Sensory and texture properties of Italian typical dry-cured hams as related to maturation time and salt content

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ABSTRACT

Maturing time and salt were fixed factors and fat was a covariate in a full factorial design study of sensory and texture properties of 36 dry cured hams. Samples were chosen to fit three ageing and salt classes. Differences (P<0.05) in sensory scores were found between whole slices (with cover fat) and their biceps femoris (BF) counterparts, with sweet taste enhanced in whole samples and conversely unpleasant bitter taste more intense in BF portions. Increased ageing time resulted in better sensory profiles, as documented by greater scores (P<0.05) for matured odour, matured taste and sweet taste, whereas salty taste was reduced. Decreased salt was associated with greater intensities (P<0.05) of undesired green odour and taste. Based on chemical composition, the ham consistency appears improved by long-term dehydration, provided that protein breakdown is under control. It is concluded that for salt reduction of up to 25% to be achieved without negative side effects, extended ageing and restrained proteolysis are key factors.

1. Introduction

Today’s concerns over dietary sodium intake encourage governments’ initiatives toward less salty foods. In several countries recommendations to industry have been made and rules set up for manufacturers willing to address ‘low salt’ or ‘reduced salt’ claims on their labels. A typical requirement for the ‘reduced salt’ statement is that the products be reformulated to contain at least 25% less salt compared with their regular counterparts (EC, 2006; FDA, 2008; Post et al., 2007). Accordingly, a new range of ‘reduced salt’ foods is becoming available to the health-conscious consumer, with the market share of healthy foods projected to steadily grow over the next decade (Desmond, 2006; Doyle & Glass, 2010; Ruusunen & Puolanne, 2005; Toldrá & Barat, 2009). However, while in many foods limiting added salt is just a matter of taste, there are a variety of products, such as traditional dry cured meats, where salt plays a pivotal role in controlling major chemical and microbial processes. In many such cases, salt acts as an essential hurdle against pathogens (Taormina, 2010) and those spoilage organisms to which major bacterial defects have been ascribed (Rastelli, Giraffa, Carminati, Parolari, & Barbuti, 2005).

As a means to reduce salt in dried meats without impacting water activity hence microbial safety, potassium chloride has been proposed as a salt replacer (Aliño, Grau, Toldrá, & Barat, 2010), but its use is limited by the bitter or astringent aftertastes it can impart to the product.

Moreover, potassium as well as calcium or magnesium salts are not allowed in the broad class of typical PDO items like Italian traditional hams, where sea salt can be used as one mandatory ingredient (Italian Republic, 1990a,b). With these meat categories, sodium reduction can only be attained by limiting salt to such an extent that sensory and texture qualities are not adversely affected. Undesired downsides may include: 1 — poor texture, as result of diminished fibre swelling (Desmond, 2006); 2 — poor flavour, delivered by the excessive amounts of bitter peptides released when proteolytic enzymes are not adequately restrained by sodium chloride, the major enzyme inhibitor (Virgili, Parolari, Schizazappa, Soresi Bordini, & Borri, 1995); 3 — poor cohesiveness hence sliceability, also related to proteolysis-induced abnormal softness (García-Garrido, Quiés-Zafría, Tapiañor, & Luque de Castro, 1999; Ruiz-Ramirez, Arnau, Serra, & Gou, 2005); and 4 — poor aroma, of which salt is an enhancer (Buscailhon, Touraille, Girard, & Monin, 1995; Ventanas, Mustonen, Puolanne, & Tuorila, 2010). Moreover, in nitrate-free dry cured hams salt has been shown to activate muscle enzymes enabling the synthesis of the stable red pigment zinc-protoporphyrin (Benedini, Raja, & Parolari, 2005), and it can be used as one mandatory ingredient (Italian Republic, 1990a,b). Therefore a reduction in salt content might pose major problems also in terms of colour formation and stability.

To counteract the undesired effects of salt reduction, the potential of processing technology and raw meat properties has been postulated. Studies demonstrate that protracting the ripening phase (also called maturation or ageing) yields better aroma and taste properties in dry-cured hams and strengthens muscle firmness (Cilla, Martínez, Beltrán, & Roncalés, 2005; Ruiz, Ventanas, Cava, Timón, & García, 1998; Soresi Bordini, Virgili, Degni, Gabba, & Schizazappa, 2004). Also, moisture reduction by dehydration has been described to be