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Original Contribution

WEIGTH DEVELOPMENT AND BODY CONFIGURATION OF TURKEY- BROILER PARENTS BIG-6

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ABSTRACT

The parameters characterizing meat production traits of turkeys are some external indices: body length, breast circumference, keel length, breast depth and total leg length. The body conformation type and the meatiness of turkeys could be better expressed via the massiveness index, the stockiness index and the long-leggedness index The purpose of the present study was to investigate production traits of 4-20 week-old male turkeys – parents - BIG-6, available in our breeding centre. The live body weight and the quantitative exterior traits that influence the conformation of the body were measured. Other principal selection indexes, stockiness, massiveness, and long-leggedness were measured. The animals attained a live body weight of 14.9kg after 20 weeks. The nine body measurements increased consistently during the entire period with breast circumference being the highest. By the age of 20 weeks turkey poults from the BIG 6 had a stockiness index of 129.30% and massiveness index of 31.87% – traits for solidity of the body and clearly defined traits for meat-type turkeys.

Key words: turkey, way of breeding, exterior, quantitative index, production quality, index, correlation

INTRODUCTION

At a global scale, modern turkey breeding industry is manifesting prosperity. The turkey is becoming more and more preferred source for poultry meat production

The parameters characterizing the meat production traits of turkeys are some exterior indices: body length, breast circumference, keel length, breast depth and total leg length. The body conformation type and the meatiness of turkeys could be better expressed via the massiveness index, the stockiness index and the long-leggedness index. They state the ratio of measurements that characterize the proportionality of bird's body (Ivanov et al., 1968, Donchev et al., 1981). The quantitative exterior traits should be included in breed characteristics (Moiseeva, 1987) and the development of breed standards.

According to Ashourov (1960), male and female turkeys from the North Caucasian Bronze breed have higher breast circumference, body length, breast depth, breast width and keel length compared to local turkey breeds and their crosses.

Nestor (2001, 2005) has studied the body shape, the growth and the various body measurements of several lines of turkeys.

Lalev (2001) has published data about the regular growth rate in all body parts up to the age of 6 months, preserving equal proportions with exception of breast circumferences, in BUT 9 gobblers.

Oblakova (2006) communicated insignificant differences in leg measurements in five lines of turkeys aged 20 weeks.

In world literature, the data on principal production traits, that is, live body weight and body measurements in turkeys, are controversial. The studies are primarily aimed at looking for a relationship between few body measurements. The presence of a diverse genetic material with marked differences with regard to phenotypes, assumes a complete study of meat productivity traits.

The purpose of the present study was to investigate production traits of male turkey – parents - BIG-6 imported in the Hybrid Centre of Poultry Breeding in Bulgaria. For this purpose, we aimed at:

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1. Determination of the live body weight of turkeys at the age of 4-20 weeks;
2. Determination of some value quantitative exterior traits that influence the conformation of the body;
3. Determination of principal selection indexes: stockiness, massiveness, long-leggedness

MATERIAL AND METHODS

The study was performed in 2004 in the selection farm of the Hybrid Centre of Poultry Breeding at the Agricultural Institute, Stara Zagora, Bulgaria. Thirty male turkeys, *Turkey parents BIG 6*, from British United Turkey limited, aged 4-20 weeks, were used. The growing turkey poults were reared under a routine technology in the breeding farm– deep litter, feeding *ad libitum* with commercial feeds in compliance with the age and the type of birds.

In order to establish the phenotype characteristics of BIG 6, measurements of 9 exterior body parameters were performed with a precision of 1 cm: body length, breast circumference (with a band), breast width and depth (with calipers), keel length, shank length, femur length, metatarsal length, total leg length (with a band). The live body weight was determined with a precision of 10 g.

Three principal exterior indices were calculated (in %): stockiness (the ratio of breast circumference to body length × 100), massiveness (the ratio of live body weight to body length × 100) and long-leggedness (the ratio of leg length and body length × 100).

Data was statistically processed using the one and two descriptive factor analysis-ANOVA 2000. The arithmetic mean, standard error, criterion and level of reliability of the arithmetic mean were employed.

RESULTS AND DISCUSSION

Exterior body measurements and indices

The live body weight is a primary production trait that is taken into consideration in the selection of male turkeys and that could be improved by massive selection. Turkey-broiler sires are selected for production of BUT-9 turkey-broilers, suited for portioned products Male birds reach 20.61 kg, females – 16.74 kg by the age of 20 weeks and the hybrid – 15.98 kg (Manual B.U.T., 2000). In the Hybrid Centre for Poultry Breeding, an evaluation of their productive traits is performed in our conditions of rearing and nutrition with regard to their utilization in schedules for live body weight increase of some sire lines in broiler production programme.

