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PRESLAUGHTER AND SLAUGHTER FACTORS AFFECTING  
MEAT QUALITY IN LAMBS

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ABSTRACT

A plug sampling technique based on a modified muscle biopsy instrument, was developed for the measurement of muscle pH without mutilation of the carcass. It was found possible to routinely obtain muscle tissue samples weighing approximately 2 g and when these were incubated for 24 hours under liquid paraffin at room temperature, followed by homogenisation in a 'Colworth Stomacher', the pH of the solution was found to be an accurate measurement of the ultimate pH of the muscle.

Both the sample method and a direct probe method were found to be well suited for measuring the ultimate pH of muscles. However, the sample method had a higher degree of precision as compared to the probe method when used for measuring pre-rigor pH values.

In a longitudinal survey, in which 1536 lamb carcasses were examined, 85.2% of carcasses were found to have ultimate pH values below 5.80. Highly significant associations were found between season (summer period) and breed (Perendales) and unsatisfactorily high values of ultimate pH. There was also a highly significant direct correlation between the duration of holding periods of lambs and the ultimate pH of meat, whereas there was a highly significant inverse correlation between wool score and ultimate pH. It was concluded that nutrition plays an important role in the development of high ultimate pH values.

Studies at the meat works indicated that there is a highly significant linear relationship between the number of times lambs are washed prior to slaughter and the ultimate pH of the longissimus muscle. Subsequent resting of animals for varying periods prior to slaughter has no apparent effect on repletion of glycogen stores and may, in some cases, exacerbate

the problem of high pH meat. It was also found that washing of lambs is associated with a highly significant increase in bruising of carcasses and that such washing may not necessarily result in a decrease in carcass contamination.

Investigations of the changes of body weights and the weights and nature of ruminoreticular contents during the preslaughter holding period indicated that the ideal time to slaughter lambs, in terms of potential carcass contamination, is 18 to 24 hours after removal from pasture.

It was found that stunning by a 'head-to-leg' electrical method significantly increased the rate of pH decline compared to other methods of slaughter. A further increase in the rate of pH decline was achieved by low voltage stimulation at the time of slaughter. It was concluded that the combined effects of low voltage and high voltage stimulation can cause irreversible contraction and associated toughness in a large proportion of carcasses.

Studies of the occurrence of haemorrhages in carcasses and organs indicated that these defects are related to the method of stunning. Although blood splash has been reported to be associated with prolonged one stage prothrombin times in lambs, no statistical association was found between this parameter and speckling.

It was found that there is a two to threefold increase in arterial pressure following 'head-only' stunning whereas there was only a moderate increase in venous pressure. On the other hand, stunning by the 'head-to-back' method was followed by a decrease in arterial pressure, but venous pressure increased to levels above 50 mm Hg. Electromyographic studies indicated that there is a significant increase in the intensity of muscular activity following 'head-to-back' stunning as compared to 'head-only' stunning and that there is a correlation between the increased muscular activity and the increase in venous pressure. It is concluded that these events may lead to pressure changes in the microcirculatory bed which are likely to be associated with the occurrence of haemorrhagic defects following stunning by electrical methods.

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