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Research article

Phenotypic characterization of the wild boar populations from the Sovata forest district, based on age and sex

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Abstract. In order to compile a phenotypic characterization of the wild boar, the number of wild game was evaluated during the period between February 14th and March 29th of the years 2009 and 2010 within two hunting funds belonging to the Sovata Forest District, Niraj 42 and Sebeş 43 hunting funds, allowing the elaboration of a technical data sheet used in the experiment. Measurements of the individuals were conducted during 2008, 2009 and 2010 and several traits were noted: body length, withers height, croup height, thorax perimeter, body weight, skull length, forehead width between the ears. The age of the boars was estimated based on dentition. They were then classified in three categories: youth (7-12 months), animals between 1 and 2.5 years and animals over 3 years of age. The results show that the body length of the animals establishes a strong difference between males and females, favoring the males after the age of 1.5 - 2 years. Measurements of the withers height showed modifications according to age until the reaching of full body maturity (3 years). Results on the croup height underline a difference given by age and sex reaching from a mean value of 58 cm in males and 56 cm in females in the first year of age, to 86 cm in males and 81 cm in females over 3 years of age. The highest thorax perimeter values were observed in the males over 3 years of age, with a mean value of 137 cm, the females exhibiting a value of only 121 cm. Because the body weight has a complex genetic determinism, being highly influenced by the soil bonitation, the existence of complementary nourishment and the mating season the trait did not condition in any way the value of the trophy at the sampling time.
Key Words: wild boar, body length, withers height, croup height, thorax perimeter, body weight, skull length, forehead width.

Introduction. Wild boar development is in direct link to habitat conditions (Miclea et al 2010; Cornoiu 2011; Şara & Benţea 2011; Vlaic 2011; Cotea et al 2001). The experiment was located in the center of Transylvania, including areas and ecosystems from the Sovata Forest District (Mureş County).

The Sovata Forest District belongs to the Mureş Forest Directorate, which is part of the Romanian National Forest Fund. The researches were based on two hunting funds: 42 Niraj and 43 Sebeş. The experimental device is situated in the mountain area and consists of the following types of forests:

- South-Eastern Carpathian Spruce forests (*Picea abies*), beech (*Fagus sylvatica*) and fir (*Abies alba*) with hawkweed (*Hieracium rotundatum*);
- South-Eastern Carpathian Beech forests (*Fagus sylvatica*) and fir (*Abies alba*) with lungwort (*Pulmonaria rubra*);
- South-Eastern Carpathian Beech forests (*Fagus sylvatica*) and fir (*Abies alba*) with bilberry (*Vaccinium myrtillus*);
- South-Eastern Carpathian Beech forests (*Fagus sylvatica*) with *Symphytum cordatum*;
- South-Eastern Carpathian Beech forests (*Fagus sylvatica*) and fir (*Abies alba*) with *Festuca drymeia*;

- Dacian Sessile Oak forests (*Quercus petraea*), beech (*Fagus sylvatica*) and yoke elm (*Carpinus betulus*) with *Lathyrus hallersteinii*;
- Mixed Dacian Sessile Oak forests (*Quercus petraea*), Beech (*Fagus sylvatica*) and Silver Lime (*Tilia tomentosa*) with Dogtooth violet (*Erythronium dens-canis*) (Donita et al 2005; Lazăr et al 2007; Gafta & Mountford 2008).

The types of forest stations have been registered in the parcel description records by using the clasification indicatives following the 1972 systematics, and their diagnosis was rendered after the „Staţiuni forestiere" paper (Chiriţă et al 1977).

The spacial variability of the geographical and ecological factors creates the high diversity of vegetation that exists in the forest district. There are four types of vegetation areas which form a total of 20936.8 ha of forests.

Concerning the bonitation of the forest areas (soil), the situation is as follows:

- superior forest areas: 6712.5 ha (32%);
- medium forest areas: 13320.7 ha (64%);
- inferior forest areas: 898.6 ha (4%);

The prevalence of the medium bonitation forest areas and the high percentage of the superior forest areas indicate that even though they are situated on steep slopes and poor soils, the climate and certain characteristics of the soil in the area constitute compensatory factors.

