

INTERRELATIONSHIP BETWEEN MAIN TISSUE COMPOSITION AND TRADITIONAL AND VISIONAL MEASUREMENTS IN COW CARCASSES.

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SUMMARY

The purpose of this work was to compare suitability of different carcass measurements to predict the main tissue composition in cow carcasses. These measurements were taken with the help of a tape measure and video camera (VIA). It was found that the simple correlations between the main tissue composition and the linear measurements, obtained with the two different methods, were very similar. Still, only the visional measurements could be used in automatic assessment of beef carcasses instead of applying traditional measurements and the subjective method of fatness score.

Introduction

The great progress in objective classification of pig carcasses by using instruments of a new generation increases also the same potential for the progress in an instrument classification of beef carcasses (2,3,7,9). As it turns out, the application of these new methods based on an objective assessment is more difficult in respect of beef carcasses than in respect of pig carcasses. This difficulty is due to the variation in the carcass composition of the beef slaughter population originating from the use of different breeds and sexes of cattle and from the variation in slaughter age and weights (5,8,9). For this reason, there is still an extensive research being done to find the best instrument assessment and optimal correlations between carcass anatomy and carcass composition. In practice, the application of a video image analysis (VIA) has the potential to replace visual fatness and conformation assessment and also the traditional linear measurements applied in carcass evaluation (4,6,8,9).

The aim of this research was to compare the interrelationship between traditional and visional measurements with the tissue composition in cow carcasses in order to find similar indices for the two different methods. While not all slaughterhouses may be interested in purchasing very sophisticated and expensive instruments yet they are all interested in determining the main tissue in bovine carcasses with objective methods.

Materials and methods

All the examinations were carried out on 22 cow carcasses of the Polish Friesian breed with 262.3 kg of weight (Table 1).

Traditional measurements were taken with a tape measure and visional measurements were taken with a video camera (VIA).

The traditional measurements of carcass length and width were taken on basis of bone structure. The length was measured from the anterior edge of pelvis to the anterior edge of the first rib. The width measurements, however, were taken at the height of the sixth pectoral vertebra and the posterior part of sternum. The width I, in turn was measured up to the external edge of the vertebra and width II in the same line from sternum to the internal edge of the backbone.

The visional measurements were taken with a video camera. For that reason the visional images recorded on the tape were transformed with the help of an image aquisition into digital image cooperating with a computer. The visional length was the total length of a halfcarcass whereas the visional width measurement was taken as a maximum and minimum carcass width within the chest and the lumbar section.

Beside the linear measurements also carcass fatness score was carried out on the basis of the visual grading system (6). The equivalent of fatness score was the measuring of the surface of the exposed muscles on

the external part of a halfcarcass. This area was then presented in percentage terms of a total area of halfcarcasses. After taking the measurement the halfcarcasses were divided into primal cuts and thoroughly dissected into meat, subcutaneous fat, intermuscular fat, bones and connective tissue.

The collected data were used in order to calculate the indices of conformation, the overall means, standard deviation and coefficients of variance. Finally, they were treated to an interrelationship analysis.

Results and discussion

The overall means of all the measurements and the tissue composition of cow halfcarcasses with standard deviations and coefficients of variance are shown in table 1. On the basis of the presented tissue composition, percentage of kidney fat and carcass score fatness it could be stated that the examined halfcarcasses had medium fatness and poor meatness.

However, with regard to the variability of the examined traits based on the value of the coefficients of variance there were very similar coefficients in other research works (1,4,5,6). Table 2 shows the indices of conformations calculated as a ratio of a hot carcass weight to obtained linear measurements. The indices of the width conformation were similar in two methods respectively. In table 3 there are simple correlation coefficients of traditional and visional linear measurements and of traditional visional calculated conformation indices. As it can be seen in table 3 the conformation indices are relatively very well correlated though obtained through different methods. Table 4 presents simple correlation coefficients between various carcass traits and the tissue composition carcasses of slaughter cows. And so it arises from this table that the linear measurements obtained by application of the two methods were not highly correlated with the tissue component of halfcarcasses.

Out of the traditional measurements only length and width I were highly correlated with fat. Similar measurements taken by means the visional method had more significant correlations (Table 4). Thus there are very interesting correlations between the carcass maximum width and the tissue composition. Generally, it was stated that the conformation indices were very highly correlated with all the tissue components. Out of this group of correlations, only the index of carcass weight : minimum width was lower correlated with tissue composition. This index had also been lower correlated with similar traditional index of conformation for width II.

One of interesting interrelationships is between fatness score and visional meat area of meat with the tissue composition. Meat area measured with a video camera was particularly highly correlated with subcutaneous fat. These high correlations were obtained for measurements without using a special light. It ought to have been repeated also on other beef carcasses of various sex and breeds. These comparisons were made to show that subjective fatness score can be replaced by instrument assessment, which has a very high repeatability for measuring all traits (7).

High interrelationships between the examined carcass traits obtained through different methods indicate the suitability of applying them for a mutual control. Though the usefulness of the visional method is greater than that one of the traditional method, still the visional method is too expensive. Hence small slaughterhouses in many cases would not probably be able to afford to buy the costly instruments that the visional method requires. Therefore they would certainly find less expensive method more available and affordable. Now there are many systems for instrument assessment of carcass value (3). According to Cross and Whitaker (2) the instrument must be capable of evaluating all carcass traits and computing the dependent variables at projected industry production rates. The visional method can evaluate all external traits of halfcarcasses. Hence this method has the potential to replace the subjectivity associated with visual fatness and conformation classification. To get more data it is necessary to use another instrument for example optical probes which are capable of the objective measuring of meat and fat colour and marbling. The accuracy of assessment of carcass value can be also improved by addition of a few traits. Combination of various independent variables can provide the most precise prediction of carcass value (5,8,10).

Conclusion

The result of the experiment indicate that the interrelationships between the main tissue components and the traditional and visional measurements in the cow carcasses are very similar. It was also found that the suitability of measurements increased highly through using the indices of conformation in comparison with the linear measurements alone.

Instead of visual fatness score the visual assessment of the exposed muscle area on halfcarcasses can be applied.

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