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Effect of sex, electrical stimulation and conditioning time on carcass and meat characteristics of Romanov lambs

Abstract

Forty-eight purebred Romanov lambs (21 males and 27 females) were slaughtered at 46 kg liveweight of which half were subjected to low voltage electrical stimulation (ES) while the other half served as controls. The left leg from each carcass was frozen at -20°C after a conditioning period of either 6 or 48 hours at 4°C . Significant sex effects were observed in fat thickness over the 12th rib, percent dissectible fat in the 12th rib, and kidney and pelvic fat, with females being higher in fat than the males ($P < 0.05$). Males had higher percent of shoulder and lower percent of loin than the females. Low voltage ES significantly ($P < 0.05$) lowered the 30-min and 4-h pH measurements by 0.2 units. Total collagen was higher in meat from males than from females ($P < 0.05$) but soluble collagen did not differ across the sexes. Females had 100% more free cathepsin D activity than males. Low voltage ES decreased total cathepsin D activity in the males only ($P < 0.05$). Thaw loss was greater in the 6-hour chilled males ($P < 0.05$) however, weight and drip losses during cooking were less than for 48-h chill treatment. No significant main effects were found on the sensory characteristics. Free moisture and Warner Bratzler shear force results indicated no main effects ($P > 0.05$).

Keywords: electrical stimulation,
Lamb carcass,
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evaluation,
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Introduction

The Romanov breed of sheep is renowned for its superior prolificacy (Desvignes 1971; Ricordeau *et al.* 1978). However, little is known about carcass characteristics and meat quality of this breed and, to the authors' knowledge, no report has dealt yet with chemical and sensory evaluation of the meat.

Freezing lamb meat for long-term preservation has its advantages. It enables stabilization of markets, exportation and transportation. However, freezing prerigor muscle is known to produce tough and dry meat upon thawing as a result of cold shortening and thaw contracture (Marsh *et al.* 1968). Electrical stimulation (ES) of lamb carcasses was found to induce rigor mortis faster by accelerating the pH decline of the meat, thus reducing the holding time required before freezing to no more than 6 h. This technique is used extensively in New Zealand to reduce the detrimental effects of cold shortening on meat tenderness, associated with rapid chilling or freezing (Chrystall & Devine 1985). In addition to these considerations the tenderising effect of ES has also been attributed to an increase in proteolysis of the myofibrillar proteins by cathepsins (Dutson *et al.* 1980). However, recent evidence suggests that neutral proteases play an important role in meat tenderisation by destroying the Z-discs (Koochmar-*ai* *et al.* 1988).

The objectives of the present study were to compare carcass and meat characteristics of male and female Romanov lambs, to test the New Zealand scheme of low