

PROCEDURE FOR ASSESSMENT OF THE LEAN MEAT PERCENTAGE AS A CONSEQUENCE OF THE NEW EU REFERENCE DISSECTION METHOD IN PIG CARCASS CLASSIFICATION

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Abstract

Pig carcass grading based on instrumental classification has as a purpose the stimulation of the producers in producing pigs of the desired quality. Council Regulation EC Nr. 3220/84 says: the classification should be linked to the muscular tissue percentage obtained from the dissection, as much as possible using a knife, on all striated muscular tissues from the carcass. The reference method involved is laborious. In 1990/1991, a test was done by CE with the purpose of finding a much simple dissection method. The results of this test were described by Cook and Yates (1992). A general agreement was reached; the dissection would be made only on the four main parts, which represent 75% from the total of the striated muscles. The striated muscles are known as the muscles from the skeleton which have a transversal structure in the microscope light. In consequence, once the numerator changed according with the denominator, this leads to a radical change of the lean meat percentage. However, the introduction of a scaling factor allows an average EU level of about 55% muscular tissue.

Key words: pig carcass, grading, dissection, lean meat, EU reference

INTRODUCTION

Pig carcass grading based on instrumental classification has as a purpose the stimulation of the producers in producing pigs of the desired quality. Council Regulation EC Nr. 3220/84 says: the classification should be linked to the muscular tissue percentage obtained from the dissection, as much as possible using a knife, on all striated muscular tissues from the carcass. The reference method involved is laborious. In 1990/1991, a test was done by CE with the purpose of finding a much simple dissection method. The results of this test were described by Cook and Yates (1992). A general agreement was reached; the dissection would be made only on the four main parts, which represent 75% from the total of the striated muscles. The striated muscles are known as the muscles from the skeleton which have a transversal structure in the microscope light. In consequence, once the numerator changed according with the denominator, this leads to a radical change of the lean meat percentage. However, the introduction of a scaling factor allows an

average EU level of about 55% muscular tissue.

The reference method has as a purpose the comparability and the reproducibility; especially when muscles from only some of the joints are dissected, definitions of the jointing procedure are important and should be clear. It is necessary that the definition of the carcass, the jointing and tissue separation to be well-documented, in order to be used as a guide for the new EU reference method.

Assessment of the muscular tissue percentage

The numerator for calculation of the muscle tissue percentage consists of the total weight of the muscle tissue from leg, loin, belly and tenderloin. Total muscle weight of these joints is defined as the difference between total weight of these joints before dissection and total weight of fat, skin and bones after dissection. In this way the differences in weight, before and after the dissection, which are due to the cutting and evaporation losses, are included in the numerator. On the tenderloin the dissection is

not done, its total weight is considered as a muscle tissue. In general the fasciae and tendons are left on the muscles, as it will be discussed later on.

The denominator for calculation of the muscular tissue percentage is defined as

$$Y = C \times 100 \times \frac{\sum^4 (J - SSF - IF - B) + T}{\sum^{12} J}$$

in which:

Y = muscular tissue percentage

C = 1.3 (a constant scaling factor)

J = weight of joint before dissection

SSF = weight of skin with subcutaneous fat

IF = weight of intermuscular fat

B = weight of bones

T = weight of tenderloin

\sum^4 = sum of weight of the joints ham, shoulder and loin including back fat and belly

\sum^{12} = sum of weight of all 12 joints

In Figure 1 are given the various joints of the new EU reference method

MATERIAL AND METHOD

Selection of the carcass

The left side of the carcass is used for dissection of the muscular tissue. Apart from the selection of carcasses from a statistical point of view, only those carcasses which have been splitted well (including the right splitting of the head and sternum) should be used, along the backbone as well as the belly. If the carcass is not splitted correctly, the next carcass with the desired characteristics should be selected (breed/ hybrid and/or sex, weight, back fat thickness, muscle tissue percentage.) In some slaughter-houses the whole head is cut, but still connected though the skin and hanging on a semi carcass until weighting at 45 minutes post-mortem. In such cases, regarding the selection of carcasses, the head should be weighted and divided by two in order to obtain the right carcass weight. Nevertheless the head should be splitted for the brain to be removed.

being the sum of all the joints whether or not to be dissected.

The calculation formula of the muscular tissue percentage is as follows (an example of the calculation is given in Appendix I):

Preparation of the carcass

Before dissection the carcass must be prepared in order to meet the requirements of Council Regulation (EEC) Nr. 3220/84 and Regulation (EC) Nr. 3513/93, in which the carcass is defined as: "slaughtered animal, bled and eviscerated, whole or divided down the midline, without tongue, bristles, hooves and genital organs and without flare fat, kidneys and diaphragm."

The parts that do not belong to the carcass should be the first removed, and also the urogenital tissue or remnants of the diaphragm (especially diaphragma pars lumbalis).

