CONSEQUENCES OF THE FUTURE EU REGULATION ON PIG CARCASS CLASSIFICATION

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Abstract – The aim of this paper was to evaluate the main consequences of the change of the EU regulation on pig carcass classification, in particular the change of the reference lean meat percentage (LMP). A sample of 29 pigs was selected in two abattoirs and stratified according to sex (50% castrated males and 50% females). The left half carcasses as well as the four main cuts were scanned by computed tomography (CT). All cuts were then dissected. CT images were thresholded in order to determine lean meat. The future reference (LMP in the carcass) will be 2.8% lower than the present one (LMP in the four main cuts), i.e. about 1.7 percentage points. The French CT procedure could be fitted via a multiplicative factor of 0.965. This procedure is robust to the main factors – sex, genotype, fatness – influencing the classification. This would allow to use this scaling factor without new dissections for the future trials for approval of classification methods in France. It could be used too in other countries interested in this CT procedure.
Key Words – dissection, lean meat percentage, X-Ray tomography

INTRODUCTION

A new EU regulation on classification of beef, pig and sheep carcasses was in December 2016 under public consultation [1] and should be published in 2017. For pig carcasses the reference of lean meat percentage, based on partial dissection (LMP_{PD}) [2, 3] since 2006, will be replaced by a lean meat percentage based on total dissection (LMP_{TD}). For the first time since 1994 no EU scaling factor was foreseen to maintain the average level in the EU. Instead, an adjustment on a (national) representative sample is required. Similarly, manual total dissection can be replaced by CT virtual dissection of half carcasses if adjusted. But surprisingly, it could not be replaced by adjusted CT partial dissection. Sample should be stratified according to factors such as breed, gender or fatness, but the minimal size would be 10 carcasses. The aim of this paper is to evaluate the main consequences of this future EU regulation on pig carcass classification.

MATERIALS AND METHODS

A sample of 29 pigs was selected in two abattoirs and stratified according to sex (50% castrated males and 50% females). Carcasses were measured by two classification methods: CGM and ZP [4]. An ear sample was analysed for Halothane gene (Hal). The left half carcasses, without the head, were CT scanned according to the acquisition procedure developed by Daumas *et al.* [5]. Then, they were cut according to the EU procedure [6]. The four main cuts were CT scanned [7]. Finally, all cuts were dissected. Both LMP_{PD} and LMP_{TD} were calculated according to EU regulation. LMP_{TD} can be interpreted as the LMP in the carcass; but the head is considered as 100% of non-lean. From the images of the 3 mm CT slices lean meat was separated by using the fixed threshold [0, 120] on the Hounsfield (HU) scale. Choice of this threshold was argued by Daumas *et al.* [4, 7]. Lean meat was converted into weight through a fixed density: 1.04. Using the same denominators as for manual dissection, LMP_{PD}ct and LMP_{TD}ct were calculated, where the suffix 'ct' means measured by CT. Firstly, LMP_{TD} was regressed on LMP_{PD} to assess the impact of the change of the reference. Secondly, LMP_{TD} was regressed on LMP_{TD}ct for adjustment. Residues were averaged for each level of each factor (sex, Hal, fatness) to get systematic deviations per subpopulation. Fatness was analysed for CGM and ZP, by converting the fat depth into 2 classes (below the mean and above the mean) or 3 classes (30% lower, 40% median and 30% upper) as some member States used to do it. Fatness was analysed too by adding fat depth in the initial model. All calculations were made with SAS software [8].

RESULTS AND DISCUSSION

Some descriptive statistics of the four LMPs, total or partial and by dissection or CT, are presented in Table 1. The intercept in the regression of LMP_{TD} on LMP_{PD} was not significant. In the model without intercept the slope was estimated at 0.972 (s.e.=0.001) and the root mean square error (RMSE) at 0.39. This means the future reference will be on average 2.8% lower than the present one, which corresponds to about 1.7 percentage points. Such a change should slow down the updating of classification methods. The intercept in the regression of LMP_{TD} on LMP_{TD}ct was not significant, which is consistent with the conception of this CT procedure. In the model without intercept the slope was estimated at 0.965 (s.e.=0.002) and the RMSE at 0.81. This error is larger than this estimated for the partial dissection (0.54) [7]. Indeed, thresholding of fat cuts seems more complex.

Table 1. Descriptive statistics of LMP (n=29). (SEM = standard error of the mean, SD = standard deviation).

LMP (%)	Mean	SEM	SD	Range
LMP_{TD}	58.9	0.70	3.77	11.7
LMP_{TD}ct	61.0	0.72	3.87	13.5
LMP_{PD}	60.7	0.70	3.74	12.1
LMP_{PD}ct	61.1	0.69	3.72	12.9

Table 2. Mean deviations per subpopulation from the regression of LMP_{TD} on LMP_{TD}ct.

Levels	N	LCLM	Mean	UCLM	Pr>|t|
Females	14	-0.16	+0.25	+0.67	0.21
Males	15	-0.70	-0.23	+0.24	0.31
Nn	19	-0.31	+0.03	+0.36	0.86
NN	8	-1.14	-0.20	+0.73	0.63
Fat 1	8	-0.72	-0.10	+0.52	0.71
Fat 2	13	-0.43	-0.01	+0.41	0.97
Fat 3	8	-0.80	+0.13	+1.05	0.76

CLM = 95% Confidence limit for the mean; L = Low, U = Up; ZP fat classes (1 = 30% lower, 2 = 40% median, 3 = 30% upper).

Mean deviations, as well as 95% confidence intervals and *P*-values, for all the levels of the three factors (sex, genotype, fatness) are presented in Table 2. No mean difference was significant. Fatness was never significant whatever the location/device (ZP or CGM method) and the type of analysis (continuous, 2 or 3 classes).

CONCLUSIONS

In the future pig classification results will be much lower than actually, putting in danger the continuity of the SEUROP grid and the EU market price. During the transitional period, which can last 10 years or more, systematic deviations between member States should increase dramatically. The cost of the trials to authorise classification methods will be greater, but no improvement of accuracy is expected. A kind of renationalisation is likely. The LMP from the French CT procedure can be easily scaled, via a multiplicative factor, against the future LMP. It is robust to the variation of the main factors – sex, genotype, fatness – influencing the classification. This would allow to use this scaling factor without new dissections for the future trials for approval of classification methods in France. It could be used too in other countries interested in this CT procedure.

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