The results of age-related dynamics of live body weight from the age of 4 to 20 weeks are presented on **Table 1 and Figure 1** .By the age of 20 weeks, male turkeys reached 14 910 g at $p<0.001$.

Table 1. *Live weight of male turkeys BIG-6(g)*

Age, weeks	N 30	$x \pm Sx$	$C\%$%	Live weight to the previous week %
4		1011.20 ± 16.11 ***	11.18	100
6		1544.90 ± 36.48 ***	16.69	152.79
8		2396.60 ± 59.56 ***	16.48	155.13
10		3451.28 ± 97.30 ***	17.61	144.00
12		5238.89 ± 142.75 ***	16.35	151.79
14		7926.25 ± 172.31 ***	13.75	151.30
16		9615.00 ± 190.26 ***	12.52	121.30
18		12029.41 ± 253.06 ***	12.27	125.11
20		14910.00 ± 554.80***	20.38	123.95

****Significant differences at p<0.001*

The variation of the trait was higher in early age (16.69 % - 16.35%) and afterwards, was reduced to 12.27% at 18 weeks and by the 20th week, its variation augmented up to 20.38%. As a compound value, the live body weight allows the evaluation of male turkeys at an early age throughout the selection process.

The growth intensity was the highest during the 6th-8th week, when the turkey poults increased their live body weight by 52% and 55% respectively. This trend was preserved up to the age of 14 weeks and after that, the relative increase was reduced to 23% at the age of 20 weeks.

The studied 9 exterior measurements are presented on **Table 2**. The values of all body dimensions were increased between the 6th and the 20th week of age. Body length at the age of 16 weeks reached 37.35 cm,

compared to 31.58 cm communicated by Lalev (2001).

The most intensive increases up to the age of 16 weeks were those of breast circumference – by 96%, body length – by 88%, breast width – by 88% and breast depth – by 85%.

From the 16th to the 20th week of age, the intensity of growth of body parts – keel length, breast circumference, breast width, was higher by 23%, 22% and 22.8%.

Body length increased at lower rates – 5.48%, the total leg length – by 8.03%, and breast depth – by 5.58%. The increase in the total leg length was on account of femur increase (12.80%); the shank and metatarsal lengths increased more slowly for the last month of the growth – by 3.75% and 2.22%, respectively.

The research of Nestor (2005**),** related to the growth and the different body measurements of two turkey lines selected in various directions showed that the F line, selected for fast growth, breast width, was lower and the shank length was higher at the age of 16 weeks compared to the primary breeding line.

An important parameter of the meatiness of turkeys is breast circumference. In *BIG-6 turkeys*, this parameter reached 75.80 cm by the 20th week. Compared to the baseline period, the increase was by 140%. The increase in breast width for the entire period of the study was 130%, the keel length – by 119%, the body length – by 98%, breast depth – by 95%, and total leg length – by 90%.

The proportions of the different body parts are obtained by determining body configuration. The most important exterior indices are shown on **Table 3**. The stockiness index (the ratio of breast circumference to body length × 100), increased with age from 153.27% at 6 weeks to 192.30% at 20 weeks, i.e. by 25.46% at $p<0.001$.

In turkeys, breast circumference increased at higher rates than body length as a result of breast depth and width.

The massiveness index (the ratio of live body weight to body length × 100) was altered throughout the growth and development. From the 6th to the 10th week, gobblers exhibited more intensive growth of body length on account of live body weight; so this index ranged from 7.65% to 10.75%. With advancing age, the skeletal growth was reduced and the genetic potential of musculature development was realized. In male turkeys, the index at 18 weeks increased to 31.87%. In turkey-broilers at the age of 16 weeks, this ratio was 20.59% (Hristakieva, 2006).

The long-leggedness index (the ratio of leg length and body length × 100) at the age of 16-20 weeks showed a trend towards stabilization of a most favourable ratio of both measurements: leg length and body length.

