Results for today; Ideas for tomorrow

Meat Technology Update

Newsletter 01/6 December 2001

Sheep and lamb dressing

Dressing systems have progressed from cradle dressing to on-rail manual systems to on-rail semi-automated or manually assisted systems. Modern on-rail inverted dressing appears to produce carcases that are visually and microbiologically cleaner than carcases from conventional dressing systems. Inverted dressing systems are also more efficient in high throughput abattoirs and provide OH&S benefits. Disadvantages of some inverted dressing systems are that they may cause more urine spillage and a greater spread of spilled urine on a carcase, they may produce carcases with reduced visual quality because of blood spotting and they can damage pelts and cause grain strain. A new style of skin puller, used mostly with carcases dressed in the conventional position uses a slow pulling action which may reduce some of disadvantages of fast action skin pullers.

Hygienic sheep and lamb dressing involves preventing contamination from scoury sheep, urine spillage and wool roll-in. In addition, dressed carcases must have acceptable visual appearance, the dressing process must be efficient and economical and OH&S risk must be minimised. No dressing system delivers the perfect solution to all these problems.

The November 2000 review of Australian processing and inspection procedures by officers of USDA's Food Safety and Inspection Service identified urine leakage as a problem, particularly when sheep and goats are dressed using inverted dressing systems. The August 2001 USDA audit closely examined measures in place to prevent leakage. In May 2001, Agriculture, Fisheries and Forestry – Australia (AFFA) distributed AQIS Notice Meat 2001/04, 'Zero tolerance for faeces, ingesta, urine and milk'. AQIS has required zero tolerance for these carcase contaminants since 1994; Meat Notice 2001/04 was issued to restate and reinforce the requirements.

Fresh urine and milk is not necessarily sterile. There may be sub-clinical infections of both the udder and lower urinary tract, including the bladder, with potential food poisoning organisms e.g. *E. coli* in the lower urinary tract and *Bacillus cereus* in the udder.

Where there has been urine contamination, AQIS requires the affected areas to be extensively trimmed. Urine is difficult to identify on the processing chain and the extent of contamination cannot be easily determined. The extent of the trimming required by AQIS varies with the type of dressing system but generally is most extensive when inverted systems are used for smallstock.

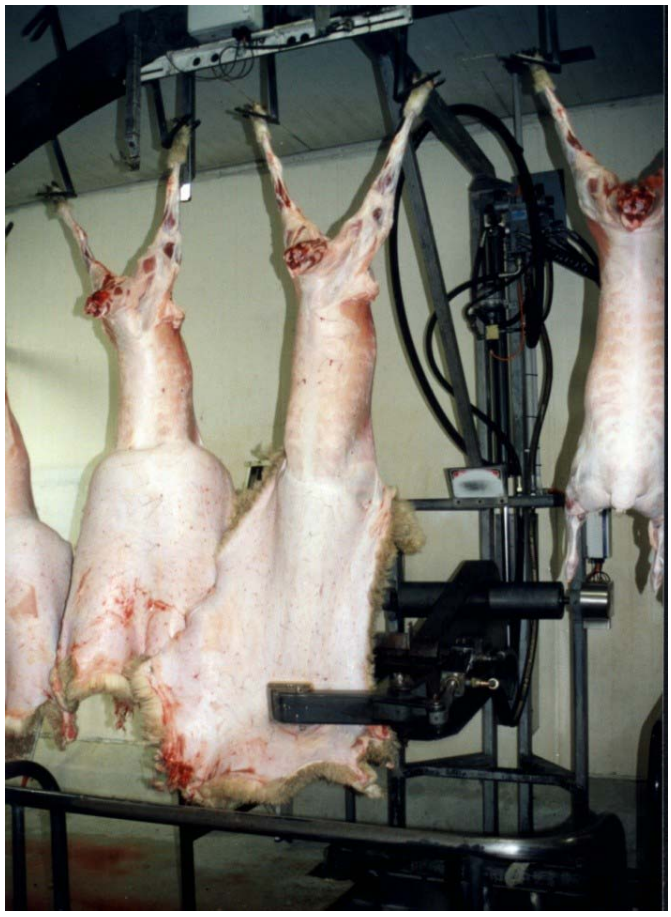

Figure 1. Typical skin puller used with inverted dressing systems.

