FILTH ON ANIMALS AND CARCASSES AND CARCASSES AND THE MICROBIOLOGICAL CONDITION OF MEAT

Colin O. Gill
Agriculture and Agri-Food Canada
Lacombe Research Centre
Lacombe, Alberta

Introduction

A fundamental assumption underlying current meat inspection practices is that enteric pathogens found on meat are derived from fecal matter that is deposited on the carcass during the carcass dressing processes.

It is well established that most of the bacteria on skinned carcasses are deposited on the meat during skinning operations. Therefore, it is generally believed that meat will be microbiologically safe if the transfer of filth from hides to carcasses is minimized, spillage of gut contents is largely avoided, and any visible filth that does find its way onto the carcass is removed by washing, vacuum cleaning or trimming. Consequently, meat inspectors and packing plant staff expend much effort on activities aimed at ensuring that no speck of filth can be discerned on carcasses that leave the dressing floor. It might be expected that such substantial efforts are justified by extensive evidence for commensurate reductions of risks from enteric pathogens. In fact, given the emphasis that is placed on carcass cleanliness by regulating authority, there has been surprisingly little investigation of the matter. Despite that it is possible to draw firm conclusions about some practices from the limited number of relevant studies that have been published.

Animal cleanliness and carcass contamination

As most filth on carcasses originates from the hide, it could be expected that animal and carcass cleanliness would be related. Various studies with cattle and sheep have examined that relationship. Newly skinned carcasses from sheep with long, dirty fleece were found to be contaminated with more filth and wool than carcasses from animals with clean, shorn fleeces. In several studies in which sheep were washed before slaughter, which is the usual commercial practice in Australasia, the skinned carcasses were found to be cleaner than the carcasses from animals that were not washed, although carcasses from both washed and unwashed stock were similarly contaminated with wool. When beef carcasses were subjected to a dehairing treatment before they were skinned, the skinned carcasses were contaminated with less filth and hair than were carcasses not subjected to dehairing before skinning. Thus, the available reports all indicate that clean animals give clean carcasses.

The relationship between the cleanliness of animals and the

microbiological condition of carcasses is another matter. It has been reported that “excessively dungy” Finnish cattle, which are slaughtered separately from and with greater care than is usual with cleaner stock, gave carcasses with more bacteria contamination than carcasses from animals that were processed routinely. Also, carcasses from spring lambs, which were clean and apparently reared indoors, were reported to be less contaminated with bacteria than carcasses from older, dirtier animals reared outdoors. However, other studies with cattle have found no relationship between the states of animals’ hides and the microbiological conditions of carcasses, while various cleaning treatments applied to animals before slaughter, as well as dehairing of carcasses before skinning were found to be without effect on the microbiological condition of skinned carcasses.

With sheep, shearing of animals with long wool was found to give some improvement of the microbiological condition of carcasses; but shearing of the crotches of sheep, which are often matted with faecal matter, did not result in reduced microbiological contamination of carcasses. Washing sheep also did not improve the microbiological condition of carcasses. Instead, if fleeces were wet when carcasses were skinned, the numbers of bacteria on carcasses from washed animals were greater than the numbers on carcasses from animals that were not washed.

There is then little doubt that cleaning of cattle or sheep before slaughter, or hides before skinning will do nothing to improve the microbiological condition of carcasses and may make the microbiological condition worse even though visible contamination might be reduced.

As for pig carcasses, most are processed with the skin on. The sequential treatments of scalding, dehairing, singeing, and polishing give carcasses that are visibly clean, and bacteria on the skin are mostly destroyed by the scalding treatment. However, carcasses may be contaminated with bacteria during the dehairing and polishing operations, while singeing may or may not be effective for destroying bacteria on dehaired carcasses. Thus, with pigs, the cleanliness of the animal and the polished carcass are unrelated to the microbiological condition of the uneviscerated carcass.

Visible and microbiological contamination of carcasses

For beef carcasses it has been reported that scores for visible contamination of specified sites were only weakly correlated with the numbers of bacteria from such sites. Also, it was found that most visibly contaminated sites on beef carcasses that were detained because of that contamination carried bacteria at numbers that are usual and acceptable for beef carcasses.

In agreement with the findings for cattle of little relationship between visible and microbiological contamination of carcasses, in a study of two sheep carcass dressing processes it was found that the process that gave the cleaner carcasses also gave carcasses with more microbial contamination. In contrast, numbers of bacteria at sites contaminated with faecal matter or wool were found to carry substantially more

bacteria than corresponding sites with no visible contamination on the same sheep carcasses. Also, a strong correlation between the incidence of visible contamination of pig carcasses by gut spillage and the microbiological contamination of carcasses has been reported.

The findings from these several studies are obviously inconsistent, probably in part because microbiological contamination was variously determined for visibly contaminated sites or for specified sites irrespective of their appearances, while visible contamination was assessed for individual sites, for sites of the same type on groups of carcasses, or for entire carcasses alone or as groups. Even so, it is apparent that sometimes visibly clean carcasses may carry large numbers of bacteria, while bacteria may be few at some visibly contaminated sites. However, for any carcass dressing process, the adoption of practices that tend to reduce the transfer of filth from hides to meat or gut spillage will usually also tend to reduce bacterial contamination which will often be unaccompanied by visible filth.

Removal of filth from carcasses

Treatments applied to dressed carcasses for the removal of filth are whole carcasses washing, vacuum cleaning with or without the application of hot water and/or steam from the vacuum head, and trimming. All have been shown to be effective for removing experimentally added filth and bacteria associated with it. When washing is applied to carcasses that are heavily contaminated with bacteria, the numbers of bacteria are usually reduced by a modest amount, probably because particles of filth and associated bacteria are washed from the carcass. However, when numbers of bacteria on carcasses are relatively low, washing is wholly ineffective for removing bacteria, probably because washing does not remove bacteria which are associated with the meat surface.

When sites are cleaned by vacuuming or tissue bearing filth is cut away, the numbers of bacteria at the treated sites are reduced. However, the treated areas are usually small, and sites with no visible contamination may carry similar or larger numbers of bacteria. Consequently, the effects of cleaning and trimming operations on the microbiological condition of the population of carcasses emerging from a dressing process are so trivial as to be undetectable. Thus, those treatments probably do little if anything to improve the microbiological condition of meat.

Conclusions

In many countries, a policy of “zero tolerance of faecal contamination” of carcasses has been adopted by meat inspection agencies. That amounts in practice to intolerance of any visible contamination on carcasses, because of the difficulty of distinguishing between specks of different materials. The presence of filth on meat is, of course, undesirable; and no one would suggest that meat should not be free of filth before it is dispatched from a packing plant. However, no useful purpose is served by the current assumption that raw meat is rendered microbiologically safe if carcasses are freed of visible contamination. Instead, the emphasis on visible contamination has lead to the expenditure of unwarranted effort of the removal of trivial quantities of filth; the

adoption of practices, such as washing of animals, which can adversely affect the microbiological condition of meat; and diversion of resources away from the implementation of packing plant practices that can improve the microbiological safety of meat. Therefore, a more balanced approach than that currently adopted for controlling visible contamination on meat carcasses would be desirable.

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