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INTEGRAL CHAIN CONTROL FOR PIGS USING A DATA MANAGEMENT SYSTEM

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Please refer to Folio 32A.

INTRODUCTION

Consumers are becoming increasingly critical as far as their food is concerned. Therefore, more information about origin, composition and production techniques is needed. At the same time the image and reliability of the quality of pork is becoming more disputable. Both trends urge the formation of additional quality guarantees throughout the production chain.

In the Netherlands a basic Integrated Quality Control system (IKB) developed for the Dutch meat sector by the Commodity Board for Livestock and Meat (PVV) is recently in operation. IKB is a quality system which entails the control and guarantee of the production within the complete pig meat chain, from breeder up to the slaughterhouse. The PVV/IKB pig regulations entail a number of basic requirements which must be met.

Within this framework guarantees are given with respect to origin, feed, hygienic conditions, the use of specific medicines and the presence or absence of specific residues in the meat. This is described in a separate paper by Schouwenburg *et al.* (1993). Moreover, information is exchanged in two directions between various links of the chain. The slaughterhouse obtains specific information about the pigs delivered, for instance concerning health and origin.

The pig farmer, on the other hand, receives the results of the meat analysis by the slaughterhouse.

In this basic IKB system the attention is drawn to the combination with the successive data carriers on the one hand and the successive chain information and control programs on the other (see Figure 1). In this way an integration of hardware and software in the production chain is achieved. Because investments in IKB can only be considered in the long term, it is important to create a framework in which IKB can prove to be an enduring development.

INFORMATION SYSTEMS

Process control should be integrated with data processing. Throughout all the stages of the production chain, from breeding, fattening, cutting to selling the parts to the retail trade, a diversity of information is needed. A distinction can be made between information concerning the product (carcass classification, PSE/DFD, weight, costs, etc.) and data on production (feed systems, operation procedures, planning, etc.).

This specific information is important for the operational tuning between the various links of the chain, but also for chain control, financial overview, integral quality assurance, trend analyses, record keeping and the acquisition and preservation of knowledge. For the pig industry a well considered data management system for effective and efficient chain control is necessary.

By using the available information for several purposes the installation and maintenance of data exchange systems is more justified and necessary investments can be earned within a shorter period.

Several information systems concerning Business Information System (BIS) and Electronic Data Interchange (TIS), Management Information System (MIS) and Electronic Data Interchange (EDI) are in development or already in use. These systems are often only used within a specific part of the chain. The complete chain is therefore lacking optimal tuning and standardization. Also the nature of the information and the confidentiality may strongly vary among parts of the chain.

A second important theme related to IKB is the organization and control of the chain aimed at production and business management. A theoretical background concerning these items has been developed, but practical experience in controlling an agro-production chain is lacking.

Supporting systems such as production planning (COPT), determination of optimal product valuation through specific carcass cutting (SNITOPT), optimal tuning between the delivery of pigs from the farmers and the demand of meat from the consumers (PIGOPT) and various decision support systems (DSS's) are in development in the Netherlands.

The VOPT system (Cost optimal Production Planning Technique) has been specially developed for the meat product industry. Its main purpose is to make production as efficient as possible with the available means. The COPT system optimizes utilization of capacity, production costs and warehouse costs.

The slaughterhouse is confronted with a pull consumer market and a push delivery of pigs from farmers. There is also a fluctuating demand of the market for special parts of the carcass, while supply is in carcasses as a whole, SNITOPT can optimize this problem in terms of money.

The demand for different quality types of carcasses is varying throughout the week, but not the number of carcasses. However, the composition in quality types of pigs may differ from farmer to farmer. Between boundaries the farmers can vary their delivery to the slaughterhouse in time. Though, a late delivery is a disadvantage for the farmer because of extra feed costs. PIGOPT will be able to reconcile these opposite interests.

For all systems tuning between the various links of the chain is essential for success.

DATA CARRIERS

The product information can be localized through data carriers such as implantable chips, hook identification and, last but not least, bar codes or other codes on products and/or packaging like crates and boxes. An interactive implantable chip will be the logical successor of the transponder which is now being tested for use in practical environments in the Netherlands. The transponder is basically an electronic identification number incapable of data storage. To fully use the diversity of information gathered in all stages, an automated registration and combined data transfer is needed.

To be able to use all the information collected/stored and linked to the ID code of the object in the different stages and locations an administrative system has to be implemented. This is necessary to ensure that the correct data are linked to the correct object and available at the appropriate time and place. Depending on the amount of data and objects the system could grow to tremendous proportions.

The use of an interactive WORM (write only, read many) chip will connect the data physically to the object itself. In this way the object (e.g., a pig) becomes a data carrier which can be read at every moment necessary. This would reduce the size of the administrative (electronic) system considerably. A central data management system is still needed for feedback, statistical analysis, possible legal aspects and information processing and storage.

BLOOD AS A SOURCE OF DIAGNOSTIC INFORMATION

A specific approach to integral chain control is the use of blood as a source of diagnostic information. It is desirable for the whole meat and livestock sector, especially for the pig sector, to produce a quality product originating from healthy animals. They form the basis for quality meat products. Residues from medicines in end products are more likely to be found in unhealthy animals. In these animals pathological and anatomical lesions caused by inflammatory lesions will be found more often.

Over the past few years the Dutch government and industry have been developing a quality surveillance system in the meat sector. Several research projects concerning integral quality control in pig, calf and poultry breeding have been carried out. By using specific monitoring points in the production process, information can be obtained concerning essential product characteristics, including health (see Figure 2). This information can therefore be used to control and administer the production process.
Research has been conducted on the relationship between blood parameters and (sub) clinical pathological lesions in pigs. Fibrinogen (a strong acute phase reactant) and albumin (a negative acute-phase reactant) values seemed to be reliable parameters to detect pigs with abscesses. Furthermore, this study showed that it is possible to distinguish healthy from unhealthy animals by analyzing blood samples. It also appeared that differences exist in haematological and clinico-chemical blood values at the end of the fattening period between different pig fattening farms.

An essential question is wether these differences already exist at the beginning of the fattening period or develop during the fattening period, caused by infections. In the latter case blood profiles will have a predictive value for the health situation of the pig fattening farm.

Finally, certain blood parameters might be useful as stress indicators to predict the sensoric and technological properties of the meat, like tenderness/juiciness and water binding capacity respectively.

More research is needed to answer the question whether monitoring acute-phase proteins in animals at slaughter is able to:

1) detect diseased animals and exclude them from human consumption
2) improve the quality of the meat produced and
3) increase the efficiency of meat inspection.

REFERENCES

No references were supplied.