THE CLASSIFICATION CENTRE FOR PIG CARCASSES

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Methods for pig carcass classification have been developed continuously during the last 50 years - especially in Denmark. The aim and the incentive have been to achieve an increasingly more correct and thereby a fairer payment to the producer for the individual pig in relation to its market value as meat and meat products. With the decision to introduce the Classification Centre (CC) at all Danish slaughterhouses the development has reached a stage where carcass classification will be objective and fully automatic. The determination of the lean meat content will be made independent of operators and be more accurate.

In October 1988 the first Danish slaughterhouses started using CC-classification for their payment system. In the beginning af 1990 the CC will be installed in all pig slaughterhouses. During the installation period of approx. two years the CC and the MFA grading systems will on average give the same classification results. The more accurate determination of meat content achieved with the CC will, however, result in an even higher payment for the leanest carcasses and a lower payment for fat carcasses. It will become more attractive to produce lean pigs.

From 1990 when centres have been installed at all Danish slaughterhouses the new classification opportunities of the CC can be taken into use and a further step can be taken towards ensuring that the payment for the pig carcasses fully reflects the market value of the individual pig. In a few years the CC could become a major factor in quality management for pig production by providing the basis for a total economic optimization - from the farm to the finished products. Such an optimization is particularly important in a world where the quality demands are still increasing and where the sales and production conditions are changing continuously.

QUALITY MEASUREMENT BY OPTICAL PROBE

The CC development project which was started about eight years ago began like many similar development activities with a search for the most suitable measuring method. A total of 18 methods - e.g. NMR, X-ray and ultrasound scanning - were evaluated by a team of specialists in measuring technology.

The early development work resulted in the selection of a CC based on the optical probe which is also used in several other types of equipment for measuring meat quality parameters e.g. for the measurement of water holding capacity, for sow carcass classification and for cattle carcass classification. A recently initiated development of on-line equipment for measuring protein content, meat pigment and fat marbling in carcasses is also based on an optical probe. It is a very wide range of applications which gives the meat trade decisive advantages as a result of better operational reliability and more efficient and cheaper service and maintenance.

MORE ACCURATE CLASSIFICATION

When the decision to install the CC in all Danish slaughterhouses was made in December 1987 a preliminary testing of the accuracy of the measurements and of the capacity had shown that the CC fulfils all the specified requirements.

Depths of fat and meat and total thicknesses are measured in 17 positions as shown in fig. 1. Thickness measurements from 13 of these positions are used for the calculation of meat content. The measurements from all 17 positions and the meat percentages can - when required - be used by the slaughterhouses for raw material selection.

The advantages of the CC for classification are the following:

- a more accurate determination of the lean meat content in the complete carcass (meat percentage for carcass)
- determination of the lean meat content in the fore-end, loin, belly and hind leg (meat percentages for cuts)
- a larger number of fat/meat/total thickness measurements in all major cuts.

The decisive difference between the CC and the MFA is seen in the extreme ends of the meat content scale (fig. 2). Carcasses with a high meat content are on average classified higher by the CC. Carcasses with a low meat content are on average classified lower by the CC. The reason is that the

CC determines a more correct meat content when compared to the true meat content.

THE BACKGROUND FOR THE MORE ACCURATE CLASSIFICATION

There are several circumstances which contribute to the more accurate meat content determination with the CC:

* The optical probe has made it possible to measure thicknesses at virtually all positions of the carcass.

* The CC has 17 probing positions distributed over all the main cuts against 3 positions in the loin for the MFA-grading system. As a result of this, differences in the meat/fat distribution over the pig carcass are better represented in the meat content calculation.

* In the CC the measurements are evaluated by computer. If a measurement which is required for the meat content calculation is rejected, the measuring procedure is repeated.

* In the CC length measurements are made of the carcass. The length measurement contributes automatically to the correct anatomical positioning of the optical probes. The classification is independent of an operator.

POSSIBLE PAYMENT FROM 1990

The meat percentages for cuts cannot be incorporated in the payment system until all the CCs have been installed, i.e. in 1990. In the intervening period a fairer payment system based on meat content in both the complete carcass and in cuts, carcass weight and dimensions of the cuts will be developed.