Materials and Methods. In order to carry on the research, the following actions have been taken:

- In the years 2009 and 2010, during the period between February 14th and March 29th we have evaluated the wild game numbers from two hunting funds belonging to the Sovata Forest District, Niraj 42 and Sebeş 43 hunting funds. On this occasion the technical data sheet was elaborated by the official hunting representatives (Eng. Rusu Cătălin Gabriel);
- The individuals sampled during 2008, 2009 and 2010 have been measured for the following traits: body length (from the snout to the tip of the tail), withers height, croup height, thorax perimeter, body weight, skull length, forehead width between the ears;

The raw data obtained by measurements with the zoometer, ribbon and compass have been statistically interpreted by calculation of the mean, variance, standard deviation, standard error of the mean and coefficient of variation.

The age of the wild boars is difficult to asses and can be performed only based on dentition. All individuals in this study have had their aged estimated based on this method and have been classified in three categories: youth (7-12 months), animals between 1 and 2.5 years and animals over 3 years of age.

Statistical analyses have been carried out for and between each age category depending on sex.

Table 1 presents the number of experimental units for each age category and sex used for elaborating the phenotypic characterization of the wild boar populations from the Sovata Forest District.

Table 1

The number of experimental units used divided by sex and age

Sex	7-12 months	1.5-2.5 years	Above 3 years
Male	17	25	27
Female	13	20	10

Results and Discussion

Mean and dispersion index for wild boars aged between 7 and 12 months. The analysis at this age of the *body length* trait, which has a strong genetic determinism and is not influenced by the lack of food at a certain moment, has shown a mean value of 113

cm in males and 112 cm in females. Both sexes exhibit a good homogeneity for this trait, which proves the high level of genetic determinism, and also the fact that different fattening status determined by the sampling season does not influence its value. The standard deviation value is 5.4 cm in males and 6.4 cm in females (Table 2).

The *height at the withers* is a trait with a high degree of heritability (Oroian et al 2009), which confers a good stability for this trait, all individuals from both sexes have values for the coefficient of variation between 8.31 and 10.97. The registered values for the boars sampled from the Sovata Forest District radius are superior to the mean values other authors had reported, the males exhibiting a mean value of 65 cm, while for the females this value is 63 cm.

The *croup height* is a trait which combined with withers height and the lateral flattened body shape of the wild boars confers the specific magnificence observed in animals in motion. The mean value for the croup height trait is 58 cm in males and 56 cm in females. The homogeneity for this trait is good, varying around 11%.

The *thorax perimeter* is another important trait which can differentiate male from females using the circumference value. It is highly influenced by health status

The *body weight* is strongly influenced by the sampling period and the bonitation of the soil, and also by the administration of complementary food. There are great differences concerning this character between the piglets born in alpine areas and those from the sub-mountainous and hilly areas, where the feeding level is totally different. The periods of harsh winter, without fruit production and without the introduction of complementary food can produce a decrease of up to 40% of the body mass of the individuals, regardless of age. For the sampled individuals, from the studied hunting funds, the mean value for the body weight trait was 56 kg in males and 50 kg in females, which can be correlated with the good bonitation of the ecosystem, but also with the complementary food registered (Table 2).

Head length. This trait has its specificity in the wild boar concerning shape, size and also the way it attaches to the torso. From the piglet to the solitary adult boar, generally the head represents one third of the body length. The head's rapid size increase starts from the first year of life, after which it runs through a period of stagnation, this fact being proven also by our research. The mean value in males is 47 cm and in females is 40 cm (Table 2).

Forehead width between the ears ranges between 9 and 10 cm, with a high variability between individuals, within the same sex, but also between the two sexes.

