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Comparison of national ZP equations for lean meat percentage assessment in SEUROP pig classification

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ABSTRACT

The objectives of the present work were (1) to compare pig carcass classification using different ZP ("Zwei-Punkt-Messverfahren") equations approved in the EU, applied on the same dataset, and to discuss the origin of differences between member states; (2) to evaluate the effect of a possible common ZP equation from the combined dataset and analyse how do the different subsets perform; and (3) to discuss the consequences of different national equations within the EU in view of the harmonization of pig carcass classification. A dataset of 951 carcasses from Belgium, France, Germany, Slovenia and Spain was used, 12 approved ZP equations in Europe were applied and the results were compared. Observed differences can be due not only to differences in genetics and sexes, but also to differences in the ZP measurement and dissection trials performed to obtain national equations. Important differences between some equations (up to almost 5 lean meat percentage) indicate a low harmonization among them and a need for improvements.

1. Introduction

The SEUROP carcass classification system determines the value of the carcasses in the majority of the slaughter plants in the EU. The objectives of carcass classification are to ensure transparency in the market, compare prices among member states, and ensure fair payment to the producers. To achieve these objectives, it is necessary to assure harmonized methods. For this reason, the EU legislation regulates different aspects of pig carcass classification such as the procedure for calibration of devices, carcass weighing, grading and marking, market price and on-the-spot checks (Commission Regulation (EC) No. 1249/2008; Regulation (EU) No. 1308/2013). However, there is a debate if this regulation is sufficient to ensure comparability of carcass classification methods among countries.

The EU pig carcass classification is based on the objective measurements of carcass traits using different devices previously calibrated to predict lean meat percentage (LMP). Prediction equations are obtained by regression techniques for each device and member state by way of a calibration trial in which at least 120 carcasses, representative of the member state's pig population, are cut and dissected according to the reference dissection method defined in the EU legislation.

Various devices coupled with approved equations are presently used in the EU; they are automatic or semiautomatic, based on different technologies such as ultrasounds, reflectance or vision. Moreover, the ZP method ("Zwei-Punkt-Messverfahren") is widely used in small slaughterhouses. It is based on two measurements: (1) a fat thickness (ZP_Fat) defined as the shortest measurement of fat plus skin thicknesses over the muscle *gluteus medius* and (2) muscle depth (ZP_Muscle) defined as the minimum distance from the vertebral channel to the cranial end of the muscle *gluteus medius* (see Fig. 1) (Sack, 1983). These measurements can be taken either with a ruler or with a commercial calliper, or with specific devices developed for that purpose such as the electronic callipers MD02 (IMK, Ljubljana, Slovenia), IM03 (Zaklad Techniki Microprocesorowej, Poznan, Poland) or Optiscan© (ClassPro GmbH, Sielenbach, Germany) (Fig. 2). The ZP method has been approved in 12 EU member states, each one with its own equation obtained as a result of a national dissection trial following EU regulations.

The objectives of the present work were (1) to compare carcass classification using different ZP equations approved in the EU, applied on the same dataset, and to discuss the origin of differences between member states; (2) to evaluate the effect of a possible common ZP equation from the combined dataset and analyse how the different member

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Fig. 1. Measurements of ZP_Fat (left) and ZP_Muscle (right) with a ruler.

states' subsets perform; and (3) to discuss the consequences of different national equations within the EU in view of the intended harmonization of pig carcass classification.

2. Materials and methods

2.1. Equations approved in the different EU countries

The ZP method has been approved in Austria, Belgium, the Czech Republic, France, Germany, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia and Spain. As each member state has to perform its own calibration trial based on a representative sample from its national slaughter pig population, the equations – and the range of carcass weights in which each equation is valid – differ accordingly (Table 1). Besides ZP_Fat and ZP_Muscle as predictors, the Lithuanian equation also includes carcass weight as a predictor.

Dataset from national studies used in this work.

To fulfil the objectives of this study, a common dataset (n = 951) was created using data of the last national calibration trials performed in Belgium (n = 140), France (n = 250), Germany (n = 308), Slovenia (n = 121) and Spain (n = 132). Carcasses come from balanced samples of females and surgically castrated males in all the countries except Spain where a 27.3% of carcasses were from entire males. Both the Belgian and Spanish trials included also some carcasses from immunocastrated males (8.6 and 9.1%, respectively). In each trial, ZP_Fat and ZP_Muscle were measured, with a ruler in Spain and Germany, with the MD02 device in Slovenia, with a commercial electronic calliper in France, and with Optiscan-TP© in Belgium. Measurements were taken – either online or offline – at the split line of the left hot carcass. The characteristics of the carcasses from the different countries used in the calculations are presented in Table 2. On average, Germany had the heaviest (95.5 kg) and Spain the lightest carcasses (85.7 kg). The highest average fat thickness was in Germany (17.1 mm) and the lowest in Spain (11.5 mm), and the highest muscle depth in Belgium (80.1 mm) and the lowest in Slovenia (72.3 mm). The reference dissected LMP was available in the whole datasets for Belgium, Slovenia and Spain, and in a subsample for Germany. It was not available in France where two separate samples were used to

Fig. 2. ZP measurements with the electronic callipers MD02 (left) and Optiscan-TP © (right).