

Phenotypic characterization of Satu Mare Tumbler pigeon breed

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SUMMARY

The aim of this study was to determine morphological characteristics of the tumbler pigeon breed of Satu Mare. This pigeon breed was first described in 1932 and was very close to extinction at the end of the 20th century. Data collection was carried out in two stocks having birds from three breeders (Bertalan Juhos, Cosmin Lupu and Werner Hartmann) in Satu Mare. In addition to the breeder, sex and color variety were also evaluated. The performed conformation measurements were statistically compared using multifactor analysis of variance. Lupu's birds were longer compared to other breeder's stock, while beak and wing was longer in Juhos's stock. Thoracic perimeter was smaller whereas queue length was the longer for Juhos's birds. Cocks' values were significantly exceeding values of hens, except beak length. Recessive red pigeons had longer body than blue birds. Beak length of recessive yellow pigeons was significantly longer than it was computed for black birds. Wingspan was longer for dun birds than it was estimated for recessive yellow pigeons. These differences show that there is reasonable genetic variability in the breed which is desired in small populations. Due to the variability within the breed, stabilising selection might be favorable, with a special account for avoiding inbreeding.

Keywords: morphological traits; conformation description; flying pigeons; native breed; animal genetic resources

INTRODUCTION

There are several hundreds of pigeon breeds in the world. Centuries of breeding resulted high variation in structure and morphological traits of the bird (Forshaw and Parkes, 1991). Breeding of flying pigeons has a long history in Romania, especially in the Transylvanian counties. Many local inhabitants worked for decades with the creation, formation and breeding of various pigeon breeds. Such breeds are: Timisoara Tumbler, Cluj-Napoca Blue, Galatz Roller etc. (Herman, 2009). The city of Satu Mare was part of the former Austro-Hungarian Monarchy, where pigeon breeding was very popular. There were various influences of Turkish origin breeds and also imports of Polish-Russian type birds. It might be the result of different trading routes across the Monarchy (Bagi & Kusza, 2014).

The Satu Mare Tumbler was described by Lászlóffy (1932) and was usually mentioned as the pied type of Komorner Tumbler. These birds are medium sized having lively temperament. The breed was quite close to extinction at the end of the 20th century. Its re-breeding had been started nearly 30 years before by two encouraged breeders (Bertalan Juhos in Satu Mare and Werner Hartmann in Munnich).

The basic researches for native breeds are important 'in libro' part of preserving genetic diversity. Such studies were carried out for several species before (e.g. Pavlova and Lukanov, 2024). Morphological characteristics of pigeons were rarely described. Atasoy et al. (2013), Özbaser et al. (2016) as well as Erdem et al. (2021) reported from some Turkish pigeon breeds. Balci et al. (2018) found higher values of cocks compared to hens in case of Bursa Oynari breed for body length, leg length and tail length. Besides them, Ionescu and Oroian (2015) as well as Ionescu et al. (2015) evaluated the Galati pigeon breed of Romania.

Parés-Casanova (2013) analyzed Spanish pigeon breeds. He formed clusters to distinguish the 30 pigeon breeds. Parés-Casanova and Kabir (2020) evaluated 12 quantitative traits for males and females of 11 different domestic pigeon breeds.

The aim of the present study was to determine morphological characteristics of the tumbler pigeon breed of Satu Mare and evaluate sexual dimorphism and other possible effects. This work gives exact information about quantitative traits of the breed, which is important from gene conservation point of view like it was already done for economically important livestock breeds.

MATERIALS AND METHODS

Data collection was carried out in two stocks having birds from three breeders (Bertalan Juhos, Cosmin Lupu and Werner Hartmann) in Satu Mare. Besides the breeder, sex and color variety were also noted. Adult birds were measured during breeding season before feeding in July 2023.

Measurement of conformation and constitution were performed with specialized tools, electronic weighing scales, respectively caliper for length, considering the following external morphological characters: body length (mm), body weight (g), beak length (mm), wing length (mm), wingspan (mm), thoracic perimeter (mm), queue length (mm), feet length (mm), breast length (mm), tight length (mm) and shoulder distance (mm). Body length was the distance from the first thoracic vertebra to the end of the pygostyle; beak length was the distance from the tip of the upper beak to the starting point of the beak; wing length was the distance between the humerus and the tip of the tenth primary; wingspan was the distance between the tips of the eighth primaries (length of two wing with body width); thoracic perimeter was the

circumference around the chest; queue length was measured from the base of the tail to the tip of the central retri; feet length was the length of metatarsus; breast length was the length of sternum; tight length was the length of tibia; and shoulder distance was the distance between the two shoulders when wings were closed to the body.

The conformation measurements were statistically compared using multifactor analysis of variance. Breeder, sex and color variety were taken into account as fixed effects. When the factor was found to be significant ($P < 0.05$), Tukey-test was used to make pairwise comparisons within factors. The pairwise correlation among measured traits was also estimated. The statistical evaluation was carried out using R software package (R Core Team, 2022).