CONCLUSION AND RECOMMENDATION

The data from the present investigation allowed us to make some principal conclusions about the growth and development of growing turkey poults from the BIG 6 on the basis of the live body weight and the exterior traits:

1. Male turkeys parents *BIG 6* reached a live body weight of 14.9 kg ($p< 0.001$) at the age of 20 weeks.
2. The growth intensity was the highest between the 6th and the 8th weeks, when the turkey-broilers increased their live body weight by 52% and 55% respectively, and this trend was maintained up to the 14th weeks of life.
3. The nine body measurements increased consistently during the entire period; by the end of the period, the most intensive growth was that of breast circumference: by 140%, followed by breast width by 130% and keel length by 119%.
4. By the age of 20 weeks turkey poults from the *BIG 6* had a stockiness index of 129.30% and massiveness index of 31.87% – traits for solidity of the body and clearly defined traits for meat-type turkeys.
5. The Male turkeys parents *BIG 6* could be placed as sire side in the hybridisation scheme for the production of the final product – turkey broiler.

Table 2. *Body measurements of male turkeys - BIG-6- (cm) in dynamic*

measurements	***6***	***8***	***10***	***12***	***14***	***16***	***% vs baseline period***	***18***	***20***	***% vs 16th week***	***% vs baseline period***
N=30	*x ± Sx Vc*	*x ± Sx Vc*	*x ± Sx Vc*	*x ± Sx Vc*	*x ± Sx Vc*	*x ± Sx Vc*		*x ± Sx Vc*	*x ± Sx Vc*		
body length	19.80± 0.17 4.60	24.93± 0.26 5.70	27.57± 0.26 5.30	31.23± 0.39 6.70	32.77± 0.32 5.30	37.35± 0.27 4.00	188	38.35± 0.31 4.40	39.40± 0.30 4.20	15.48	198
breast circumference	31.55± 0.32 5.50	38.00± 0.41 6.00	43.01± 0.46 5.90	50.87± 0.39 4.20	57.98± 0.50 4.80	62.08± 0.73 6.50	196	67.63± 0.61 5.50	75.80± 0.61 4.50	122	240
keel length	9.63± 0.10 5.60	11.58± 0.10 5.00	12.70± 0.17 7.40	14.70± 0.12 4.50	16.47± 0.09 2.90	17.10± 0.14 4.50	177	18.41± 0.21 6.20	21.10± 0.26 6.70	123	219
femur length	10.55± 0.13 6.90	12.17± 0.13 6.10	13.27± 0.22 9.20	15.17± 0.18 6.60	17.27± 0.18 5.70	17.80± 0.33 10.30	168	18.60± 0.23 6.70	20.87± 0.23 6.20	112.20	197
shank length	13.70± 0.15 6.00	16.90± 0.16 5.30	19.50± 0.26 7.20	21.98± 0.19 4.90	24.10± 0.26 6.00	24.95± 0.26 5.70	182	25.30± 0.24 5.20	26.25± 0.20 4.30	103.75	191
metatarsal length	10.34± 0.10 5.20	12.63± 0.13 5.70	14.02± 0.18 6.90	16.22± 0.17 5.80	17.65± 0.14 4.50	17.88± 1.95 6.00	172	17.97± 0.14 4.30	18.37± 0.12 3.50	102.22	177
total eg length	34.47± 0.34 5.40	41.53± 0.39 5.10	45.20± 1.48 18.20	53.02± 0.63 6.60	58.95± 0.44 4.10	60.63± 0.41 3.70	176	61.85± 0.42 3.80	65.50± 0.42 3.60	108.03	190
breast width	10.44± 0.13 6.70	12.35± 0.21 9.40	14.04± 0.13 5.10	15.37± 0.15 5.20	18.78± 0.23 6.70	19.62± 0.24 6.80	188	21.58± 0.22 5.60	24.10± 0.21 4.80	122.80	230
breast depth	13.39± 0.20 8.00	15.93± 0.16 5.60	18.02± 0.26 8.00	21.43± 0.21 5.50	23.55± 0.26 6.10	24.73± 0.22 5.00	185	26.60±0.21 4.30	26.11± 0.17 3.60	105.58	195

