CORRELATION BETWEEN MEATINESS TRAITS ESTIMATED BY PIGLOG 105 AND DISSECTION

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Background

The application of ultrasound to indirectly estimate the meatiness in live animals expanded considerably over the past 40 years. Previous research was directed toward determining the most suitable point on the body of an animal which would provide a satisfactory correctness for measuring by an ultrasonic device . Investigations included the most suitable points for measuring the backfat thickness such as the withers, the last rib or the last lumbar vertebra, and at what distance to measure from the medial line (from 5 to 8 cm laterally).

Objectives

The objective of this study is to analyze the measurements obtained by the PIGLOG 105 and dissection.

Methods

Measuring the thickness of backfat and the depth of *Musculus longissimus dorsi* (MLD) was performed on a sample group of 175 animals, each weighing from 80 to 130 kg. Measurements on live animals were carried out by an ultrasonic device, the PIGLOG 105, at the following points: the thickness of backfat in the lumbar part (BF1) between the third and the fourth lumbar vertebra was measured from the last lumbar vertebra at 7 cm, laterally, from the back line; the backfat thickness in the back part (BF2) between the third and the fourth rib was measured from the back, laterally 7 cm off the back line and the depth of MLD in the back part between the third and the fourth rib was measured from the back at 7 cm, laterally, from the back line.

Pig slaughter and total dissection were performed at the PKB "Imes" slaughterhouse in Belgrade. The pigs were fattened on the PKB"Vizelj" farm, in Belgrade, and belonged to the following genotypes: the Swedish Landrace pig (n=72) and half-breeds of the F1 generation of the Swedish Landrace pig x Yorkshire pig (n=103). The spots on which the backfat thickness and MLD depth were measured were marked by tattooing live animals so that, later, measurements of BF1, BF2 and MLD depth could be taken on the cooled carcasses on the same spots.

Results and discussion

The body weight of the pigs studied was 110.40 kg, the weight of warm carcasses was 88.84kg while the weight of cold carcasses was 84.95 kg (Table 1).

The average backfat thickness determined by the PIGLOG 105 was 20.27 mm (BF1) and 17,42 mm (BF2), while the backfat thickness estimated by dissection , at the same points, was 23.42 mm (BF1) and 19.59 mm (BF2).The MLD depth determined by the PIGLOG 105 was 46.59 mm, whereas that found by dissection was greater (54.58 mm). The meat percentage estimated by the PIGLOG 105 and dissection was 51,87% and 55.72%, respectively. The differences determined by the t-test were statistically highly significant ($P<0.01$). It can be concluded that the PIGLOG 105 measurements determined the backfat thickness, MLD depth and meat percentage in live animals with a lesser degree of accuracy.

It is necessary to point out that the exactness of measuring the backfat thickness and MLD depth by means of an ultrasonic device is affected by numerous factors such as the body weight at the end of the test, the number of fasciae on the backfat, movements of the animal during measuring, size and frequency of the probe used for measuring, error performed by the ultrasound device in the course of measuring and operators' systematic errors.

Correlation between the measurements established by the PIGLOG 105 and dissection (Table 2) is as follows: for BF1 it is $r=0.724$ ($P<0.01$), for BF2 it is $r=0.820$ ($P<0.01$), for MLD the correlation is $r=0.447$ ($P<0.01$) and for meat percentage it is $r=0.787$ ($P<0.01$).

Between the BF1 and BF2 that were estimated by the PIGLOG 105 on one side and the MLD depth measured on the carcasses on the other side, the correlation is negative and very weak to weak and ranges from $r= - 0.128$ ($P>0.05$) to -0.256 ($P<0.01$). Between SL1 and SL2 (dissection) and the MLD depth (the PIGLOG 105) there is no correlation (SL1:MLD= - 0.070; SL2:MLD = 0.046). The results obtained indicate that the correlation between the traits specified does not exist because the correlative coefficients are very small and statistically are not significant ($P>0.05$).

The results obtained reveal the existence of a negative and very strong correlation between the thickness of backfat and the percentage of meat that were estimated on live animals (it varies from $r = - 0.882$ to -0.935). The correlation established between the thickness of backfat and the percentage of meat on the carcasses also is very strong and negative (ranging from $r=-0.768$ to -0.772). The correlation between SL1 and SL2 estimated by the PIGLOG 105 ,on one side, and the percentage of meat on the carcasses , on the other side, is somewhat weaker and is within an interval between the strong and very strong one (from $r=-0.661$ to -0.760). The established correlation is statistically highly significant ($P<0.01$), which shows that there exists a relation between the traits discussed.

