

THE PRODUCTION AND MICROBIAL QUALITY OF SKIN-ON SHEEP CARCASSES

A.V. Fisher^{*1}, C.A. Wilkin¹, G. Purnell² and M. Howell³

¹ Division of Farm Animal Science, School of Veterinary Science, University of Bristol, Langford, Somerset BS40 5DU, UK. ² Food Refrigeration and Process Engineering Research Centre, Faculty of Engineering, University of Bristol, Langford, Somerset, BS40 5DU, UK. ³ Meat Hygiene and Veterinary Division, Food Standards Agency, Aviation House, 125 Kingsway, London WC2B 6NH, UK. Email: alan.fisher@bristol.ac.uk

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Introduction

In some regions of the world, such as parts of West Africa, it is common practice to place a carcass of a food animal directly on, or over, a fire to burn off the hair and singe the skin. In addition to removing unwanted hair, this burning imparts a smoked flavour to the meat and browns the surface, these being regarded as desirable changes. Demand for these skin-on, singed products by several ethnic groups resident in the United Kingdom is evident and may well occur in other developed countries. However, current EU legislation requires the skinning of ruminant carcasses and this conflict between demand and legality has resulted in a black market for these products, produced primarily from sheep. There are concerns that the illegally produced carcasses may pose a risk to human health for a variety of reasons and an approved procedure for the production of skin-on sheep carcasses that had acceptable microbiological status would be beneficial to the sheep industry and would be welcomed by specific consumer groups. The fleece or skin is a primary vehicle for the introduction of contamination to the slaughterhouse (Koochmarai *et al.*, 2005) but there is little information on the number of microorganisms remaining on the skin of a sheep carcass after singeing. This study aimed to devise a sequence of procedures (protocol) which resulted in the best carcass microbiological quality and which achieved a desired product, evaluated using assessors with prior experience of skin-on meat.

Materials and Methods

The animals used were purebred and crossbred Shetland ewes, from one farm. Coat colour ranged from all white through white/grey to black. The sheep were shorn within a week of slaughter so that the wool length was approximately 5 mm. They were conventionally stunned electrically and slaughtered. The hind feet were removed at the tarsus prior to further processing.

In order to achieve consistent singeing, purpose-built, automated equipment was constructed. This consisted of eight inwardly directed gas burners attached to a supporting microswitch-controlled octagonal ring that was chain driven and moved up and down around a suspended carcass. A hood was built above the rig to collect rising heat and fumes and was connected to a large displacement extractor fan using flexible ducting. Preliminary trials showed that a satisfactory carcass finish was achieved by three complete cycles of burner ring travel followed by removal of charred wool from the carcass surface with a pressure washer and water at a nominal 50°C. This was followed by evisceration and, after completion of all dressing and inspection procedures, the carcass was returned to the singeing rig for a final single pass of the burners ('toasting'). These steps and their sequence were based on microbial skin counts and defined the protocol used to produce the skin-on carcasses. The microbiology of ten carcasses produced according to this protocol was compared with that of ten carcasses produced conventionally (skin removed) in the same abattoir on the same day. Skin samples from the rump, belly, flank, brisket, shoulder and neck, excised from the singed carcasses, were matched by samples of superficial tissues excised from the conventional carcasses and *Enterobacteriaceae* and APC counts (CFU/cm²) were made on both sets after culturing using standard EN/ISO methods.

Five Nigerian and two Ghanaian male postgraduate students, with previous handling and eating experiences of skin-on, smoked products, assessed the appearance of three skin-on carcasses from sheep with white, white/grey and brown fleeces, produced according to the standard protocol. They also assessed the aroma of boiled, skin-on meat. For each assessment, acceptability was scored using eight-point category scale ranging from extremely acceptable to extremely unacceptable and for carcass appearance there was an additional two-choice question: was it typical/atypical?

Results and Discussion

The conventional carcasses had APC counts consistently above two Logs, values being similar to those reported by Zweifel and Stephan (2003), but for skin-on carcasses all counts were less than one Log (Figure 1). Of the 60 counts (site x animal), 35 were below the detectable level on the skin-on carcasses compared with 5 on the conventionally dressed carcasses. Likewise, the conventional carcasses had higher *Enterobacteriaceae* numbers on all sites sampled, with a minimum site mean value of 0.44 Log (rump) compared with a maximum of 0.14 Log for the skin-on carcasses (neck site). The belly and brisket sites were the most heavily contaminated by *Enterobacteriaceae* in the conventionally dressed carcasses, a finding in agreement with Zweifel and Stephan (2003), but corresponding counts on the skin-on carcasses were not at detectable levels (Figure 2). In total there were 58 of the possible 60 counts of *Enterobacteriaceae* below detectable levels in the skin-on carcasses compared with 34 of 60 in the conventionally dressed carcasses.

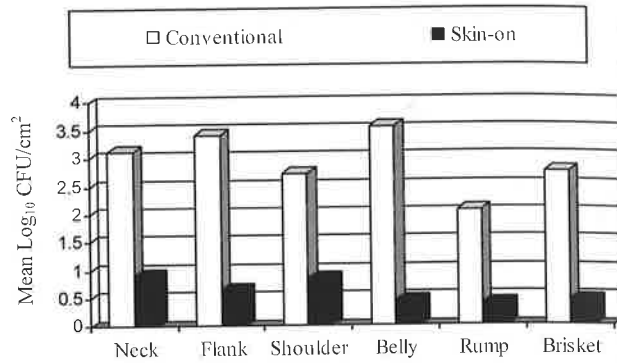


Figure 1: Comparison of APCC counts between conventionally dressed and skin-on carcasses produced according to the standard protocol on six sites on the carcass, immediately after preparation.

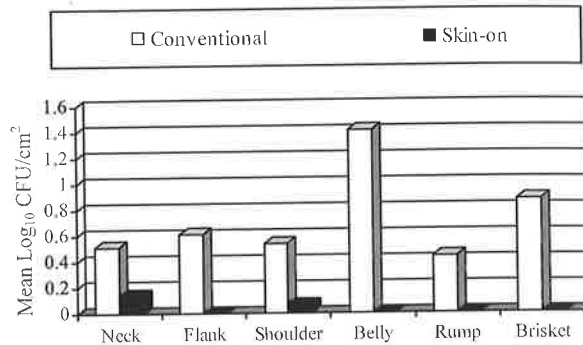


Figure 2: Comparison of *Enterobacteriaceae* counts between conventionally dressed and skin-on carcasses produced according to the standard protocol on six sites on the carcass, immediately after preparation.

The carcass from the white sheep was unanimously considered to be typical of smoked, skin-on product (hair-free with a good overall colour). Three assessors rated that carcass as being extremely acceptable and four as very acceptable. For the other two carcasses, six and four of the responses indicated a carcass in the acceptable half of the range and, overall, the production protocol adopted resulted in a desirable product. Similarly, the aroma of the meat from the carcass of the white sheep was judged to be extremely acceptable by three assessors and very acceptable by the other four.

Conclusions

Skin-on sheep carcasses can be produced, using singeing, washing and toasting interventions, to have a lower microbial loading than conventionally dressed carcasses and to meet consumer requirements. White fleeced sheep provide the visually most acceptable carcass.

References

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