

Body Measurements and their Correlations in Transylvanian Naked Neck Chickens (Black Variety) Grown in a Semi-Intensive System

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Abstract

The growth process is complicated being influenced by genetic and environmental factors. Body development in birds can be assessed by carrying out body mass weighings as well as taking body measurements. Body size measurements can effectively estimate body mass and provide useful information in assessing bird conformation and establishing fitness for certain productions by determining various correlations and simple or multiple regression equations, being the best parameter for decision making in production activity. In this study, we analyzed both the growth dynamics of the Transylvanian Naked Neck youth breed (the black variety) and the existing correlations between different body regions within this mixed breed over a period of 32 weeks on a batch of 13 specimens in semi-intensive growing system. At the end of the analyzed period, the Transylvanian Naked Neck birds recorded an average weight of 1796.67 g, trunk length 19 cm, sternal carapace length 12.13 cm, chest width 7.90 cm, pelvis width 9.10 cm, perimeter chest 32.60 cm, waist circumference 4.30 cm and trunk depth 11.33 cm. The correlations between the measurements performed are mostly strongly positive ($r > 0.8$), and body mass shows strongly positive correlations with all the measurements performed in this study.

Keywords: chicken, Transylvanian Naked Neck, body measurements, correlation.

1. Introduction

Global poultry meat production in 2023 was 142.7 million tonnes and represents about 39% of global meat production [1]. Poultry has many benefits, a safe and affordable source of protein, suitable for processing and without religious restrictions on consumption [2]. The poultry sector is influenced by genotype, selection [3], age, sex, production systems [4] and nutrition [5].

A breed known as the lightest of the mixed breeds, the Transylvanian Naked Neck breed stood out in 1875, when a Transylvanian breeder showed a homogeneous batch of hollow-necked chickens at

the Vienna exhibition. It is an ancient breed due to its spread in the Balkan Peninsula, Asia Minor and from the Black Sea coast to the Caucasus. There is controversy regarding its origin, with some claiming that it originated in Transylvania, and others that it originated in Asia or the island of Madagascar, home to a bare-necked fighting race [6].

The Transylvanian Naked Neck breed was imported to many European countries, such as England (1920), France and especially Austria and Germany due to the breed's appearances in international exhibitions. In the early 1930s, Hungary started a breed improvement program to adapt to commercial needs [7].

Within the breed, the first homologated varieties were white, black and striped [8] and then the red, yellow and blue varieties appeared.

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Transylvanian Naked Neck chickens are used by companies from Western Europe to obtain meat hybrids used in ecological and industrial breeding, the hybrids being used in chicken production having a quality label due to their size, ease of slaughtering, good adaptation to thermal stress and disease resistance [9]. This breed raised in a semi-intensive system can partially provide the biological needs in the ecological production of poultry meat and eggs, where in Romania there are favorable prospects [7].

This breed raised in a semi-intensive system can partially provide the biological needs in the ecological production of poultry meat and eggs, where in Romania there are favorable prospects. Researchers have discovered that the poor plumage of this breed brings an economic benefit. This hollow neck characteristic has led to commercial lines of Cornish hollow necks, which are used in broiler production and are suitable for rearing in tropical climates.

First of all, the rusticity contributed to the expansion of this breed, while the external appearance imposed it as an exhibition breed [6].

External characteristics of the Transylvanian Naked Neck breed: the birds of this breed have a robust constitution, with medium height. The head is the right size, slightly elongated, with a strong pinkish-white or black beak. Eye color is red-orange. The crest is toothed, small, which advances slightly towards the beak. The chins and ears are medium-sized and red. It has a tuft of feathers on the nape and top of the head.

The neck is smooth, having the right length, curved in an S shape. The skin on the neck is red with the specification that the shade in the male is very bright. The neck is completely featherless. If there are filament type feathers or a tie of feathers this fact tells us that the breed is not pure but some crosses with another breed have been carried out.

The trunk is carried obliquely, having a cylindrical shape, the spine is quite long and wide. The tail is of medium length with little plumage. The abdomen is large, in the case of the hen, even voluminous.

The wings are closely carried and of medium length. The leg whistles are fine boned and the right length. The calves are robust.

2. Materials and methods

In the paper we aimed to analyze the growth dynamics of the youth of the Naked Neck breed from Transylvania, the black variety. This breed is used by companies in Western Europe to have meat hybrids used in organic and industrial breeding due to the format, resistance to heat stress and ease of plucking.

