

Spray Application, Deluge or Immersion Application of Interventions

Meat carcasses are difficult to decontaminate by reason of their shape and structure. Most treatments require physical contact with the carcass surface, and an even coverage of the surface. Carcasses are a very irregular shape, so there is the possibility that one part of the carcass will be over-exposed to the treatment, while another part may be unaffected by the treatment. Crevices and folds in the surface are areas where contamination will collect, and also these areas are often poorly draining, and pools of the treatment solution may collect, adversely affecting the visual appearance of that part of the carcass. Treatments which require a direct beam of energy, such as ultraviolet light may not access areas where the beam is blocked by a protruding part of the carcass, leaving an area of meat surface effectively in the shadow. Application methods for food safety treatments must be well designed to overcome such issues.

Spray application

Spray washing is the most common method of application of a food safety solution. However, the angle of application of the spray and the pressure at which the solution is delivered, have a significant effect on the outcome of the treatment, and automated spray cabinets differ substantially in number and positioning of the nozzles. Thus, spray cabinets are not all the same, but neither are the carcasses that pass through them. It is important to choose a cabinet designed to suit the stock handled through the plant.

Manual spray washing systems are impractical under commercial conditions because of speed, and the cost of hot water is excessive (Sheridan, 1982), and its efficacy will be directly related to the skill and motivation of its operator. Therefore, the research results will always be better than those from commercial premises (Bailey and Roberts, 1976).

Optimising spray performance involves proper spray nozzle selection (i.e., flow rate, spray pattern, particle size and speed), preventative maintenance, spray analysis (i.e., nozzle positioning and spacing), and automated spray control. Automated carcass washing systems have been available for a number of years, with water flow rates of 220-270 litres per minute (Powell and Cain, 1987; Graham *et al.*, 1978; Graham, 1979), while in the 1980s a combined washer and sanitiser unit, called the Carcass Acquired Pathogen Elimination/Reduction (CAPER) System was developed, delivering water at up to 378 litres per minute in the wash section, and a sanitising solution at up to 189 litres per minute in the sanitiser unit (Anderson *et al.*, 1987).

Wash units are manufactured based on USA designs by CHAD Equipment, LLC.

Deluge

Deluge systems, where the carcass passes through a waterfall of the treatment solution, may be more effective than spray systems. However, it is important to realise that the lower surfaces of the carcass, such as the clod and stick area may be shielded from the treatment by the carcass above. A deluge system may be more cost-effective than a spray system (Davey and Smith 1989), using 40 litres of water per carcass. It is possible to recirculate the water. Many modern wash cabinets use multiple spray nozzles to deliver a similar effect to a deluge system, with the advantage that sprays can be directed towards the lower 'protected' parts of the carcass. Deluge systems can be produced to order.

Immersion

Immersion treatments are suitable for smaller items, such as cuts of meat or poultry carcasses. They are often used to decontaminate the outer surface of meat packages prior to opening for further processing.

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