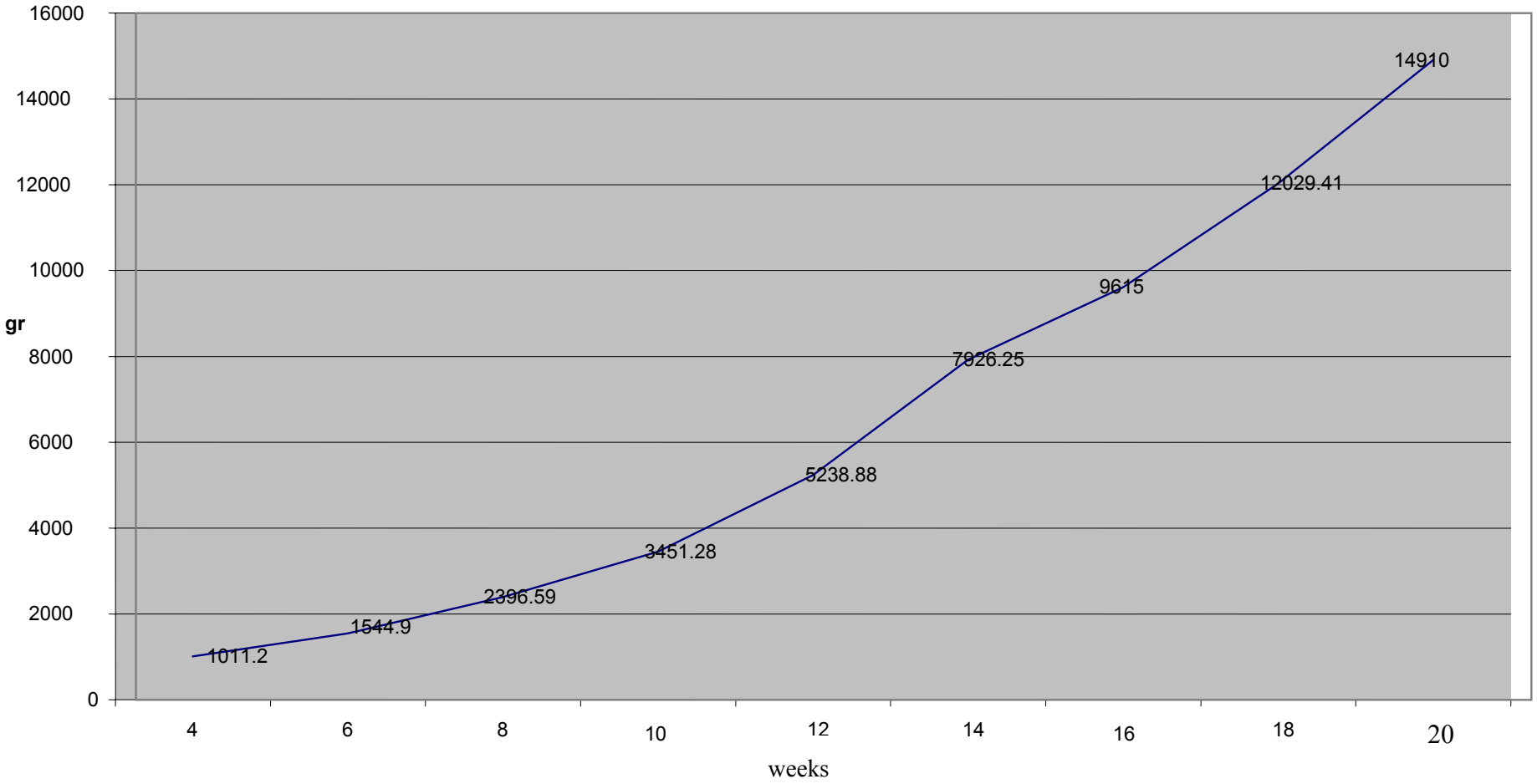
****Significant differences at p<0.00*

Table 3. *Body configuration of male turkeys- BIG-6 –(%)*

Age, weeks	***stockiness index***		***massiveness index***		***long-leggedness index***	
	x ± Sx	*Vc*	*x ± Sx*	*Vc*	*x ± Sx*	*Vc*
6	153,27±1,60 ***	5,80	7,65±0,18 ***	13,20	174.47 ±1.21***	3.80
8	153,27±1,60 ***	5,80	10,16±0,21 ***	13,00	162.83 ± 3.29 ***	11.10
10	156,33±1,43 ***	5,00	8,33±0,15***	10,20	167.72 ± 2.41 ***	7.40
12	165,60±1,62 ***	5,40	10,75±0,16***	8,00	169.70 ± 1.66 ***	5.40
14	177,00±1,41 ***	4,40	24,13±0,55***	19,40	175.24 ± 1.91 ***	6.00
16	167,13±1,91 ***	6,30	26,54±0,43 ***	9,00	162.54 ± 1.17***	4.00
18	176,37±1,34 ***	4,20	31,87±0,57 ***	9,80	163.01 ± 1.34 ***	4.50
20	192,30±1,35 ***	3,90	30,12±0,67 ***	12,20	166.31 ± 1.50***	5.00

****Significant differences at p<0.001*

Figure 1: *Age-related dynamics of live body weight from the age of 4 to 20 weeks*



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