As a difference from the Council Regulation, the tail, in the sense of the EU reference method, does not belong to the carcass. It should be removed between the 6th and the 7th coccygeal vertebra. This also applies to the removal of the spinal cord and the brain before dissection. The cold carcass side weight is recorded before starting dissection as a check for weighing mistakes during dissection.

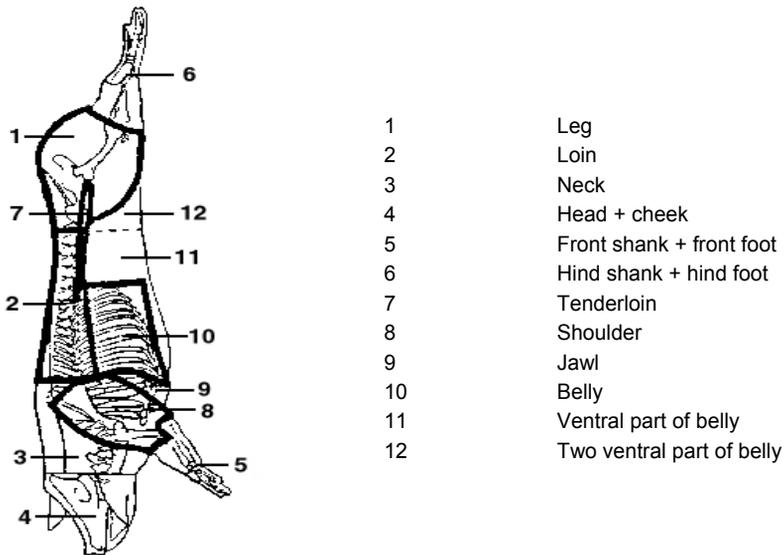


Figure 1

The jointing of the carcass according to the EU Reference method; the main joints to be dissected are indicated as areas within the thick lines. (Figure 1)



Photo 1. The carcass divided into various joints according to the Eu Reference method.

Dissection

Only the four main parts are fully dissected; this means the complete tissue separation of ham, loin, shoulder and belly into muscle, bone and fat. Fat is divided into subcutaneous fat including skin and intermuscular fat. The latter remains after dissection of muscle by muscle. All weights, except side weight, should be recorded at least to the nearest 10 gram or better to the nearest 5 or 1 gram, if possible.

RESULTS AND DISCUSSIONS

In making the National Test of dissection, 145 carcasses from 14 farms representative for the pig population in Romania, were dissected. The dissection was made in a separate room in ALDIS slaughter-house, at 24-28 hours from the slaughtering, in perfect refrigerating conditions (temperature under 10 degrees). The cutting was made by the same experimented butcher, according to the

reference method for dissection in UE (Wakstra and Merkus, 1996). The losses of weight during the dissection were extremely small, around 0.38% for the leg, 0.49% for the loin, 0.44% for the shoulder and 0.84% for the belly.

The dissection of the four main parts of the carcasses were done by 10 butchers. The dissection was watched during the entire time by specialists from the Danish Meat Research Institute.

The results were the following:

The perimeters of dissection sample

Sex	% lean meat dissection	hot weight carcass (kg)	thickness bacon FOM (mm)	thickness tenderloin FOM (mm)	thickness bacon OGP (mm)	thickness bacon OGP (mm)
Females	57.71	79.87	17.39	53.69	15.98	53.57
Average	72	72	72	72	72	72
N	5.537	7.368	8.106	8.106	5.346	10.508
Standard Deviations						
Males	54.91	79.92	52.89	52.89	17.09	50.53
Average	73	73	73	73	73	73
N	4.696	8.195	8.103	8.103	4.493	9.032
Standard Deviation						
Total	56.30	79.90	18.01	53.29	16.54	52.04
Average	145	145	145	145	145	145
N	5.303	7.768	4.707	8.086	4.949	9.877
Standard Deviation						

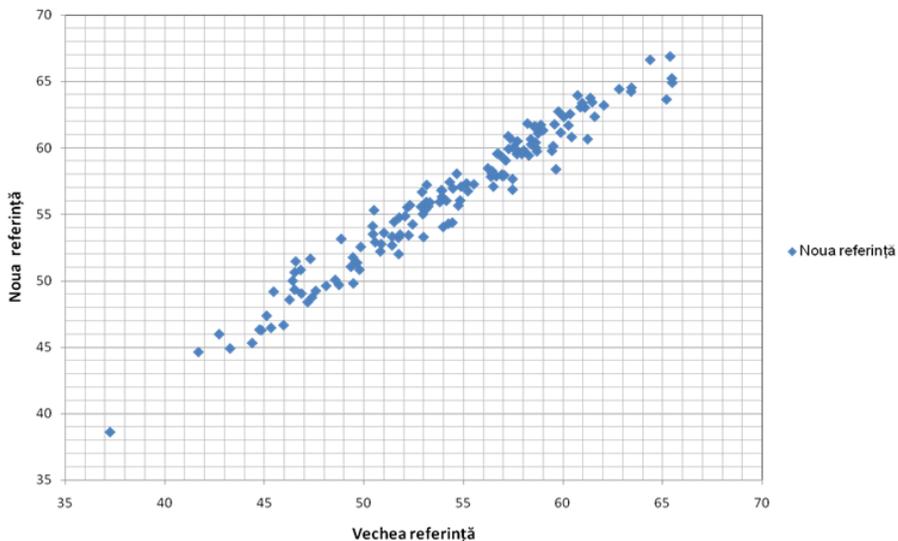
The difference between the old and the new reference can be seen in table 2.

