COMPARISON OF ACCURACY OF DIFFERENT METHODS OF ASSESSMENT OF PORK CARCASS MEATINESS

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INTRODUCTION

Various European countries follow the methods of instrumental classification of pork carcasse used in European Union. Hungary has applied the optical - probe devices (Fat-o-Meater) in the biggest slaughterhouses. Czech Republic, Bulgaria and Estonia are getting ready for a practical application of various classification devices.

Also in Poland in twenty three plants there have been installed ultrasound instruments and one optical - probe apparatus. In practice significant differences in precision of meatiness estimation according to those methods have been observed. The aim of the paper was the assessment of accuracy estimation of a lean meat contribution to pork carcass with an application of the three following methods: ultrasound, optical - probe and electronic measurement of overall dimensions of carcass.

MATERIALS AND METHODS

The experiment was carried out on 222 pork halfcarcasses with an average meatiness of 49% (SD 5,32). The population of pigs had a normal distribution of meatiness. There were used three different methods of measurement of fat and muscle Longissimus dorsi (m. LD) thickness and other dimensions of halfcarcass e.g. ultrasound, optical - probe and electronic slide caliper (DP) one. In the first two methods fat and m. LD thickness were measured in eight different anatomical points of a hanging hot left halfcarcass (fig. 1). Using DP method ham thickness, waist thickness (between ham and belly) and fat thickness over the middle of the Gluteus medius muscle (m. GM) were measured.

After chilling process, left halfcarcasses were dissected according to the DLG method. Simple and multiple correlation coefficients and regression equations for the estimation of meatiness have been elaborated. The regression equations were calculated according to the step method (forward, backward) and the standard method.

RESULTS

Significantly stronger relation has been found between fat thickness and pork carcasses meatiness than between thickness of m. LD and lean meat content (tab. 1).

The values of simple correlation for fat thickness and meatiness ranged from 0,61 to 0,86, and for m. LD thickness from 0,19 to 0,58.

Higher values of simple correlation coefficient between meatiness and fat thickness measured with optical - probe instrument have been observed than with ultrasound device.

Significant relations have been also found for fat thickness over the m. GM and meatiness and for halfcarcass thickness in waist and meatiness. The observed dependences enabled to calculate regression equations for meatiness evaluation according to ultrasound and optical - probe measurements. The standard method of calculation has been proved the best method of choice because the step method (forward and backward) has showed equations with dimensions which are difficult to practical application in slaughterhouses.

The measuring points utilized in standard method of regression analysis were as follows:
a) ultrasound method - fat and muscle thickness in point H and fat thickness in point D ($R^2 = 0,71$, RSD = 3,17) (Fig. 2).
b) optical - probe method - fat and muscle thickness in point E and fat thickness in point G ($R^2 = 0,82$, RSD = 2,36) (Fig. 3).

In the case of DP method, in spite of low correlation between ham thickness and meatiness of carcass, the regression equation including three measures e.g. thickness of halfcarcass in the waist, fat thickness over the m. GM and ham thickness ($R^2 = 0,71$, RSD = 2,95) estimated meat content more accurately than the regression equation basing on two measures only, excluding ham thickness ($R^2 = 0,65$, RSD = 3,24).

CONCLUSION

Among three compared methods of estimation of pork carcass meatiness, when the meatiness demonstrated high variability, the best precision was observed for optical - probe method. DP method was characterized by lower precision and the ultrasonic method by the lowest one.

Fig.1. View of measuring points

6cm 7cm

Ⓐ Ⓑ → last rib
Ⓒ Ⓓ → 1/2 rib
Ⓔ Ⓕ → 3/4 rib
Ⓖ Ⓗ → 5/6 rib
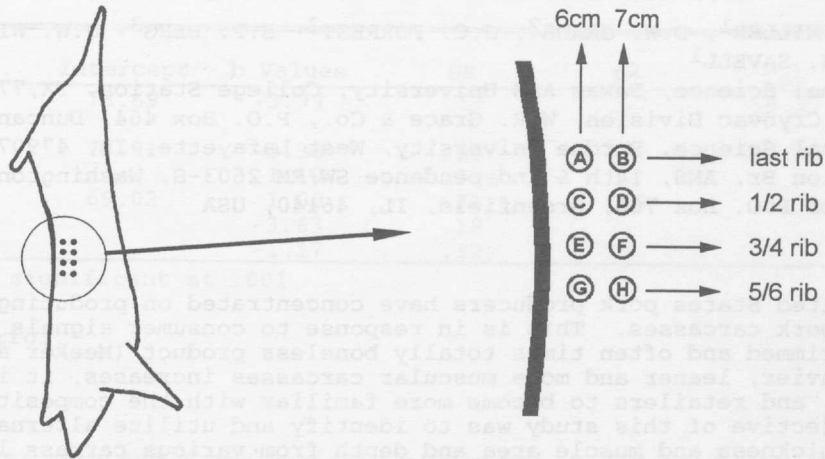
Tab.1. Coefficients of single correlation between content of meat in carcass and dimensions of fat and muscle LD thickness, and another dimensions of halfcarcasses

Coefficients of single correlation	Measuring Points																ham thickness	waist thickness	fat GM
	A		B		C		D		E		F		G		H				
	fat	m.	fat	m.	fat	m.	fat	m.	fat	m.	fat	m.	fat	m.	fat	m.	thickness	thickness	GM
ultrasound device	-0.79	0.41	-0.78	0.38	-0.61	0.43	-0.82	0.58	-0.65	0.52	-0.68	0.53	-0.61	0.41	-0.76	0.47	-	-	-
optical-probe instrument	-0.76	0.51	-0.86	0.30	-0.85	0.45	-0.86	0.47	-0.84	0.48	-0.84	0.41	-0.86	0.34	-0.85	0.19✱	-	-	-
slide-caliper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.03✱	-0.53	-0.81

m. = muscle, ✱ = correlation nonsignificance

Fig. 2. DIAGNOSTIC GRAPH
ULTRASOUND DEVICE

DISSECTION MEATINESS (y-axis: 34, 38, 42, 46, 50, 54, 58, 62, 66)
INSTRUMENTAL MEATINES (x-axis: 34, 38, 42, 46, 50, 54, 58, 62)

Regression
95% confid.

Fig. 3. DIAGNOSTIC GRAPH
OPTICAL - PROBE INSTRUMENT

DISSECTION MEATINESS (y-axis: 36, 40, 44, 48, 52, 56, 60, 64)
INSTRUMENTAL MEATINESS (x-axis: 36, 40, 44, 48, 52, 56, 60)

Regression
95% confid.