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Use of biometric data for evaluation of wild boar *Sus scrofa* individual quality

Wykorzystanie pomiarów biometrycznych w ocenie jakości osobniczej dzików *Sus scrofa*

Summary. The objective of the present study was to analyze the chosen biometric parameters of wild boars in the weight classes. The research material included 74 carcasses of wild boars hunted in the Lublin, Podlaskie, Warmia-Mazury Voivodship study areas over the 2007/2008 season. The measurements formed a basis for chest capacitance index (CI) and body structure index (BSI) calculation. The studies revealed that BSI, whose value decreases with an increase of male, female and juvenile wild boar body mass, is more useful for determination of a body weight class of wild boar.

Key words: wild boar, biometric measurement, individual quality

INTRODUCTION

The studies of total free-ranging game populations are difficult to conduct, therefore the monitoring method applied to a part of it (randomly chosen individuals) is used as an information-gathering technique providing conclusive population estimates supported by the mathematical statistics procedures [Bobek *et al*. 1984]. Variation in the biological populations is described and analyzed with biometric measurements implication [Kałuziński 1978, Fruziński *et al*. 1982]. They allow calculation of index parameters that, subject to a measurement type, indicate the level of development of the skeletal and muscle system, respiratory and cardiovascular system as well as animal growth rate [Drozd *et al*. 2006, Karpiński and Czyżowski 2006]. The elements mentioned above describe the animal individual body condition, which, in turn, is an indicator of population adjustment to carrying capacity of the resource zone [Fowler 1987, Mattioli and Pedone 1995].

The objective of the present investigation was to analyze chosen biometric parameters of wild boars in the weight classes. This study is a continuation of the research work done previously in the Department of Amateur Breeding and Wild Animals focused on application of the biometric measurements for assessment of hunting animal population quality.

MATERIAL AND METHODS

The research material comprised 74 carcasses of wild boars obtained from the Lublin, Podlaskie, Warmia-Mazury Voivodships during the 2007/2008 hunting season. The carcasses were eviscerated and weighed with 0.1 kg accuracy. The following biometric measurements were performed:

– chest depth (stick measurement) – distance from the stern at elbow protuberances to the highest point at the withers;

– chest width (stick measurement) – the mean of three measurements: at shoulder protuberances, at 5th rib height (behind elbow protuberance) and costal arch;

– chest girth (tape measurement) – measurement taken around the chest immediately behind the elbow protuberances;

– length of head (tape measurement) – from the snout disc to the end of occipital bone;

– body length (tape measurement) – from the snout disc to root of tail.

The measurements-based calculations allowed to determine the chest capacitance index (CI) and body structure index (BSI) according to the formulas:

$$CI = \frac{\text{Mean width of chest}}{\text{Chest depth}} \times 100$$

$$BSI = \frac{\text{Total body lenght}}{\text{Chest depth}} \times 100$$

Accurate and reliable age estimation of free-living wild boar is hard to perform, therefore, in the present study the biometric measurements of wild boars were placed into the weight classes, including a division into juvenile individuals (shoats) and adults (male and female):

juveniles – I class ≤ 30 kg, II class 30–39 kg, III class ≥ 40 kg

female – I class < 60 kg, II class ≥ 60 kg

male – I class < 70 kg, II class 70–99,9 kg, III class ≥ 100 kg

On the basis of the obtained data, there was studied variation of each biometric parameter of wild boars using the analysis of variance and assessing the significance of differences between the means. Besides, variation between each biometric parameter was defined calculating the correlation coefficient.

RESULTS AND DISCUSSION

The measurement analyses indicated differences in the mean carcass weights of wild boars hunted in each evaluated area (Tab. 1). The highest mean weight was recorded for males and females obtained from the Warmia-Mazury Voivodship, while the lowest the wild boars gained in the Lublin region. However, a significant difference ($P \leq 0.05$) was

noted only between the mean weight of male wild boar carcasses from the compared areas. The data may raise an interesting point with regard to a forest cover rate in the investigated regions [Raport... 2006]. Low body weight of carcasses obtained from wild boars obtained in the Lublin region is related to poor forest cover observed there (22.4%) and, consequently, higher carcass weight reported in the Warmia-Mazury and Podlaskie Voivodships correlates with higher forest cover value in both areas studied (30%). Still, the differences between mean weight of carcasses from wild boars gained in the compared regions should be attributed to the climatic conditions (Bergman`s Rule) rather than to forest cover of the investigated areas [Bobek *et al.* 1984].

According to the Swiss research [Moretti 1995], wild boars inhabiting the forest area in Poland are characterized by higher carcass weight and total body length, i.e. over 150 cm (Tab. 2).