The Transylvanian Naked Neck Breed Raised in a semi-intensive system can provide the biological material for the ecological production of eggs and poultry meat.

The research was carried out in a private household in Timiș County, on a flock of 13 birds of the Transylvanian Naked Neck breed. The experiment lasted 32 weeks. The biological material was obtained in the form of hatching eggs from breeders in the west of the country. The eggs were incubated respecting the physical and mechanical parameters in the household.

During the 32 weeks, the birds were provided with the same environmental conditions so that the differences that were recorded were determined by the genetic structures.

From the age of 1-28 days the birds were fed with starter feed, at the age of 28-42 days fed with growth feed, at the age of 42-70 days fed with cereals (maize 70% and wheat 30%) and at age 70-213 days also fed with cereals (same proportions) adding green mass at discretion.

Individual weigh-ins and measurements were taken at specific time intervals: 2 weeks, 8 weeks, 14 weeks, 26 weeks and 32 weeks. Assessment of the body shape and dimensions of birds is done by direct measurement, using metric and gravimetric methods, an operation called somatometry or biometrics.

In the experiment, the following body measurements were taken: trunk length (compass), sternum length (ribbon), chest width (compass), pelvis width (compass), chest circumference (ribbon), whistle perimeter (ribbon), trunk depth (compass).

To make these measurements, the following were used: the compass (Wilkins) consisting of two arms in the shape of a circular arc, the scale and the ribbon.

The avian genetic diversity in Romania is mostly ensured by the populations in the breed collections of private breeders and very little in the gene pool of the species from the elite farms. The

biodiversity of birds decreased due to the reduced number of breeds that corresponded to the zoo-economic requirements. At the level of the country, we still find approximately 1,000 specimens of the Transylvanian Naked Neck purebred breed in households. The aim of the paper is to estimate the influence of the genetic structure on the growth dynamics of the mixed breed Transylvanian Naked Neck raised in a semi-intensive system.

3. Results and discussion

Table number 1 shows the average values and dispersion indices for the body mass of the youth

of the Transylvanian Naked Neck breed in the current study. In the data of table 1, we may observe that chickens raised in a semi-intensive system from the Transylvanian Naked Neck breed at the age of 2 weeks have an average body weight of 113.80 g, at the age of 8 weeks it is 617.40 g, having an increase by approx. 440 p% compared to the body mass from 2 weeks.

At the age of 14 weeks, the average body mass was 1005.34 g, increasing by approx. 62% compared to the mass at 8 weeks. At 26 weeks, the chickens reach an average weight of 1559.33 g, which tells us that there was an increase of about 55 p% compared to the last weighing.

Table 1. Body mass (kg)

Specification	Age (Weeks)				
	2	8	14	26	32
Average	113.800	617.400	1005.340	1559.330	1796.670
Average medium error	3.248	26.220	27.892	62.118	70.504
Standard deviation	10.271	82.917	68.321	152.158	172.699
Minimum value	98.000	481.000	882.000	1363.000	1622.000
Maximum value	127.000	719.000	1058.000	1663.000	2004.000

Table 2. Lengths and widths (cm)

Specification		Age (Weeks)				
		2	8	14	26	32
Average	Trunk length (cm)	5.550	12.720	16.000	18.730	19.000
	Length of the sternal carriage (cm)	3.790	8.120	10.130	12.030	12.130
	Chest width (cm)	2.810	4.900	6.030	7.600	7.900
	Basin width (cm)	3.220	6.040	7.480	8.670	9.100
Average Standard Error	Trunk length (cm)	0.059	0.449	0.139	0.402	0.316
	Length of the sternal carriage (cm)	0.031	0.165	0.142	0.278	0.415
	Chest width (cm)	0.021	0.117	0.076	0.193	0.096
	Basin width (cm)	0.037	0.100	0.083	0.152	0.285
Standard Deviation	Trunk length (cm)	0.189	1.421	0.340	0.985	0.774
	Length of the sternal carriage (cm)	0.099	0.522	0.350	0.683	1.017
	Chest width (cm)	0.067	0.371	0.186	0.473	0.236
	Basin width (cm)	0.118	0.316	0.204	0.372	0.698
Minimal Value	Trunk length (cm)	5.290	10.200	15.500	18.000	18.500
	Length of the sternal carriage (cm)	3.640	7.200	9.600	11.200	11.200
	Chest width (cm)	2.710	4.200	5.700	7.000	7.700
	Basin width (cm)	3.090	5.500	7.200	8.200	8.600
Maximal Value	Trunk length (cm)	5.790	14.200	16.500	20.000	20.000
	Length of the sternal carriage (cm)	3.880	8.700	10.600	12.700	13.400
	Chest width (cm)	2.940	5.100	6.200	8.000	8.200
	Basin width (cm)	3.450	6.400	7.800	9.000	10.000

At the age of 32 weeks the average body mass has the value of 1796.67 g, increasing by 15 p% compared to 26 weeks.