Results of our investigations agree with those that were gained by a great number of authors (*Kanis* et al., 1986; *Demo* et al., 1994a; *Demo* et al., 1996; *Brkic* , 1998;) who , utilizing the ultrasonic measuring of backfat in different points (the withers, the last rib, the last lumbar vertebra, 3 to 8 cm laterally off the medial line) , found that the greatest correctness of measuring was achieved above the last rib and 8 cm laterally off the medial line.

Our findings correspond with the results by *Demo* (1994b) and *Brkic* (1998), who ascertained that the PIGLOG 105 measures the backfat thickness and the MLD depth with a lesser degree of exactness if body weights are higher (130 kg). Moreover , *Martyniuk Elzbieta* et al., 1996, got a lower degree of correctness when measurements were taken on live animals with lower body weights (under 50 kg).The degree of correlation in our research is in accordance with the results gained by *Demo* (1994a), *Demo* (1994b) and *Brkic* (1998) who established a strong and negative correlation between the meat percentage in carcasses and the backfat thickness (from $r=-0.65$ to -0.85), as well as, a very strong one between the percentage of meat in carcasses and the percentage of meat in live animals (from 0.70 to 0.86).

Conclusion

On the basis of the results obtained , a stronger correlation was established concerning SL2 than SL1 and other traits. Referring to the correlation results derived from the examined sample , the utilization of the PIGLOG 105 for selection purposes can be recommended. Since the regression equation for evaluating meatiness is derived from examining the population of Danish pigs, with the intention to improve the exactness with which meatiness is estimated in the live animals belonging to the domestic pig population, there is a need to formulate a new regression equation.

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Data in the of form tables

Table 1. Average values and variability of traits examined (n=175)

Traits		x	SD	S_x	CV	t-test PIGLOG 105 : Dissection
Body weight, kg		110.40	11.34	0.86	10.27	
Warm carcass weight, kg		88.84	9.90	0.75	11.14	
Cold carcass weight, kg		84.95	9.50	0.72	11.18	
PIGLOG 105	BF1, mm	20.27	5.31	0.40	26.18	**
	BF2, mm	17.42	5.52	0.42	31.71	**
	MLD, mm	46.59	5.18	0.39	11.11	**
	Lean meat, %	51.87	4.84	0.37	9.34	**
	Meat, kg	43.84	4.75	0.36	10.83	**
DISSECTION	BF1, mm	23.42	6.95	0.53	29.69	
	BF2, mm	19.59	6.56	0.50	33.47	
	MLD, mm	54.58	7.13	0.54	13.05	
	Lean meat, %	55.72	3.99	0.30	7.16	
	Meat, kg	47.26	5.38	0.41	11.39	

** P<0.01; * P<0.05; NS P>0.05;

Table 2. Correlation between the PIGLOG 105 and dissection concerning indicators of meatiness (n=175)

Traits		PIGLOG 105					DISSECTION				
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
PIGLOG 105	BF1, mm (1)	1.000	0.708^{**}	0.031^{ns}	-0.882^{**}	-0.269^{**}	0.724^{**}	0.743^{**}	-0.128^{ns}	-0.661^{**}	0.069^{ns}
	BF2, mm (2)		1.000	-0.153^{*}	-0.935^{**}	-0.370^{**}	0.754^{**}	0.820^{**}	-0.256^{**}	-0.760^{**}	-0.046^{ns}
	MLD, mm (3)			1.000	0.204^{**}	0.483^{**}	0.046^{ns}	-0.070^{ns}	0.447^{**}	0.214^{**}	0.422^{**}
	Lean meat, % (4)				1.000	0.398^{**}	-0.778^{**}	-0.841^{**}	0.270^{**}	0.787^{**}	0.035^{ns}
	Meat, kg (5)					1.000	-0.151^{*}	-0.260^{**}	0.429^{**}	0.407^{**}	0.858^{**}
DISSECTION	BF1, mm (6)						1.000	0.812^{**}	-0.197^{**}	-0.768^{**}	0.020^{ns}
	BF2, mm (7)							1.000	-0.284^{**}	-0.772^{**}	-0.035^{ns}
	MLD, mm (8)								1.000	0.502^{**}	0.495^{**}
	Lean meat, % (9)									1.000	0.352^{**}
	Meat, kg (10)										1.000

–) $tab_{0.05}$ =0.138 (P<0.05); $tab_{0.01}$ =0.181 (P<0.01);