

## Preparation of Clean Livestock for Slaughter: Effect of Crutching Practices on the Microbiological Quality of Lamb Carcasses

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### Background

The Sheepmeat Council of Australia specifies removal of concretions of faeces and mud in wool (dags) and stipulates requirements for shearing sheep in the hind area (crutching) for different animals with different wool lengths in its guidelines (Anon). These recommendations have not been correlated with the microbiological status of the carcasses. Conflicting reports exist as to the microbiological impact shearing sheep has on the resultant carcasses from these animals. Biss and Hathaway (1995) and Vipond *et al* (1992) demonstrated that shearing sheep produced carcasses with the lowest microbiological contamination compared to unshorn animals. Roberts (1980) however, found that crutching did not lower the bacterial numbers on sheep carcasses.

### Objectives

The purpose of this study was to evaluate the effects of different crutching techniques on the microbial quality of sheep carcasses.

### Methods

Three trials were conducted on sheep held outdoors during the southern Australian winter-spring period.

#### Winter trial 1

Two hundred and forty 6 month old second cross lambs (sired by Poll Dorset out of first cross ewes, Border Leicester x Merino) of liveweight 20-32kg were allocated to 3 wool length groups; 0-5mm, 25-50mm and 50-75mm. Lambs from each wool length group were allocated to one of four crutching groups; no crutching or cleaning, keyhole crutch (wool removed from perianal area), traditional crutch (wool removed from perianal area, the inside hind legs and over the tail) and traditional crutch plus legs, top knot and belly (traditional crutch with wool removed from the belly, front legs and the face). Lambs were crutched 24 hours before transport. Animals were taken off food 12 hours prior to transportation to the abattoir 350km away. Lambs were penned overnight with water then slaughtered at an export abattoir using inverted dressing, processing 10 lambs per minute.

#### Spring trial

One hundred 11 week old lambs (breeding as above) were allocated to one of five crutching groups (the four mentioned above and shearing to obtain a wool length of 0-5mm). Lambs were crutched 24 hours before transport. Animals were taken off food 12 hours prior to transportation to the abattoir 380km away. Lambs were penned overnight with water then slaughtered at a domestic abattoir using inverted dressing, processing 6 lambs per minute.

#### Winter trial 2

One hundred 11 month old lambs (breeding as above) were allocated to one of five crutching groups described for the spring trial. Lambs were crutched 24 hours before transport. Animals were taken off food 12 hours prior to transportation to the abattoir 180km away. Lambs were penned overnight with water then slaughtered at a domestic abattoir using inverted dressing, processing 8 lambs per minute.

#### Samples

Three site composite sponge samples were collected from one side of each carcass at least 4 hours post-slaughter. The sites selected were the mid-loin, flank and brisket to meet the US Department of Agriculture sampling regimes (USDA 1996b). Each site was 5x5cm, so that one sample consisted of 3x25cm<sup>2</sup> sites. Samples were transported to the laboratory within 12 hours of collection and stored below 4°C. Samples were tested for *E. coli* and coliforms using Petrifilm™ count plates and total plate counts (AS 1766.1.3, 1991).

### Results and discussion

There was no significant difference in log<sub>10</sub> plate count or *E. coli* counts between any of the wool treatment groups or crutching treatments studied in the first winter trial (table 1). There was no significant difference in log<sub>10</sub> coliform counts between any of the wool and/or crutching treatments (with outliers excluded) (table 1).

Table 1: Effect of treatment on total plate count, coliform and *E. coli* counts (results excluding outliers) – Winter trial 1

Treatment Groups		cfu per cm <sup>2</sup> (Log <sub>10</sub> )		
Wool Length	Crutch	Total Plate Count	Coliform	<i>E. coli</i>
0 to 5 mm (0 – ¼ inch)	Non crutch	3.79 (3.79)	-2.38 <sup>a</sup> (-2.38)	-1.83 (-2.59)
	Keyhole	4.09 (3.63)	-0.33 <sup>b</sup> (-1.31)	-1.67 (-1.67)
	Traditional	4.13 (4.13)	-1.45 <sup>abc</sup> (-1.45)	-1.52 (-1.52)
	Traditional & belly	3.60 (3.60)	-1.61 <sup>abc</sup> (-1.61)	-1.90 (-1.90)
25 to 50 mm (1 – 2 inch)	Non crutch	4.68 (4.24)	0.09 <sup>bc</sup> (-1.59)	-0.91 (-1.74)
	Keyhole	4.07 (4.07)	-2.26 <sup>a</sup> (-2.26)	-1.71 (-2.50)
	Traditional	3.65 (3.65)	-2.60 <sup>a</sup> (-2.60)	-2.98 (-2.98)
	Traditional & belly	3.88 (3.88)	-2.14 <sup>a</sup> (-2.14)	-2.11 (-2.11)
50 to 75 mm (2 – 3 inch)	Non crutch	3.77 (3.77)	-1.56 <sup>abc</sup> (-1.56)	-1.60 (-1.60)
	Keyhole	3.88 (3.88)	-2.83 <sup>a</sup> (-2.83)	-3.01 (-3.01)
	Traditional	3.89 (3.89)	-1.94 <sup>a</sup> (-1.94)	-1.97 (-1.97)
	Traditional & belly	4.20 (3.69)	-1.92 <sup>a</sup> (-1.92)	-2.10 (-2.10)