Inevitably, as companies review and revalidate their procedures there has been renewed focus on ways to prevent leakage and other types of contamination. These reviews should include critical consideration of the principles of the dressing systems.

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Dressing techniques

Traditionally, smallstock were dressed with the carcase lying on its back in a cradle. This technique is suitable for small slaughterhouses where one operator completes the dressing but larger abattoirs have for many years used more efficient and controllable methods of continuous on-rail processing. In the first of the rail dressing techniques, carcases are suspended from the hind legs throughout the dressing operation. This technique is known as *conventional* dressing.

During the 1970s an alternate technique was developed in New Zealand. Using this technique the carcase is bled in the hind-feet-up position, as for the conventional procedure. It is then inverted and suspended from the forefeet for pelt removal. Finally the carcase is reverted to the hind-feet-up position for evisceration and subsequent dressing procedures. This procedure is known as *inverted* dressing.

Pelt pulling has been more successfully mechanised for inverted dressing systems than for conventional systems. However there are pelt-pulling designs for both conventional and inverted dressing systems. A slow-moving mechanical system of pelt pulling has recently been developed that is suitable for conventional dressing systems. It allows operators the control and time to intervene if damage or contamination appears likely.

The pelt-removal and evisceration steps of dressing can both lead to hygiene and carcase-finish problems unless care is taken. This Update attempts to identify the advantages and disadvantages of different on-rail dressing systems under Australian conditions. It considers the procedures in terms of:

- Hygiene;
- carcase finish;
- occupation health and safety (OH&S);
- cost effectiveness; and
- opportunities for mechanisation.

Pelt removal

The risk of microbial contamination during pelt removal is higher than during evisceration. For the purpose of comparing alternative procedures, the pelt removal operation can be considered in two stages:

- 'Workup', where a knife is used to remove the pelt from the extremities and to open the pelt from the belly to the crutch; and
- 'Pelt pulling' where the pelt is pulled away from the body of the carcase using manual or mechanical power.

Whenever a knife is passed through the pelt there is a risk of transferring contamination from the fleece to the underlying tissue. Provided that spear cuts are made during pelt opening, this contamination occurs primarily from the wool falling or rolling back into the incision rather than from the creation of the incision itself.

To some extent, the risk of contamination from the fleece is proportional to the extent of carcase opening.

During conventional dressing, a considerable amount of workup is carried out on the hindquarter to open the pelt down the front of the legs and flay it entirely from the legs and over the chump. Workup is also required on the belly and flanks and this workup can result in wool roll-in and knife scoring of the pelt.

For inverted dressing, the majority of the pelt workup is carried out on the forequarter to allow the weasand to be secured and as preparation for pelt pulling. No preparation is needed on the hindquarter. The overall lesser amount of workup required for inverted dressing reduces the risk of contamination during this stage. Traditionally the hindquarters of carcases have been of greater value than the forequarters. The prospect of being able to limit workup almost entirely to the forequarters was one of the underlying drivers for the development and implementation of the inverted system.

Stronger markets for forequarter products, or products utilising the whole carcase, have now increased the importance of forequarter quality. It has also been recognised that while there is a risk of contaminating the hindquarter in conventional dressing, the problem of wool roll-in on forequarters during inverted dressing is almost impossible to control with carcases that carry more than the very shortest wool.

Pelt pulling

While a number of steps in the inverted dressing process have been mechanised, the most common and most effective is pelt removal. Several puller designs have been used, all relying on a rapid pull to remove the pelt from the carcase in the few seconds available at the pulling station on the dressing line. The most common of these pullers uses a hydraulic arm with a set of gripping jaws that secure the pelt. The arm moves rapidly downward in an arc, removing the pelt to the floor level. This puller is shown in Figure 1.

A recently developed system of pelt pulling offers a slow-moving mechanical alternative to both manual pulling and fast mechanical pulling. This system allows the operator more control and time to intervene if damage or contamination appears likely. This system is shown in Figure 2.

The system has been developed for conventional dressing but has also been used with inverted dressing systems.

