4 Juiciness – its importance and some contributing factors

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4.1 Introduction

Meat juiciness is an important contributor to eating quality and also plays a key role in meat texture (Szczesniak, 1963; Jowitt, 1974; Dransfield et al., 1984a; Hutchings and Lillford, 1988), contributing between 10% and 40% to its variability. Unlike other key aspects of texture, juiciness remains a uniquely subjective property. The relationship between ‘subjective’ juiciness of meat and any objective measurement remains elusive and poorly understood (Hamm, 1960).

The problems related to the measurement of meat juiciness and the complexity of interpreting sensory data collected by a myriad of methods from a wide variety of meat sources are discussed in this chapter. The discussion leads to a summary of the impact of animal characteristics, post-mortem development of rigor mortis, meat processing, handling and storage on meat juiciness. The authors believe this to be the first comprehensive review of meat juiciness, and it particularly focuses on red meat, pork and poultry. The exclusion of fish juiciness in this chapter is not an oversight but rather a recognition that factors impacting upon fish juiciness do not appear to overlap significantly with red meat, pork and poultry factors. As such, fish should merit a chapter in its own right.

4.2 Subjective assessment of juiciness

The only reliable and consistent measure of juiciness is achieved using sensory methods. Early researchers suggested that meat juiciness could be separated into two components. The first is the impression of wetness during the first few chews, produced by the rapid release of meat fluids, while the second is one of sustained juiciness, apparently due to the stimulating effect of fat on salivary flow and the coating of fat on the tongue, teeth and other parts of the mouth (Gaddis et al., 1950; Weir, 1960; Dikeman, 1987). Therefore, early sensory research tended to assess juiciness using a two-component assessment (initial wetness and sustained juiciness). With the advent of sophisticated multicomponent evaluation and multivariate analysis of sensory attributes, it is now established that
initial wetness and overall juiciness can be combined into one factor (Harries et al., 1972; Dransfield et al., 1984a). Modern sensory techniques, therefore, usually measure juiciness as a single attribute.

Despite modifications in sensory methods and a better understanding of mastication, meat juiciness is still considered to arise from two sources: (i) moisture released by meat during chewing, and (ii) moisture from saliva (Harries and MacFie, 1976; Harris, 1976; Horsfield & Taylor, 1976; Howard, 1976; Gullet et al., 1984). Thus, ‘juiciness’ is influenced not only by meat-related factors, but also by physiological factors inherent within individual tasters.

The complex sensory experiences that occur during texture and juiciness testing, from both a perceptual perspective (i.e. what a panelist perceives as juiciness) and a physical perspective (i.e. applied forces, deformation rates, viscosity in the mouth) have been reviewed by Christensen (1984). The review clearly shows that good correlations between complex sensory attributes (such as juiciness) and objective measurements using either raw or cooked meat will be fortuitous unless the masticatory experience is taken into account. Attempts to model juiciness have found it to be highly complex. One of the best models is a three-dimensional one, involving the effect of ‘time’ in the mouth on the ‘degree of structure’ and the ‘degree of lubrication’. All these variables are needed to allow the model the greatest flexibility as shown in Figure 4.1 (Hutchings and Lillford, 1988). This is a

![Figure 4.1 The mouth process model with special emphasis on juiciness of foods. (Reprinted from Hutchings and Lillford (1988), with permission of the Food and Nutrition Press Inc. USA) 1, Tender juicy steak; 2, tough dry meat; 3, dry sponge cake; 4, oyster; 5 liquids.](image-url)