Table nr.2

Character	Average	Standard Deviation	Minimum	Maximum
Weight hot carcass, kg	79.9	7.77	58.6	100.7
Weight cold semi-carcass, kg	39.3	3.87	28.5	50.4
Lean meat dissection, % ("old" reference)	54.36	5.53	37.23	65.51
Lean meat dissection, % (reference from 2006)	56.30	5.30	38.61	66.89
X1 FOM, mm	18.0	4.71	10	32
X2 FOM, mm	53.3	8.09	37	74
X1 OGP, mm	16.5	4.95	9.4	30.8
X2 OGP, mm	52.0	9.88	32.1	82.2

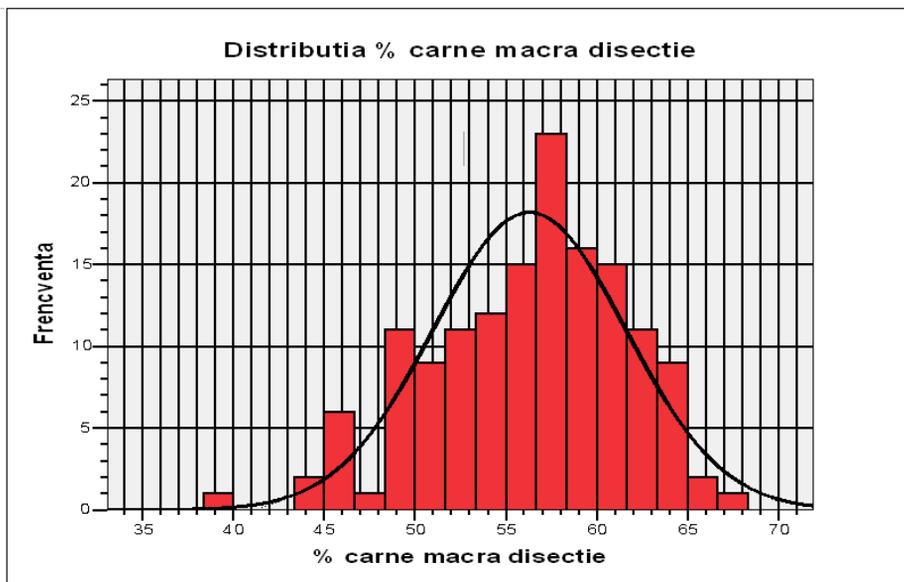
The distribution of lean meat obtained at the national test of dissection can be seen in figure nr. 3.

Relația dintre noua referință și vechea referință



Multiple R 0.978082966

Distributia % carne macra disectie



The information offered by the two equipments used at the National Test of dissection is the following:

Fat-O-Meat'er (FOM)

N = 145
 $R^2 = 0.78288$
RMSE = 2.48840

$$Y = 60.26989 - 0.81506 * X1 + 0.20097 * X2$$

RMSEP = 2.51938

Y = the estimated lean meat percentage
X1 = the thickness of the bacon including the skin, in milimeters, measured at 7 cm from the median line, between the 3rd and 4th last rib
X2 = the thickness of the tenderloin in milimeters, measured at 7 cm, form the median line, between the 3rd and the 4th last rib

OptiGrade-Pro

N = 145
 $R^2 = 0.79425$
RMSE = 2.42238

$$Y = 61.21920 - 0.77665 * X1 + 0.15239 * X2$$

RMSEP = 2.45933

Y = the estimated lean meat percentage
X1 = the thickness of the bacon including the skin, in milimeters, measured at 7 cm from the median line, between the 3rd and 4th last rib
X2 = the thickness of the tenderloin in milimeters, measured at 7 cm, form the median line, between the 3rd and the 4th last rib

CONCLUSIONS

• The purpose of the standardization is to creat a comparable base, equable, for the prices paid by the slaughter-houses to the pig producers. For example, a producer, sends two lots of contemporany pigs to two slaughter-houses. In a slaughter-house the Fat-o-meat'er equipment is being used for the classification of the carcasses, and in the other the OpiGrade-Pro. It is necessary, for the given lots, the estimative lean meat proportions and also the distribution in the quality classes should be similar.

• In Romania: 1 unite % lean meat corresponds to aproximative 5.4 RON/carcass.

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