

## The application of computer vision system in meat science and industry

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**Introduction:** Objective assessment of meat quality is becoming more and more important along with growing expectations of customers, who are interested in purchasing meat and meat products with certain sensory characteristics. Evaluation of meat quality can be carried out by many methods: sensory, chemical, or instrumental, however they are laborious, time-consuming, destructive and sometimes not fully objective. Computer vision system (CVS) is a relatively new research technique, being still developed and improved. The aim of the work was to present the possibilities to use CVS in meat science and meat industry.

**Materials and methods:** The papers from over 20 years, with a special emphasis on the most recent ones were used in the review.

**Results:** Using different devices for image acquisition such as digital cameras, even those from smartphones, ultrasound, nuclear magnetic resonance, computed tomography, dual energy X-ray absorptiometry, near infrared spectroscopy and hyperspectral imaging make it possible to obtain information about both: external features of objects as well as about their internal structure [1]. Various attributes can be measured on the images (colour, texture, object dimensions) and used to determine the quality of meat [2-4]. Among them there are marbling characteristics [5], chemical composition [6,7], quality defects such as PSE, DFD [8,9], meat freshness [10] or muscle fibres characteristics [11]. Moreover, the technique might be used for prediction of meat tenderness based on images obtained with digital cameras, widescreen imaging techniques, two-dimensional surface reflectance and magnetic resonance [12-14]. CVS is also used in researches related to the assessment of the composition of animal carcasses, which might be helpful in determining the impact of cross-breeding or rearing system on the quality of meat [15]. The results obtained by CVS technique can also contribute to determination of an impact of technological treatments on the quality of raw and cooked meat. CVS has also a great potential as an automatic method for carcass classification in beef [16] and poultry industry.

**Conclusions:** CVS technique is a modern research method that is widely used to determine the quality of meat. Research is continuing on an improvement, automation of operations related to image processing and its combination with advanced statistical methods. The aim of all these treatments is a more effective, objective and sustainable assessment of the quality of animal carcasses, meat, and meat products. However, there are some challenges in improving CVS such as simplifying the image acquisition and further automation, with the use of machine learning techniques to obtain higher precision of predictions.

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