Table 1. Average body mass of wild boars in the evaluated areas (kg)
Tabela 1. Średnia masa dzików z porównywanych województw (kg)

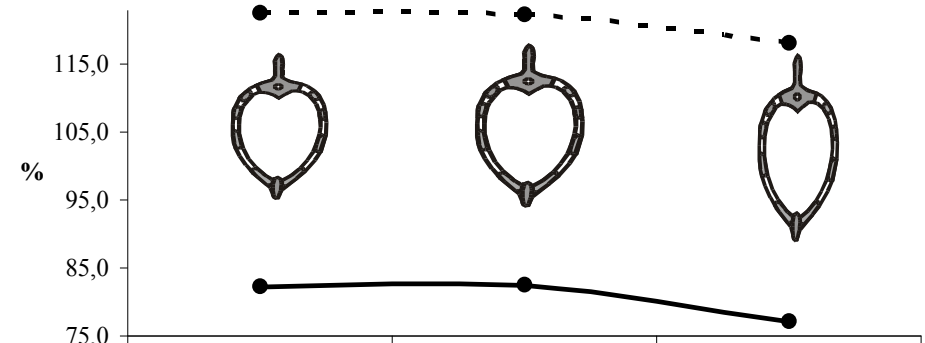
Area Województwo	Male Odyńce			Female Lochy		
	$\bar{x}$	SD	n	$\bar{x}$	SD	n
Warmia-Mazury	79.0*	15.7	16	67.4	12.9	10
Podlaskie	70.1	10.8	8	60.5	5.3	7
Lublin	64.9*	9.7	15	56.8	17.8	18

* differences significant at $P \leq 0.05$
* różnice istotne przy $P \leq 0{,}05$

Table 2. Average values of biometric parameters (cm)
Tabela 2. Średnie wartości poszczególnych parametrów biometrycznych (cm)

Wild boars Dziki	n	Chest depth Głębokość klatki piersiowej		Chest girth Obwód klatki piersiowej		Chest width Szerokość klatki piersiowej		Skull length Długość czaszki		Total body length Całkowita długość ciała	
		$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD
Male Odyńce	33	38.8	3.2	124.6	8.7	31.2	3.1	42.6	3.2	150.4	9.3
Female Lochy	30	36.4	4.1	112.1	8.9	26.4	4.8	39.9	2.9	150.0	6.2
Juveniles Przelatki i wycinki	11	26.1	3.9	83.0	11.3	20.9	4.1	30.1	1.8	111.6	9.4

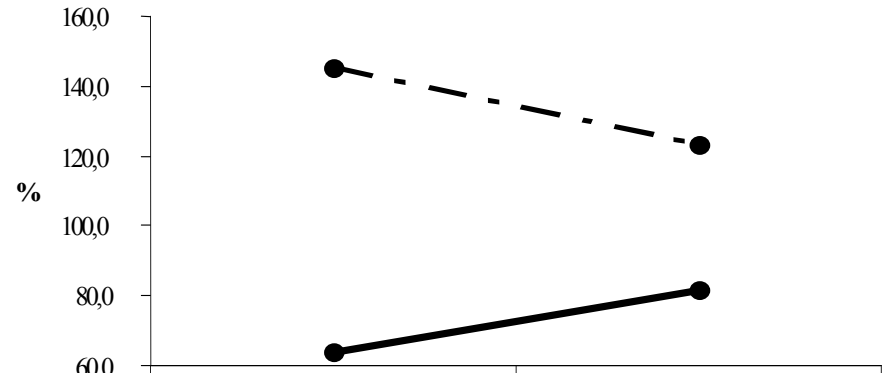
Analyzing the relationships between the main biometric parameters, there was found a significant dependence ($P \leq 0.01$) of body weight of the investigated wild boars on total body length ($r = 0.86$) and chest girth ($r = 92$). However, other authors [Ernhaft, Csányi 1995] report the correlation coefficient between carcass weight and body length to reach 0.74, and 0.80 between body weight and chest girth.



	I	II	III
IP	82,2	82,4	77,2
IPF	122,6	122,2	118,0

Weight classes
Klasy wagowe

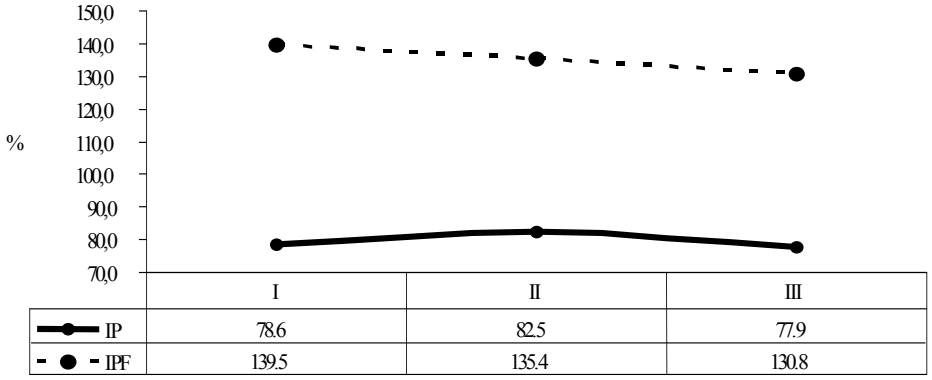
Fig. 1. Changes in chest capacitance index (CI) and body structure index (BSI) in successive male weight classes
Rys. 1. Zmiany indeksu pojemnościowego (IP) oraz indeksu podłużnego formatu (IPF) w kolejnych klasach wagowych u odyńców