RESULTS AND DISCUSSION

The results of the measurement of morphological traits by breeders is shown in *Table 1*. There was no breeder effect ($P > 0.05$) for body weight, wingspan and tight length. Lupu's birds were longer compared to other breeder's stock ($P < 0.05$), while beak and wing was longer in the case of Juhos's stock ($P < 0.05$). Thoracic perimeter was smaller whereas queue length was the longer for Juhos's birds. Interestingly, despite of being geographically close, there was significant difference between Juhos's and Lupu's stock for feet length, breast length and shoulder distance while Werner's loft was between them.

Table 1. Descriptives of measured traits by breeder

Trait	Breeder		
	Hartmann	Juhos	Lupu
N	6	60	21
Body length (mm)	236.4 ± 2.82 ^b	237.9 ± 8.64 ^b	242.6 ± 5.89 ^a
Body weight (g)	300.8 ± 42.21 ^a	298.8 ± 31.73 ^a	314.2 ± 24.44 ^a
Beak length (mm)	15.3 ± 0.82 ^b	16.1 ± 0.98 ^a	15.4 ± 0.71 ^b
Wing length (mm)	215.6 ± 5.12 ^b	227.8 ± 9.27 ^a	221.5 ± 8.53 ^b
Wingspan (mm)	635.1 ± 13.12 ^a	648.4 ± 20.80 ^a	644.7 ± 19.03 ^a
Thoracic perimeter (mm)	211.3 ± 9.11 ^a	199.9 ± 11.22 ^b	216.5 ± 10.08 ^a
Queue length (mm)	148.3 ± 5.42 ^b	156.5 ± 6.10 ^a	149.9 ± 3.43 ^b
Feet length (mm)	36.5 ± 1.93 ^{ab}	35.0 ± 2.16 ^b	37.0 ± 1.96 ^a
Breast length (mm)	65.2 ± 3.02 ^{ab}	64.6 ± 2.73 ^b	66.9 ± 2.76 ^a
Tight length (mm)	58.5 ± 1.07 ^a	57.6 ± 3.50 ^a	59.2 ± 3.45 ^a
Shoulder distance (mm)	78.0 ± 4.49 ^{ab}	77.2 ± 4.20 ^b	80.3 ± 4.89 ^a

^{ab}: different letters show significant differences ($P < 0.05$)

The descriptives of the measured values by sex can be seen in *Table 2*. There was no difference in beak length between hen and cock pigeons. Our computation is in agreement with the expectation to the breed as its beak is medium sized among various tumbler breeds. These values were in agreement with Ionescu and Oroian (2015) and Ionescu et al. (2015) findings for different color varieties of Galati player pigeons. Other traits were significantly different ($P < 0.05$) and cock's values were higher than it was computed for hens. The tendencies in sexual dimorphism were also very similar to Ionescu and Oroian (2015) and Ionescu et al. (2015). Erdem et al. (2021) also reported the differences between sexes for the Alabadem pigeons. Balci et al. (2018) found also significant differences for body length, leg length and tail length. The sexual dimorphism is very important and previously reported (Parés-Casanova and Kabir, 2020) in pigeon breeding, so the significantly larger values (except beak length) of cocks are desirable to make it easier to distinguish cocks and hens based on their morphological traits.

Table 2. Descriptives of measured traits by sex

Trait	Sex	
	hen	cock
N	40	47
Body length (mm)	235.1 ± 7.51 ^b	242.2 ± 6.95 ^a
Body weight (g)	290.7 ± 31.29 ^b	312.8 ± 27.7 ^a
Beak length (mm)	15.8 ± 1.08 ^a	15.9 ± 0.85 ^a
Wing length (mm)	222.0 ± 8.3 ^b	228.3 ± 9.71 ^a
Wingspan (mm)	636.0 ± 13.86 ^b	655.6 ± 20.26 ^a
Thoracic perimeter (mm)	200.4 ± 12.23 ^b	208.3 ± 12.59 ^a
Queue length (mm)	152.5 ± 6.31 ^b	155.9 ± 6.05 ^a
Feet length (mm)	34.8 ± 2.09 ^b	36.3 ± 2.17 ^a
Breast length (mm)	64.0 ± 2.69 ^b	66.2 ± 2.69 ^a
Tight length (mm)	57.1 ± 3.06 ^b	58.9 ± 3.52 ^a
Shoulder distance (mm)	76.7 ± 4.29 ^b	79.1 ± 4.47 ^a

^{ab}: different letters show significant differences ($P < 0.05$)

The descriptives of the measured values by color is shown in *Table 3*. There were five different colored birds in the evaluated lofts. It was not a surprise that there were more pigeons from the dominant intensive colors (black and recessive red) than from their recessive diluted pairs (dun and recessive yellow). The lower quantity from blue colored pigeons was also expected as this color is the non-Spread type of black color, which is dominant over the wild-type color. There were no differences among colors for body weight, wing length, queue length, feet length, breast

length, tight length and shoulder distance. Recessive red pigeons had longer ($P<0.05$) body than blue birds. Beak length of recessive yellow pigeons was significantly longer ($P<0.05$) that it was computed for black birds. Wingspan was longer ($P<0.05$) for dun birds than it was estimated for recessive yellow pigeons. Thoracic perimeter was the longer for black pigeon and in case of blue birds. These differences show that there is reasonable genetic variability in the breed which is desired in small populations.