Table 2 shows the lengths and widths at different ages. At 2 weeks the puppies have a trunk length of 5.55 cm, a sternum length of 3.79 cm, a chest width of 2.81 cm and a pelvic width of 3.22 cm.

At the age of 8 weeks, the length of the trunk has the greatest increase with an average value of 12.72 cm, followed by the length of the average sternal carapace which was 8.12 cm.

Trunk length at 14 weeks reached an average value of 16.00 cm, sternum length at an average value of 10.13 cm, chest width at an average value of 6.03 cm, pelvis width at 7.48 cm.

At 26 weeks, the following values were obtained: trunk length increased by 17 p% (reaching 18.73 cm), sternum length by 18.76 p% (reaching 12.03 cm), chest width by 26 p% (reaching to 7.60 cm), the width of the basin by approx. 16% (reaching 8.67 cm).

At 32 weeks body measurements saw much less growth, trunk length 19.00 cm, sternal carriage

length 12.13 cm, chest width 7.90 cm and basin width 9.10 cm.

In table 3 the two perimeters (chest and whistle) and trunk depth are noted. Their average value in the first 2 weeks of the puppies is: chest circumference 11.21 cm, perimeter of the whistle 2.01 cm and a trunk depth of 3.82 cm.

At the age of 8 weeks, the smallest growth was recorded at the perimeter of the whistle, having 3.62 cm.

Chest circumference at 14 weeks is 26.60 cm, perimeter of the whistle 4.12 cm, and trunk depth 9.23 cm.

It is found that the chest circumference increased at the age of 26 weeks reaching 29.90 cm, the whistle perimeter being 4.43 cm and the trunk depth being 10.73 cm.

As can be seen from table 3, the age of 32 weeks does not show a large increase, highlighting the chest circumference that reached 32.60 cm. The perimeter of the whistle is 4.44 cm and the depth of the trunk is 11.33 cm

Table 3. Perimeters and depth (cm)

Specification		Age (Weeks)				
		2	8	14	26	32
Average	Chest circumference (cm)	11.210	21.780	26.600	29.900	32.600
	Perimeter of the whistle (cm)	2.01	3.620	4.120	4.430	4.440
	Trunk depth (cm)	3.820	7.280	9.230	10.730	11.330
Average Error	Chest circumference (cm)	0.116	0.485	0.279	0.614	0.466
	Perimeter of the whistle (cm)	0.019	0.106	0.060	0.076	0.096
	Trunk depth (cm)	0.061	0.224	0.204	0.393	0.210
Standard Deviation	Chest circumference (cm)	0.367	1.533	0.684	1.504	1.141
	Perimeter of the whistle (cm)	0.061	0.335	0.147	0.186	0.236
	Trunk depth (cm)	0.194	0.709	0.500	0.964	0.516
Minimal Value	Chest circumference (cm)	10.610	19.500	25.500	28.000	31.500
	Perimeter of the whistle (cm)	1.930	3.100	3.900	4.200	4.100
	Trunk depth (cm)	3.590	6.000	8.500	9.500	11.000
Maximal Value	Chest circumference (cm)	11.830	23.500	27.400	31.200	34.000
	Perimeter of the whistle (cm)	2.120	4.100	4.300	4.600	4.600
	Trunk depth (cm)	4.080	8.000	10.000	11.500	12.000

4. Conclusions

At the end of the experiment, the Transylvanian Naked Neck chickens (black variety) have an average weight of 1796.67 g, trunk length 19 cm,

sternal carriage length 12.13 cm, chest width 7.90 cm, pelvic width 9.10 cm, chest circumference 32.60 cm, whistle perimeter 4.44 cm and trunk depth 11.33 cm.

Body mass shows strong positive correlations with all measurements taken in the experiment.

There is a trend towards a faster growth rate up to 14 weeks of age and slower growth after this age. The perimeter of the whistle experienced the lowest rate of growth.

Body measurements can effectively estimate body mass and provide useful information in assessing bird conformation and establishing aptitudes for certain productions by determining various correlations and simple or multiple regression equations, being the best parameter for decision making in production activity.

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