	I	II
IP	63,5	81,3
IPF	145,2	123,2

Weight classes
Klasy wagowe

Fig. 2. Changes in chest index capacitance (CI) and body structure index (BSI) changes in female weight classes
Rys. 2. Zmiany indeksu pojemnościowego (IP) oraz indeksu podłużnego formatu (IPF) w kolejnych klasach wagowych u loch



	I	II	III
IP	78.6	82.5	77.9
IPF	139.5	135.4	130.8

Weight classes
Klasy wagowe

Fig. 3. Changes in chest capacitance index (CI) and body structure index (BSI) in juvenile weight classes
Rys. 3. Zmiany indeksu pojemnościowego (IP) oraz indeksu podłużnego formatu (IPF) w kolejnych klasach wagowych u przelatków i wycinków

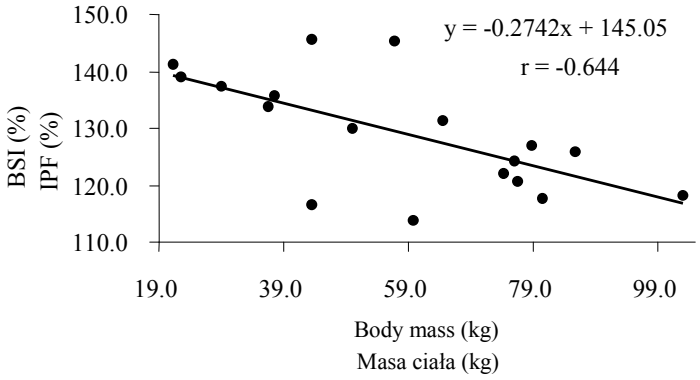


Fig. 4. Correlation between body mass and body structure index (BSI)
Rys. 4. Zależność pomiędzy masą ciała a indeksem podłużnego formatu ciała (IPF)

Studying the course of the calculated indices for male wild boars in each weight class (Fig. 1), no changes were recorded in II class weight. In III weight class, a decline of capacitance index (CI) was observed as well as and animal body structure index (BSI) fall. It was visualized in elongation of the chest transverse cross-section and increased silhouette height in relation to its length. As for the changing indices reported for female wild boars (Fig. 2), it was noted that growing body mass accompanied the chest capacitance index rise (chest transverse cross-section takes up a more oval shape due to more

intensive development of the front parts of animal body). On the other hand, the body structure index of females declines, thus following the trend documented for males, which is noticeable in the increased silhouette height regarding its length.

In juvenile individuals (shoats), the body structure index decreases steadily in the successive weight classes (Fig. 3), which is reflected by the silhouette shortening. The chest capacitance index was shown to elevate in II weight class (an oval shape of chest transverse cross-section), while it markedly decreased in the last weight class. In sum, the present studies have indicated a decline of the body structure index (BSI) in wild boars in the successive weight classes, which is illustrated by the regression line generated for carcass weight and BSI value (Fig. 4) as well as the correlation coefficient between the analyzed parameters ($r = -0.644$, $P \leq 0.05$). However, no significant interrelation was recorded between carcass weight and chest capacitance index.

CONCLUSIONS

1. To determine the proper weight class for wild boars, it seems advisable to employ the body structure index, whose value decreases along with an increasing body mass of male, female and juvenile wild boars.

2. A decline of the animal body structure index is visualized by the silhouette shortening and dynamic growth of front parts of the body (so-called carp-like silhouette).

3. Assessment of a wild boar silhouette is of practical value for the hunting practice as it aids in assigning an animal into a suitable weight class and thus facilitates the correct selective evaluation.

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Streszczenie. Celem pracy była analiza wybranych parametrów biometrycznych dzików w poszczególnych klasach wagowych. Materiał badawczy stanowiły 74 tusze dzików pochodzące z terenów województwa lubelskiego, podlaskiego oraz warmińsko-mazurskiego, pozyskane w sezonie łowieckim 2007/08. Na podstawie przeprowadzonych pomiarów wyliczono indeks pojemnościowy klatki piersiowej (IP) oraz indeks podłużnego formatu zwierzęcia (IPF). Badania wykazały, że w ustaleniu właściwej klasy wagowej dzików bardziej przydatny wydaje się indeks podłużnego formatu ciała, którego wartość zarówno u odyńców, jak i loch oraz osobników młodocianych spada wraz ze wzrostem masy ciała.

Słowa kluczowe: dzik, pomiary biometryczne, jakość osobnicza