PIG CARCASS GRADING IN CROATIA

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Introduction

Croatian legislative prescribes two methods with defined equations for on-line lean estimation of pig carcasses. These are: instrumental and manual, so called two points, method. The coefficients used in equation are dependent on mean lean share, and after a two years time period or after a significant change in pig population, they should be checked (EC Regulation No 2967/85). In order to simplify the expensive and time consuming full dissection trial, EC (Commission Regulation No 3127/94, Walstra and Merkus, 1995) introduced a simplified dissection method (EU referent method) based on a dissection of four main parts. The aim of this paper is to investigate if a correction of current Croatian formula for "two points" method is needed.

Materials and Methods

The experiment was performed on 144 swine carcasses slaughtered at several Croatian slaughterhouses, selected according to backfat measures obtained by "two points" method approved in Croatia (NN 119/1999). There was no stratification according to the carcass weight. One day after slaughter right sides of the carcasses were dissected according to EU referent method. Measures for obtaining the variables according to "two points"-method were: lumbar muscle thickness – M (mm); measured as the shortest connection between the cranial end of the lumbar muscle and dorsal edge of the vertebral canal, and fat thickness – S (mm), measured as the minimum thickness of subcutaneous fat (with skin) at the split of the carcass, above *m. gluteus medius.* Meat lean percentage was estimated by four equations (MP1-MP4). Results of meatiness determined by EU-referent method and by estimation formulae were statistically compared. Pig carcasses were classified into market classes (SEUROP system) based on objectively determined (EU_ref) and estimated meat percentage (MP1-MP4). The data were statistically processed by GLM procedures of SAS program package, version 9.0 (SAS Ins. Inc., 2002).

Results and Discussion

Equation MP1 (Table 1) represents the current equation for "two points" method prescribed by Croatian regulation, whereas the other three were developed according to original data from dissection experiment. Measures of muscle (M) and fat (S) thickness on original and transformed scales were taken as independent variables in meat percentage estimation formulae; the dependent variable was meat percentage objectively determined by EU referent method.

Table 1. Evaluated equations for lean meat percentage

Abbreviation	Equation
EU_ref	Lean meat percentage by dissection
MP1	$y=47.978+26.0429\frac{S}{M}+4.5154\sqrt{M}-2.50181\log S-8.4212\sqrt{S}$
MP2	$y = 63.90877 - 63.17733\frac{S}{M} + 1.06056\sqrt{M} - 67.20033\log S + 18.44824\sqrt{S}$
MP3	$y = 71.51047 - 84.03306\frac{S}{M} - 79.38676\log S + 23.64163\sqrt{S}$
MP4	$y = 36.97681 - 0.46424\mathrm{S} + 0.32207\mathrm{M}$

Table 2. Basic statistics for lean meat percentage and statistical criteria for equations

	EU_ref	MP1	MP2	MP3	MP4
N	144	144	134	134	134
Mean	51.4682[a]	55.4680[b]	51.6620[a]	51.3743[a]	51.1459[a]
RMSE	-	-	2.2051	2.2167	2.5192

Means within row with different superscript (a, b) differ at $P < 0.01$

The average lean meat percentage in dissected pig carcasses was 51.47%. The lean percentage estimated by equations obtained from dissection trial did not differ statistically from objectively determined meatiness, whereas the meat percentage estimated by equation MP1 differed statistically ($P<0.01$) from lean meat percentage determined by EU referent dissection. This suggests that formula, approved by Croatian regulation, overestimates the lean share of investigated pig population. The statistical criterion that has to be fulfilled for implementation of on-line estimation equation is RMSE (root mean square error) <2.5. RMSE of equation MP2 and MP3 was below 2.5, whereas the RMSE of MP4 formula was slightly higher than prescribed by EU regulation.

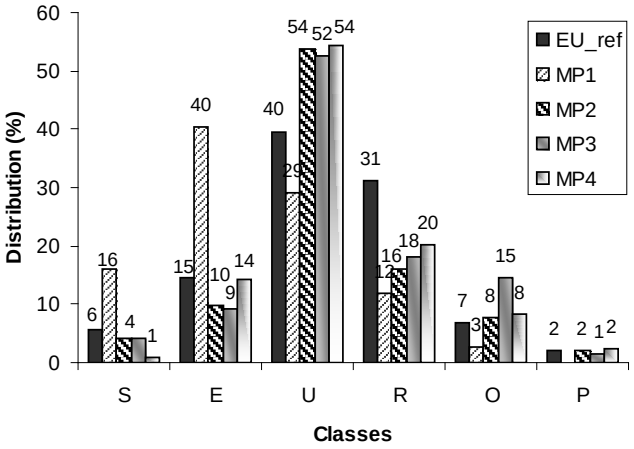

Figure 1. Distribution of pig carcasses in classes (SEUROP).

The results of pig classification into SEUROP system can be observed on Figure 1. The use of equations MP2, MP3 and MP4 has classified most of pig carcasses into quality class U. The mean value of objectively determined lean meat percentage by EU referent method belonged to the same class. On the other hand, equation MP1 has classified the majority of pig carcasses into class E, whereas the EU referent method has classified only approximately 15% of pig carcasses into the same class. The equation MP1 has assorted 16% of the carcasses into class S; it was objectively determined that only around 6% of the carcasses belong to the same class. Equations MP2 and MP3 have classified 4%, and MP4 around 1% of the pig carcasses into class S. On the basis of objectively determined meat percentage 2% of the pig carcasses were classified into class P, whereas the formula MP1 has not classified any of the carcasses into this class. MP2, MP3 and MP4 formulae have assorted 2%, 1%, and 2% of the carcasses into this quality class, respectively.

Conclusions

Based on the results of present study, following conclusions can be drawn:

- The meatiness estimated by equation MP1 differed statistically ($P<0.01$) from lean meat percentage objectively determined by EU referent dissection; the current formula significantly overestimates the meatiness of pig carcasses from Croatian population.
- Root mean square error of the MP4 equation was slightly higher than 2.5; it can not be recommended for on-line estimation of lean percentage at Croatian slaughterhouses.
- The equations MP2 and MP3 have RMSE less than 2.5. Therefore, they can be recommended for on-line estimation of lean meat percentage at Croatian slaughterhouses.

References

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