SIMPLIFIED METHODS OF DETERMINING DISSECTIONAL MEATNESS

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Background

In accordance with the European Treaty, Poland has been adjusting its standards and regulations to the standards and regulations of the ECC. It regards, among other things, the rules of implementatiom of objective pork carcass classification. The EUROP classification is employed at present in about 40 slaughter-houses in Poland.
The equipment used for determining carcass meatness undergoes atestation. The atestation procedure consists in examining regression between the parameters that are characteristic of particular elements, i.e. muscles or pork fat, and meat content in a carcass determined through dissection. Dissectional meatness is calculated on the basis of the net weight of red striated muscle tissue [MG], obtained from a half-carcass, and total carcass body weight [SK].

$$\text{Dissectional Meatness } MF\% = MG \times 100/SK$$

As the method determining dissectional meatness requires a lot of work, there was a demand for a new simplified method. In Germany, for example, a simplified method consists in replacing dissection of 15 carcass elements with dissection of 4 basic elements , i.e. ham, loin, shoulder and belly. This method helps to determine muscle tissue mass [MG] in a carcassc at a correlation of 0,998 with a real value and RSD = 1%. Since January 1st 1996 in the ECC there has been implemented a compulsory procedure of simplified dissection and regression equation described by Walstra and Merkus. Similarly to the German one, the Walstra method provides for the dissection of ham, loin, shoulder, belly, and moreover, m psoas maior.
The aim of the study was the elaborating of a similar simplified method, testing its use in the conditions of the Polish meat industry and finally, comparing it with the Walstra method.

Materials and methods

The experimental raw material consisted of 120 pork half-carcasses, not skinned, randomly selected from the slaughter lines of several slaughter-houses. Half-carcasses were taken from porkers of varied meatness and body weight. Over ten measurements were taken of warm and chilled half-carcasses with the help of a caliper measure. Then dissection, after the German DLG method recommended by the EU, was carried out. That is a chilled left half-carcass was, including skin, cut into 18 elements. Each part of the half-carcass except feet and tail was dissected into tissue elements, i.e. meat, inner fat, underskin fat, bones, skin, connective tissue and glands, and weighed with precision of up to 1g.

Results

Simple correlation between dissectional meatness and parameters characteristic of a carcass , its elements, fat and muscles, was studied. The data from **Tab.1** indicate that the highest correlations occur between carcass dissectional meatness and proportional meat content in ham, shoulder, loin, belly, and proportional underskin fat content and skin in ham. High correlations can also be observed between dissectional meatness and proportional total fat content in belly, the cross-sectional area of l. dorsi between the 3rd and the 4th rib and pork fat on the back and at point C_7 as well.
On the basis of those data there has been proposed evaluating dissectional meatness with two methods. They only differ in complexity degree of dissection and measurement procedure and precision. In **Tab.1** there are those parameters for which the correlation was high enough to use it in a simplified method of dissectional meatness evaluation.
The first method employs eight parameters symbolised by x_1 - x_8 connected with dissectional meatness of carcass Y through equation I presented graphically in **Fig.1**

Equation I $Y = 20,3+0,19x_1-0,07x_3+0,14x_3+0,20x_4-0,29x_5+0,07x_6+0,0004x_7-0,021x_8$

Determination coefficient $R^2=0,98$ RSD 0,890

The equation was calculated after the 'step forward' method. And so, it starts with an equation with one variable only. At every successive step one variable was added, up until the moment of obtaining a satisfactory equation with eight variables. Then, for practical reasons, the variables describing proportional meat and fat content in belly x_2 and x6, were removed and all the stages, described above, were repeated for obtaining the best equation II.

Equation II $Y=11,38+0,31x_1+0,14x_3+0,25x_4-0,25x_5+0,0005x_7-0,04x_8-0,05x_9$

Determination coefficient $R^2=0,98$ RSD=0,910

The exclusion of proportional meat content in belly x_2 and fat content in belly x_6 from equation II has a double justification:
1. the precision degree of belly dissection is rather low, which has to do with the difficulty in separating meat from fat, and separating the whole of the meat-fat from bones.

2/ out of the parts selected for dissection, belly is an element requiring the greatest amount of work and effort. Along with the hard-to-achieve precision of separation and the changed-to-degree RSD value of equations, describing simplified dissection methods, the omission of belly dissection can be regarded as purposeful.
This creates a chance to choose an alternative method of a similar value of the correlation coefficient and of a similar standard error which helps to obtain the final result sooner and at a lower cost.
The calculations revealed that the Walstra method applied to the Polish raw material yields similar precision as the calculations made on the basis of Equation II.

Conclusions

1. The dissectional meatness evaluation methods employed here, consisting in the measurement of parameters peculiar to elements, muscles and fat, on the basis of multiple correlation equation, elaborated for pork half-carcasses derived from pigs produced in Poland, are characterized by the precision nearing that of the Walstra method.
2. Method I as more precise can be used for elaborating equations for new measuring techniques and new devices.
3. Method II can be used for verification of regression equations for classification devices operating on slaughter lines.

Tab.1. Simple correlations of the analysed, selected, variables with dissectional meatness ($p < 0.01$).

% MEAT IN HAM - X_1	**0.96**
% FAT IN BELLY - X_2	**-0.91**
% MEAT IN SHOULDER - X_3	**0.86**
% MEAT IN LOIN - X_4	**0.68**
% UNDERSKIN FAT AND SKIN IN HAM - X_5	**-0.95**
% MEAT IN BELLY - X_6	**0.85**
THE AREA OF L.DORSI EYE OVER THE 3/4 RIB - X_7	**0.73**
PORK FAT THICKNESS ON THE BACK - X_8	**-0.57**
PORK FAT THICKNESS AT THE LEVEL OF C_7 - X_9 (C_7 - the level of the last rib, 7cm off the line of carcass intersection)	**-0.70**

Fig.1 Diagnostic graph
Dependent variable: dissectional meatness

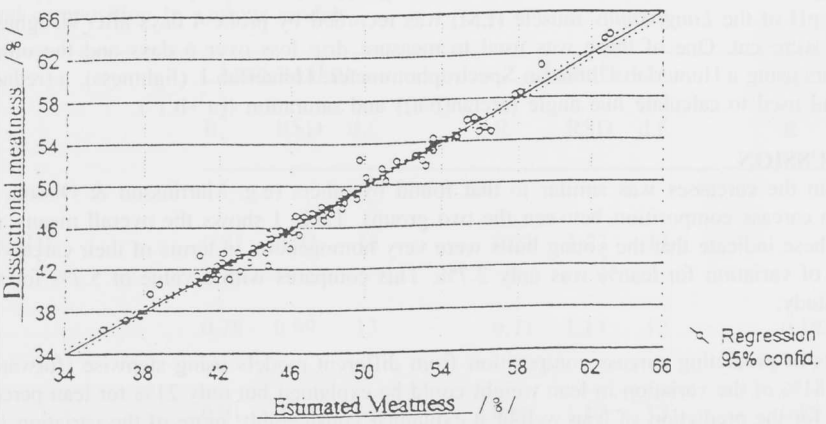

Fig.2 Diagnostic graph
Dependent variable: dissectional meatness