8 Automated analysis of meat quality

S.E. SØRENSEN

8.1 Introduction

Quality of meat cannot be described adequately by a single property and the optimal quality level is often viewed differently by end users of meat. In this chapter, the quality of meat is defined as an objective description of all characteristics of the product. For practical purposes the description of quality can be divided into four main headings:

(1) **Carcass quality** covers the total lean meat content and the distribution of fat and lean meat in carcasses and cuts. The carcass geometry expressed as the weight, dimensions and shape of the major cuts is also a feature of carcass quality. The increasing importance of carcass quality and consumer awareness of the nutritional and health aspects of eating a diet containing less fat have influenced the market greatly.

(2) **Meat quality** includes the sensoric, technological and nutritional properties of muscles and fat. Absence of deviating meat quality characteristics such as pale, soft and exudative (PSE) or dark, firm, dry (DFD) muscle structure are important for yield, appearance and eating quality. The composition and colour of fat (the fatty acid composition) are also aspects of meat quality. Sexually controlled off-odour which can be found during heating of meat from some male pig carcasses also plays a role and is discussed in more detail later in this chapter.

(3) **Hygienic quality** covers wholesomeness and safety aspects, particularly contamination with pathogens and the potential presence of unwanted chemical residues such as antibiotics, sulfonamides and other drugs, pesticides, heavy metals and mycotoxins. The influence of bacteria on shelf-life is also an important factor.

(4) **Ethical quality** aspects are currently subject to an increasing emphasis by consumers and by the media. This deals with aspects that normally cannot be measured in carcasses or finished products and therefore require a tight control of the complete process from conception to consumption. Environmental factors in animal production and animal welfare can influence consumers in their choice of food.
8.2 Trends in quality development

As many industrialised societies have overcome the basic requirement to get enough food to survive, consumer demand for high quality food has strengthened. The increasing consumer awareness of quality has also been acutely felt by the meat industry in many countries where production and processing of meat and meat products is an important part of the economy. Quality assurance and documentation of quality are therefore of increasing importance in the meat industry with emphasis on product uniformity, leanness, freshness, wholesomeness and purity.

In most industries quality assurance systems are based on monitoring of production processes with a view to correcting undesirable variations and thereby preventing or at least reducing the quantity of defective products. This strategy is often impractical when dealing with meat and meat products. The raw materials for meat processing (the slaughter animals) are of biological origin and are therefore subject to a range of biological variations. The meat industry cannot in the short term control or alter the properties of the raw materials.

This has led to an alternative strategy which could be termed quality by selection. The variable raw materials can be sorted into homogeneous groups, each fulfilling the requirements for a specific product or market. This strategy has created a need for a range of methods for measuring various quality attributes. Such methods must be able to provide rapid, reliable results for further selection of the raw materials. Sampling followed by conventional laboratory analysis does not usually provide results fast enough for application in the subsequent steps of production of such perishable products. The requirement is therefore for on-line quality measuring methods that can provide objective information about composition and other quality characteristics of slaughter animals, carcasses or meat raw materials in time to control further processing stages.

8.3 Market trends

The changes in the retail trade in many parts of the world have resulted in the formation of larger international retailing organisations and subsequently a small number of professional buyers. Changes in the international meat processing industry, another large customer for the slaughterhouse sector, has forced slaughterhouse companies to fulfil tight specifications for the products they supply. These changes also lead to a growing internationalisation of the pork trade. Another factor in this development is the approach of the Single European Market.