Carcase hygiene

Pelt removal has been repeatedly identified as a major risk for microbiological contamination because of the large load of microorganisms on the fleece. In conventional dressing, with carcases suspended from the hind legs, any faecal material or dust falling from the wool during the workup and early part of pulling is likely to land on the exposed surfaces of the carcase.

Logic suggests that the removal of a pelt from the 'clean' head end to the 'dirty' tail end would favour inverted dressing as a cleaner operation than the conventional approach.

Data from the AQIS ESAM program indicate that the microbiological quality of carcases from inverted dressing may be slightly better than that from conventional dressing. This is indicated by a slightly lower incidence of *E. coli* detections on the dressed carcases. However there is insufficient data for statistical analysis to confirm the difference in microbiological quality as there are few export plants using conventional dressing techniques. Also, it must be remembered that of the sites sampled in the ESAM program for sheep, lambs, and goats–flank, brisket, and mid-loin–only the brisket would reflect forequarter contamination.

Data from New Zealand and Italy indicate that total counts from carcases dressed using the inverted dressing technique were 0.5 to 1.0 log cfu/cm^2 lower than conventionally dressed carcases, which were in turn lower than cradle-dressed carcases. Some preliminary data available for the slow-pull mechanical puller indicate levels of microbiological contamination similar to those for manually pulled, conventionally dressed carcases.

There is a view that proficient slaughtermen can more easily prevent faecal or wool contamination on the hindquarter during conventional legging than on a forequarter during Y-cutting of inverted carcases. This is supported by studies that have shown that for conventionally dressed carcases there is little difference in hind-quarter contamination between shorn and woolly sheep but significantly higher counts on the forequarters of inverted dressed carcases from woolly sheep.

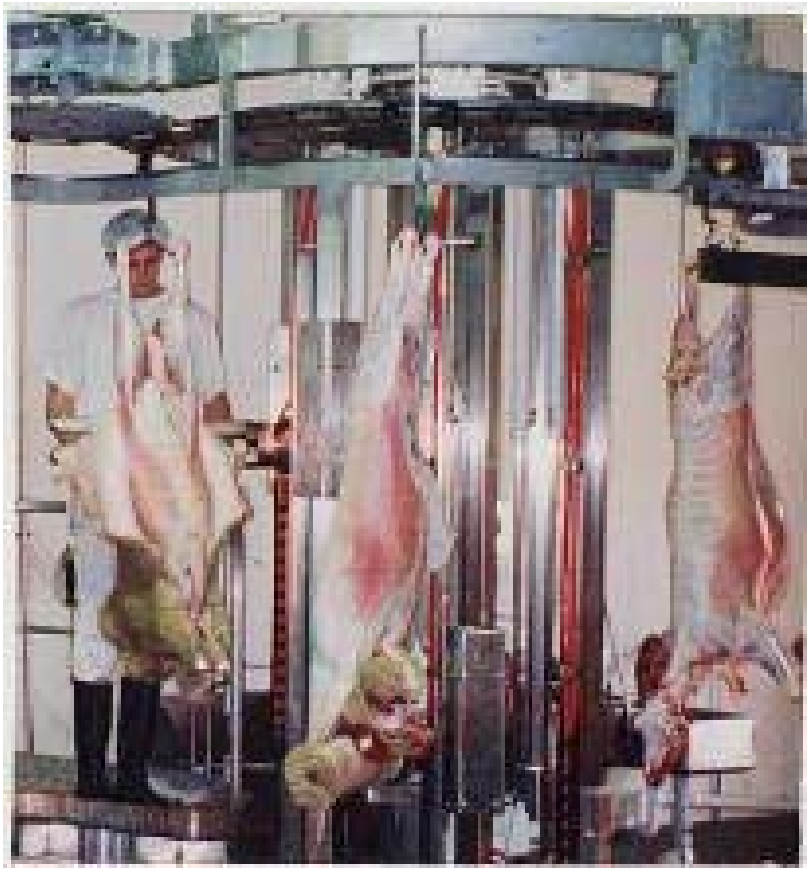

Figure 2. Slow action puller.

Carcase visual quality

Mechanical pelt pullers, of the type used during inverted dressing, are less able than manual pulling to accommodate the variations that occur in carcase size, shape and condition. As a result it is not uncommon for damage to occur to both the pelt and the carcase during final pelt removal.

