed significant variation between ages. The yield at 16th week was 11.11% and at 14th week 12.03% and they are statistically different from the yield of 13.78% at

12th week. There was no variation between the varieties and sexes on back yield. Majumdar et al. (2000) also reported that bony parts like back, wings and neck showed declining trend as the age increased. As the age increased the percent of back meat yield decreased in tom and female turkeys.

Thighs: The percent thighs yield in toms showed highly significant difference between ages with lowest at 12 weeks over the 16th week yield. The yield at 14th week was numerically higher than 12th week but lower than 16th week. In Female turkeys the yield ranged from 9.79 to 12.40 percent and the difference was not statistically significant. There was no variation between the varieties and sexes on thigh yields. The results are in concurrence with the report of Young et al. (2001) that as the age increased the percent yields of thigh meat increased.

Table 4
Mean percent values of cut-up parts of Tom and female turkeys belonging to three varieties

| Age | Parameters | Variety | | | | | | Overall Mean Tom | Overall Mean Female |
|-----------------------|------------|---------|-----------|--------|-----------|--------|-----------|---------------------|---------------------|
| | | V1 Tom | V1 Female | V2 Tom | V2 Female | V3 Tom | V3 Female | | |
| 12 th Week | Breast | 16.17 | 16.03 | 16.19 | 16.66 | 16.35 | 19.45 | 16.24 ^a | 17.38 |
| | Back | 13.66 | 13.59 | 14.22 | 12.65 | 13.60 | 15.09 | 13.83 ^b | 13.78 ^b |
| | Thigh | 10.54 | 10.20 | 8.33 | 9.79 | 9.74 | 11.67 | 9.54 ^a | 10.55 |
| | Drumstick | 10.42 | 10.15 | 10.55 | 10.09 | 10.42 | 11.83 | 10.46 | 10.69 |
| | Wings | 12.14 | 12.25 | 11.63 | 11.58 | 10.43 | 12.49 | 11.40 | 12.11 |
| | Neck | 4.75 | 4.22 | 6.69 | 4.15 | 4.04 | 4.77 | 5.16 | 4.38 |
| 14 th Week | Breast | 14.67 | 18.23 | 17.79 | 19.25 | 18.21 | 18.13 | 16.89 ^a | 18.54 |
| | Back | 17.85 | 11.72 | 11.55 | 12.49 | 11.34 | 11.87 | 13.58 ^b | 12.03 ^a |
| | Thigh | 9.76 | 10.79 | 10.01 | 11.24 | 10.61 | 11.37 | 10.13 ^{ab} | 11.13 |
| | Drumstick | 9.63 | 10.09 | 10.81 | 10.99 | 10.71 | 10.86 | 10.38 | 10.65 |
| | Wings | 10.60 | 11.89 | 11.19 | 11.98 | 11.47 | 12.05 | 11.09 | 11.97 |
| | Neck | 4.51 | 4.80 | 4.72 | 4.61 | 4.71 | 4.68 | 4.65 | 4.70 |
| 16 th Week | Breast | 19.00 | 18.63 | 19.69 | 20.15 | 20.13 | 20.88 | 19.61 ^b | 19.89 |
| | Back | 11.60 | 11.74 | 10.51 | 11.40 | 11.09 | 10.18 | 11.07 ^a | 11.11 ^a |
| | Thigh | 11.26 | 10.78 | 11.51 | 11.49 | 11.28 | 12.40 | 11.35 ^b | 11.56 |
| | Drumstick | 10.14 | 9.91 | 10.45 | 10.14 | 10.20 | 10.28 | 10.26 | 10.11 |
| | Wings | 11.52 | 11.63 | 11.60 | 11.63 | 11.70 | 11.38 | 11.61 | 11.55 |
| | Neck | 4.64 | 4.73 | 4.64 | 4.15 | 4.17 | 4.02 | 4.48 | 4.30 |

Means having at least one common superscript with in the column do not differ significantly ($P < 0.01$).

Drumsticks: The percent of drumstick yields ranged from 9.63 to 10.81 percent in tom turkeys and in female turkeys 9.91 to 11.83 percent. The yields did not show significant variation between different ages or varieties or sexes. The result is in accordance with Young et al. (2001) that female turkeys had higher percent yields of drumstick meat.

Wings: The percent of wings yield ranged from 10.43 to 12.14 percent in tom turkeys and in female turkeys 11.38 to 12.49 percent. The yields did not show any significant variation between different ages or varieties but the difference between the sex was statistically significant ($P < 0.05$). The tom turkeys had an overall average of 11.36 percent and female turkeys 11.88 percent of wing yields. However Roberson et al. (2003) obtained differences in wing yields for different commercial hybrid strains. This difference may be due to the improvement in genetic characteristic of the hybrid strain.

Neck: The neck yield percentage ranged from 4.04 to 6.69 in tom turkeys and in female turkeys 4.02 to 4.80 and did not show any significant variations.

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