Table 2

The mean value and dispersion indexes for the wild boars aged between 7-12 months

Trait	Sex	n	x±sx	s	V%
Body length (cm)	♂	17	113±1.24	5.4	4.78
	♀	13	112±1.68	6.1	5.45
Withers height (cm)	♂	17	65±1.31	5.4	8.31
	♀	13	63±1.67	6.9	10.95
Croup height (cm)	♂	17	58±1.55	6.4	11.03
	♀	13	56±1.83	6.6	11.79
Thorax perimeter (cm)	♂	17	64±2.06	8.5	13.28
	♀	13	51±2.61	9.6	18.82
Body weight (kg)	♂	17	56±1.31	5.4	9.64
	♀	13	50±1.56	5.6	11.20
Head length (cm)	♂	17	47±0.78	3.2	6.81
	♀	13	40±1.03	3.7	9.25
Head width between the ears (cm)	♂	17	10±0.61	2.5	25
	♀	13	9±0.58	2.1	23.33

Figure 1. Hunting picture; wild boars prepared for measurements (Oroian et al 2010ab).

The mean and dispersion indexes for wild boars aged between 1,5 and 2,5 years. The body length measured at 1.5-2.5 years of age for the 25 sampled males has a mean value of 133 cm, with a standard deviation of 8.8 and a variation coefficient of 6.6%. The mean value for the 20 females analysed is 122 cm, with a 9.6 standard deviation and a 7.87% variation coefficient (Table 3 and Figure 1).

Withers height exhibits significant differences between males and females. The mean value is 87 cm in males and 75 cm in females.

The croup height trait exhibits a 9 cm difference in favor of the males, which have a mean value of 70 cm, while the females have only a 61 cm mean value (Table 3).

Thorax perimeter. At this time in their life, male boars achieve a +27 cm mean value compared to females, males have a mean value of 112 cm, as for females this value is 85 cm. Both sexes have an increased standard deviation value, 15.2% (males) and 13.4% (females), which shows that the sampling season and the health status of individuals have a great influence on this trait (Table 3).

Table 3

The mean and dispersion indexes for the wild boar aged between 1.5 and 2.5 years

Trait	Sex	n	x±sx	s	V%
Body length (cm)	♂	25	133±1.76	8.8	6.62
	♀	20	122±2.14	9.6	7.87
Withers height (cm)	♂	25	87±.,28	6.4	7.36
	♀	20	75±1.67	7.5	10.0
Croup height (cm)	♂	25	70±1.66	8.3	11.86
	♀	20	61±2.03	9.1	14.92
Thorax perimeter (cm)	♂	25	112±3.04	15.2	13.57
	♀	20	85±2.99	13.4	15.76
Body weight (kg)	♂	25	114±2.70	13.5	11.84
	♀	20	83±3.66	16.4	19.76
Head length (cm)	♂	25	47±0.66	3.3	7.33
	♀	20	43±0.92	4.1	9.53
Head width between the ears (cm)	♂	25	17±0.22	2.6	17.33
	♀	20	13±0.78	3.5	26.92

The body weight exhibits large differences between males and females. These differences can reach up to 30-31 kg, because of the sexual dimorphism which appeared at this age and also because of the bonitation of the soils habituated by young males or by small packs of females with piglets. The value of 114 kg for the body weight trait in males is good, keeping in mind the characteristics of the species and the existing population vigor. Because the 20 females have been sampled usually during December-February, the mean body weight achieved was 23 kg (Table 3).

The head length at this age for males has a mean value of 47 cm, the same as the one measured one year ago, and in females the mean value is 43 cm.

Mean and dispersion indexes for wild boars over the age of 3 years. Body length. At 3 years of age the boars become solitary individuals and the sows become adult in the true sense of the word. At this 3 year age and over, the morphological differences for this trait are associated with sex, age, soil bonitation and the weight is based on the sampling season and the existence of supplementary fodder in the area. After the age of 3, the males become solitary, searching for female packs during the mating season, this being the reason why they have a bigger movement area than females, additional foraging possibilities, but also higher energy consumption because of the distances traveled and

the fighting for females during mating season. The body length trait does not change according to maintenance status of the individual; for the 27 specimens sampled the mean value for this trait was 183 cm. The mean value in the sampled and analyzed females was 161 cm (Table 4 and Figure 1).