Within each column the values followed by different letters are significantly different (p<0.05)

The spring trial showed there was no significant difference in the log<sub>10</sub> total plate counts between treatment groups (figure 1). Coliform counts were significantly higher in shorn sheep compared to non crutched and "traditional crutch plus" (p<0.05), and in traditionally crutched lambs compared to non crutched lambs. *E. coli* counts from shorn lambs and traditionally crutched lambs were significantly higher (p<0.05) than non crutched and "traditional crutch plus".

There were no significant differences in the total plate count, coliform counts or *E. coli* counts between the treatment groups in the second winter trial (figure 2).

Figure 1: Microbiological analysis of spring sheep trial

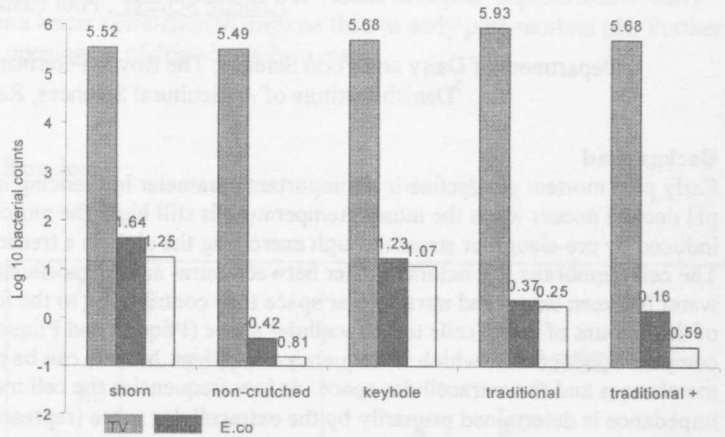
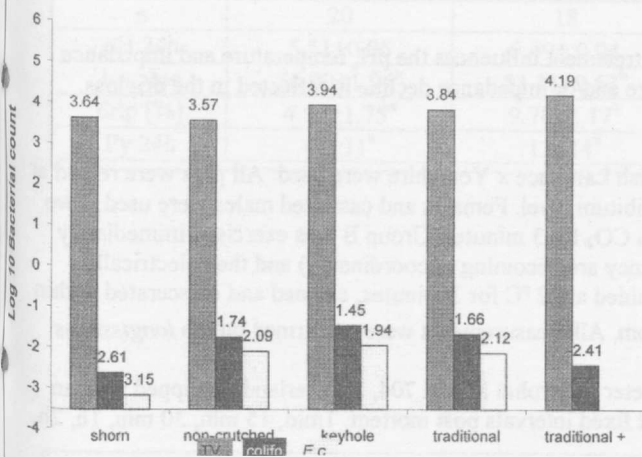


Figure 2: Microbiological analysis of winter trial 2



- All carcasses in the three trials had microbial levels well within the USDA (1996a) microbiological requirements.
- There were no significant differences in microbial loading observed due to wool length.
- There were no significant differences in Total Plate Counts observed between crutching treatments.
- There were no significant differences in *E. coli* or Coliform counts due to crutching practices in abattoirs that have inverted dressing systems.

**Conclusions/Recommendations**

- Under normal circumstances no crutching method appears to influence the microbiological quality of the carcass. Keyhole crutching is the recommended crutching method as this method maximises the returns for the lambskins.
- In a standard dressing system shorn lambskins (0 to 5mm wool length) tend to curl back on the carcass, allowing the wool side of the skin to touch the carcass, increasing the risk of microbial contamination of the carcass.
- The time between when the animals leave the farm and are slaughtered (time in transport, holding for sale and in lairage) should be minimised to reduce stress on the animals, thereby reducing microbial shedding and decreasing the risk of faecal contamination of the carcass.
- It is recommended that lambs should be emptied out (denied access to food but not water) for a minimum of six hours prior to transportation, should be transported in clean dry transport and should be dry prior to slaughter.

**References**

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