At a later state it will probably also be possible to include measurements of other quality characteristics in the CC, e.g. protein content and meat pigment. The development work in progress within this field aims at incorporating such quality measurements in the spare stations of the CC. The introduction of the CC has thus created other possibilities than those obtainable in the short term. This flexibility with possibility for further developments was an important factor in the decision period.

CONSTRUCTION AND FUNCTION

The capacity of the CC is 360 carcasses per hour.

The mechanical equipment consists of a series of stations, a transport system and nine frames fixing the carcasses during the transport through the CC - see fig. 3.

1. Before a carcass enters the CC the length of the carcass is measured. This measurement is used e.g. at the IN-station for height adjustment of the head holder.

2. In the IN-station the carcass is transferred to a frame and held in position by a head holder. The carcass remains on this frame all the way through the CC.

3. In the anatomic measuring station the heights of the front leg and of the pubic bone are measured. These measurements are used for the positioning of the probes.

4 and 6. These are spare stations which can be used e.g. for automatic back fat sampling for detection of boar taint and/or for meat quality measurements.

5. In the probe measuring station 17 probes are inserted into the carcass. The probes are positioned anatomically correct in the carcass on the basis of the length measurement and the anatomical measurements in station 3.

7. At the branding station the carcass is marked with class, cut classes and EEC health certificates with gas-heated branding-irons.

8. In the OUT-station the carcass is released from the frame which is led to the return conveyor and back to the IN-station.

9. The CC is provided with an emergency track where manual classification can be carried out with MC-equipment (manual classification). This emergency classification is generally carried out as the present Fat-O-Meat'er classification and with the same accuracy of classification. The emergency classification will be used in the case of CC break-downs and on carcasses from which parts have been rejected and cut away at the meat inspection.

The control of the CC is based on a micro computer system which is capable of guidance, data cap-

ture, calculation (data processing) and surveillance.

INFORMATION AND TRAINING

The CC project is one of the biggest development projects carried out under the auspices of the Danish Bacon and Meat Council. The project has been carried out in a close co-operation between the Danish Meat Research Institute, ATLAS Industries Ltd., Siemens Ltd., the National Institute of Animal Science, Radiometer Ltd., SFK, Slagteriregion SYD, STEFF-HOULBERG and a number of trade representatives in management and advisory committees.

In the construction and installation period this circle will be extended to include the involved groups of employees from all slaughterhouses. This creates heavy demands on training and information transfer, but also on project supervision and co-ordination of all activities.

Fig. 1

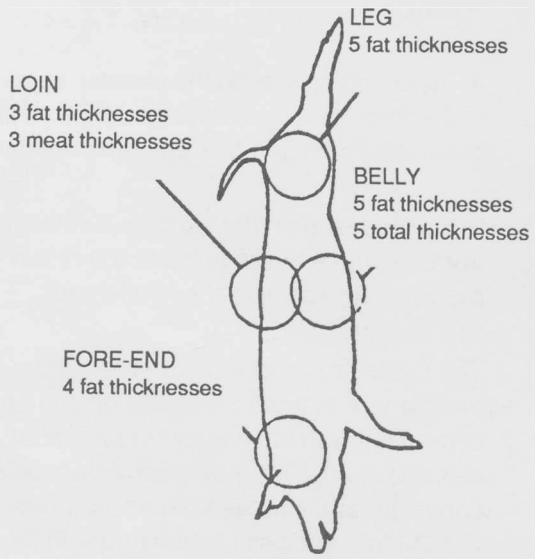

Fig. 1: Distribution of positions of meat/fat depth measurements on the carcasses

Fig. 2

Average CC- and MFA-Meat Content %

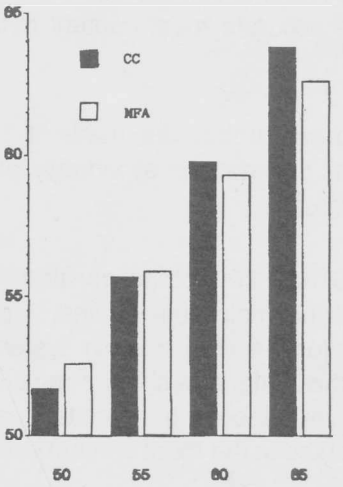

Fig. 2: Comparison of MFA and CC Classification. The CC classifies more accurately. It results in a noticeable difference for pigs with high and low true meat contents (total dissection).

Fig. 3

Schematic plan of CC