Pelt removal using a slow-action pull may improve the visual quality of the carcase. For example, the selvage on the forelegs of carcases dressed with the slow-pull type of puller is left intact.

Inverted dressing has the additional problem of blood spotting that can occur when surface capillaries are broken due to the development of increased blood pressure as the pelt is peeled down over the hind quarters. This is particularly a problem as the pull exerted increases over the rump of the carcase. Efficient bleeding and adequate workup can reduce its incidence but it cannot be avoided completely.

Blood spotting has not been identified as a problem with conventionally dressed carcases either with, or without, mechanical assistance. In trials, inverted dressing seems to create less visible blood spotting when a slow-pull pelt puller is used although the capillaries remain more pronounced than with conventionally dressed carcases.

Processors supplying markets that require high standards of visual quality can better maintain the required visual standard using conventional dressing with a manual or slow-moving mechanical pull.

Pelt quality

Pelt values vary significantly from season to season depending on the international markets for wool and leather. When pelts are of high value, pelt prices can be significantly affected by the presence and the extent of grain strain. When pelts are of low value, variations in quality are of lower economic importance.

The incidence and extent of grain strain is directly related to the method of pelt removal and the care taken in handling the pelt prior to, and during, dressing. High-speed pelt pullers are known to produce a high incidence of grain strain. Manual pelting can produce lower levels of grain strain but care must be taken in manual handling to minimise grain strain. Low-speed pelt pullers have been shown to produce consistently lower levels of grain strain.

To achieve increased value for pelts, all pelts from a processor must consistently be free of grain strain. Inconsistent levels in grain strain will depress the value of the 'clean' pelts as well as the damaged ones, as they are valued as a lot. The consistent minimisation of grain strain in mechanically pulled pelts using a slow-pulling machine can result in an increase in pelt market value of as much as 20%.

Labour costs

When inverted dressing was first developed in New Zealand, part of the incentive for its introduction was the potential for reduction in manning levels on the dressing chain. Indications at that time were that manning on an inverted system could be reduced by 2 to 3 operators for a 21-man team when compared with a conventional system of similar capacity. However the use of inverted technology as developed in New Zealand did not translate well to Australian conditions and the same savings in manning were not obtained.

Since the initial development, hygiene standards and production techniques have changed significantly and manning levels are now generally similar for both inverted and conventional dressing systems.

Costs related to OH&S issues

Costs related to occupational health and safety, reflected either in Workcover premiums, in loss of productivity, or in direct payments to workers who have suffered injury, are high in the meat-processing industry. The implementation of mechanical aids to dressing has significantly reduced the incidence and cost of repetitive strain injuries on the slaughter floor.

On smallstock slaughter floors, the use of mechanical pelt-pulling systems has made a significant contribution to improved OH&S. Because mechanical assistance has only been available with inverted systems, inverted dressing systems have shown significantly lower OH&S-related costs than conventional dressing systems.

Balancing the performance parameters

When assessing the overall merit of the different dressing systems, it is important to determine the relative importance of each of the performance parameters to the market being serviced. In some instances there will be a conflict between the requirements of several different markets serviced by the one plant. For example a carcase market, such as the domestic retail market, demands high visual quality with an acceptable level of carcase hygiene. It may be necessary to sacrifice some production efficiencies to achieve a high-quality dressing standard. An export 'cuts' market can often accept a lesser standard of visual quality and optimise productivity.

While one market may favour the use of one system, another market may favour the use of another. Abattoirs that supply to markets with different needs must balance the importance of each market as well as the systems' abilities to achieve market requirements.

Further information

'Sheep dressing hygiene guidelines'. MLA technical report and video. 1996

Further information on dressing systems, carcase hygiene and grain strain is available from Food Science Australia's Meat Industry Services contacts.

For more information, contact one of the Meat Industry Services staff listed below.

Food Science Australia Meat Industry Services Section

The Meat Industry Services (MIS) Section of Food Science Australia is an initiative supported by Meat and Livestock Australia (MLA) and the Australian Meat Processor Corporation (AMPC) to facilitate market access for, and support world-class practices in, Australia 's meat industry.

Need additional information help, information or advice?

Contact any of the following:

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