Table 3. Descriptives of measured traits by color variety

Trait	Color variety				
	Dun	Black	Blue	Recessive yellow	Recessive red
N	8	27	8	14	30
Body length (mm)	238.8±7.57 ^{ab}	239.4±6.17 ^{ab}	232.3±8.82 ^b	236.2±10.64 ^{ab}	241.6±7.00 ^a
Body weight (g)	314.3±36.88 ^a	311.2±28.55 ^a	293.1±33.69 ^a	287.5±29.98 ^a	301.5±30.27 ^a
Beak length (mm)	15.9±0.78 ^{ab}	15.5±0.90 ^b	15.6±0.69 ^{ab}	16.4±0.95 ^a	16.0±1.01 ^{ab}
Wing length (mm)	232.1±6.15 ^a	225.4±9.80 ^a	225.3±5.58 ^a	223.2±7.54 ^a	224.7±11.33 ^a
Wingspan (mm)	662.0±17.34 ^a	645.1±16.58 ^{ab}	651.7±14.74 ^{ab}	638.9±16.75 ^b	646.0±24.41 ^{ab}
Thoracic perimeter (mm)	205.5±10.36 ^{ab}	208.3±10.85 ^a	194.6±12.40 ^b	201.6±13.64 ^{ab}	205.3±14.16 ^{ab}
Queue length (mm)	158.7±4.97 ^a	153.2±5.49 ^a	154.6±5.06 ^a	154.1±5.76 ^a	154.2±7.73 ^a
Feet length (mm)	35.5±0.96 ^a	35.8±2.18 ^a	34.9±3.35 ^a	35.2±1.99 ^a	35.9±2.40 ^a
Breast length (mm)	65.5±2.35 ^a	65.9±2.65 ^a	63.8±3.73 ^a	64.3±2.11 ^a	65.3±3.22 ^a
Tight length (mm)	59.4±2.25 ^a	58.3±3.63 ^a	57.2±3.81 ^a	56.6±3.45 ^a	58.5±3.29 ^a
Shoulder distance (mm)	77.7±3.34 ^a	79.7±5.66 ^a	77.1±2.34 ^a	76.6±3.52 ^a	77.5±4.31 ^a

^{ab}: different letters show significant differences ($P<0.05$)

The estimated pairwise correlations among the measured traits are shown in *Table 4*. Only around 60% of the estimated correlations were significant. These values were low to moderate, the closest value (0.618) was estimated between feet length and tight length. The

low correlations suggest relatively huge different possible combinations in the appearance of the pigeons. This makes it difficult to develop any scientifically and professionally acceptable intervals for the characterization of this breed.

Table 4. Pearson correlations among the measured traits

Trait	Body weight (g)	Beak length (mm)	Wing length (mm)	Wingspan (mm)	Thoracic perimeter (mm)	Queue length (mm)	Feet length (mm)	Breast length (mm)	Tight length (mm)	Shoulder distance (mm)
Body length (mm)	0.507*	0.190	0.396*	0.489*	0.567*	0.358*	0.442*	0.394*	0.384*	0.340*
Body weight (g)		0.033	0.381*	0.488*	0.592*	0.184	0.448*	0.559*	0.383*	0.519*
Beak length (mm)			0.191	0.155	-0.041	0.304*	0.134	0.038	0.200	-0.073
Wing length (mm)				0.486*	0.210	0.409*	0.018	0.232*	0.119	0.287*
Wingspan (mm)					0.326*	0.552*	0.443*	0.437*	0.472*	0.151
Thoracic perimeter (mm)						-0.014	0.449*	0.515*	0.416*	0.523*
Queue length (mm)							0.071	0.008	0.271*	-0.053
Feet length (mm)								0.494*	0.618*	0.127
Breast length (mm)									0.420*	0.328*
Tight length (mm)										0.246*

*: $P<0.05$

CONCLUSIONS

Some morphological traits of Satu Mare Tumbler were measured and compared. The sexual dimorphism of the breed was confirmed for most evaluated traits,

the computed values (except beak length) were higher for cocks than for hens. Due to the variability within the breed, stabilizing selection might be favorable, with a special account for avoiding inbreeding.

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