Withers height is a highly heritable trait. The withers together with the mane confer the wild boar its monumentality. The mean height of the 27 sampled and analyzed male individuals was 97 cm. Their mean value is by 7 cm superior to the female value.

The croup height mean value is inferior with up to 10 cm compared to the withers height value, both in males and females. The splayed croup together with the position of the posterior legs gives the necessary pushing force while running. When being over 3 years of age the males exhibit a mean value of over 86 cm, compared to 81 cm in females.

The thorax perimeter is strongly correlated with the withers height and the thorax depth, but also with maintenance status of the individual. According to the sampling and mating seasons, the differences between males and females are significant, as well as there are significant differences between males of the same age, but with different maintenance statuses. Generally for swine, the thorax perimeter actually represents the body weight in cm with plus-minus 10%. The measurements we have carried out, as well as the data communicated by other authors, do not allow a satisfactory correlation in order to permit the estimation of the body weight according to the thorax perimeter value. For the sampled individuals, the mean value for the thorax perimeter trait is 137 cm in males and 121 cm in females (Table 4).

The mean body weight of the 27 males was 170 kg, with a variation from 135 kg to 304 kg, according to the sampling period which determines the maintenance status of the individuals. The mean value for 10 sampled females was 139 kg, ranging between 110 kg to 194 kg. The body weight in females is influenced at the same age by the soil bonitation and also by the number of piglets the sow had and has in her care at the moment, but also by the size of the pack and the knowledge of the leading sows to follow tranquil feeding, bathing and scrubbing paths.

The head length exhibits values of 49 cm in males and 45 cm in females, varying from 40 cm to 58 cm. The forehead width values 20 cm in males and 15 cm in females, values which indicate the ending of bone formations growth, starting with the age of 3.

Table 4

Mean and dispersion indexes for the wild boars at over 3 years of age

Trait	Sex	n	x±sx	s	V%
Body length (cm)	♂	27	183±2.63	13.7	7.30
	♀	10	161±4.11	13	8.07
Withers height (cm)	♂	27	97±1.96	10.2	10.52
	♀	10	90±3.58	10.6	11.78
Croup height (cm)	♂	27	86±2.17	11.3	13.14
	♀	10	81±2.23	11.6	14.32
Thorax perimeter (cm)	♂	27	137±3.17	16.5	12.04
	♀	10	121±5.51	17.4	14.38
Body weight (kg)	♂	27	170±3.55	16.4	9.65
	♀	10	139±5.09	16.1	11.58
Head length (cm)	♂	27	49±0.83	4.3	8.78
	♀	10	45±1.55	4.9	10.89
Head width between the ears (cm)	♂	27	20±0.42	2.2	11.0
	♀	10	15±0.66	2.1	14.0

Conclusions. Concerning the body length trait, no significant differences stand out between males and females until the age of 12 months, but starting with 1.5-2 years of age a continuing with the individuals over 3 years of age, the differences strongly favor males over females, with a 10-15%.

Withers height is a highly heritable trait which suffers modifications according to age until the reaching of full body maturity (3 years), when males from the studied hunting funds achieve an average value of 97 cm, while for females this mean value is 90 cm.

The croup height values differ according to age and sex, reaching from a mean value of 58 cm in males and 56 cm in females in the first year of age, to 86 cm in males and 81 cm in females over 3 years of age.

The thorax perimeter can be seen as an indicator for the body conformation type, but also for the maintenance status and season. The values differ from one age to another and from one sex to the other, the highest values being observed in the males over 3 years of age, with a mean value of 137 cm, the females exhibiting a value of only 121 cm.

Body weight is a complex trait with a complex genetic determinism, being highly influenced by the soil bonitation and the existence of complementary nourishment, same as the mating season. It cannot be considered as a useful trait for weapon selection, this trait did not condition in any way the value of the trophy (fangs) at the sampling time.

The body shape expressed through its length is typical for the wild boar, the two jaws possessing a specific dentition, which highly differs together with age and sex. Generally, it is considered that for the wild boar, the head represents one third of the total body length.

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