The application of biosensors for meat quality analysis

To meet the demands of growing meat consumption in recent years, animal farming tended to increase meatiness. The rise of meatiness was not in concordance with the improvement of the meat quality. The quality of meat is the result of both genetic and environmental factors. The example of the tendency for maximizing weight at the same time neglecting quality is highly muscled pigs with the genetic predisposition to PSE (*pale, soft, exudative*)- a main meat defect. Meat of poor culinary or technological quality as well the defective meat are eliminated from the market which contributes to significant economic losses. The traditional and accepted measurement of meat quality is glycolytic potential introduced by Monin and Sellier in 1985. The glycolytic potential reflects the metabolic processes that occur in the muscles before and after slaughter. In the absence of oxygen, glycogen is a major source of energy determining meat metabolism.

In a number of studies it has been demonstrated that the content of glycogen, rate and extent of its degradation are closely linked with the quality of meat. The amount of glycogen and its degradation products in muscle depend on genetics and environmental factors. Lactate are products of glycolysis which accumulate in the muscles, determining the meat pH. The increase in acidity of meat affects the process of proteins denaturation. The higher glycolytic potential and low pH may results in acid meat in the meat production. This kind of meat has poor quality and is called “acid meat”. The range and dynamics of glycogen changes affect quality features of meat. For meat processors essential is the technological meat quality which depends on the set of parameters such as pH, colour, water-holding capacity, fat and protein content. A simple and inexpensive method of glycolytic potential assessment is crucial in the meat production. For this purpose biosensors seem to be the best available tools. They are designed to selectively detect chemical compounds. Biosensors are very sensitive and give a rapid response. They are cheap and convenient to use. Biosensors can replace the long and difficult laboratory analysis. In our study we have demonstrated the usefulness of strip tests for glucose and lactate level assessment in the pork muscles juice (drip loss) obtained immediately after slaughter. The level of glucose and lactate in muscle juice correlates with the glycolytic potential and can determine the rate and extent of *post mortem* glycolysis. A simple strip test designed for domestic glucose level measurement by diabetic patients, showed a good correlation in assessment of meat juice glucose with the time-consuming analytical methods.

The study showed that measurements of glucose and lactate by application of biosensors are good predictors of glycolytic potential and therefore they can be suitable to defective meat. The widespread use of strip tests in meat production can influence the improvement of breeding methods, meat production and processing. It can increase the meat quality offered to the consumers. Early detection of meat defects will reduce economic losses and enable the elimination of animals with a genotype associated with an increased incidence of defective meat. The practical applications of biosensors for metabolites assessment, especially at the production stage, need to be confirmed in further studies.

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