Assessment of processing hygiene along two pork slaughter lines in Norway

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Background

In commercial pig abattoirs, the slaughter lines are similar, though routines and local adaptations vary. Regulatory testing for process hygiene criteria is useful for monitoring hygiene, especially through trend analysis, but does not provide knowledge on the cause of potential problems.

Aim

The aim was to assess the process hygiene along two pork slaughter lines in Norway, and compare and discuss potential differences in the bacterial load. In addition, the effect of sample points on the carcass was assessed along the slaughter line.

Materials and methods

Samples were collected from six points (Figure 1) along two slaughter lines, A and B, in two separate abattoirs using sterile gauze cloths moistened with peptone water. At each sample point, two external and two internal sites on the carcass were swabbed (Figure 2). A total of 90 pooled samples from 270 carcasses were collected from each slaughter line. All samples were quantitatively assessed for the process hygiene criteria Enterobacteriaceae and E. coli using 3M™ Petrifilm™.

Results

The mean of both hygiene indicators was significantly reduced from the start of the slaughter line to after chilling on both slaughter lines A and B (Figure 1). The degree of reduction varied between and along the two lines as a response to variation in slaughter techniques and management practices. For instance, both indicators were significantly reduced between prior to scalding and after scalding on line B, but not A ($P < 0.05$). Singeing caused a significant reduction in both indicators on both lines, while evisceration and removal of pluck caused a significant increase in E. coli on both lines ($P < 0.05$), while Enterobacteriaceae only increased on line A.

There was only a significant difference between the sampling sites on the carcass at a few points along the slaughter line (Figure 2). For Enterobacteriaceae, mean cfu/cm2 on the outside neck was significantly higher (P<0,05) than outside pelvis at sampling point after singeing. This was observed on both lines individually and when combined. At line B, significant difference (P<0,05) between outside neck and outside pelvis, and outside neck and inside chest at sample point after splitting was observed for Enterobacteriaceae, with outside neck being significantly higher in both instances. For E. coli, there was no significant difference in the combined results, however, on line A the mean cfu/cm2 on outside pelvis was significantly higher (P<0,05) than outside neck at sample point after scalding.

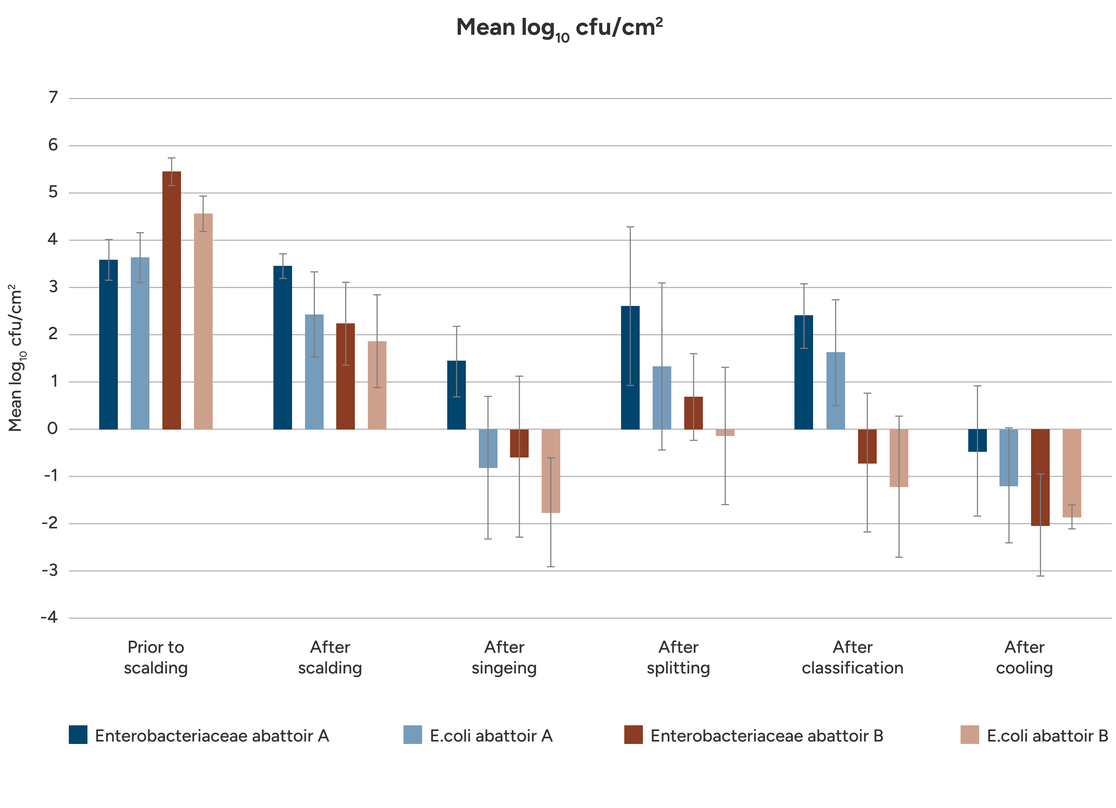

Figure 1: Enterobacteriaceae and E. coli mean log cfu/cm2 from abattoir A (blue) and abattoir B (red) at the six sampling points along the slaughter line. Error bars illustrate ± standard deviation (SD).

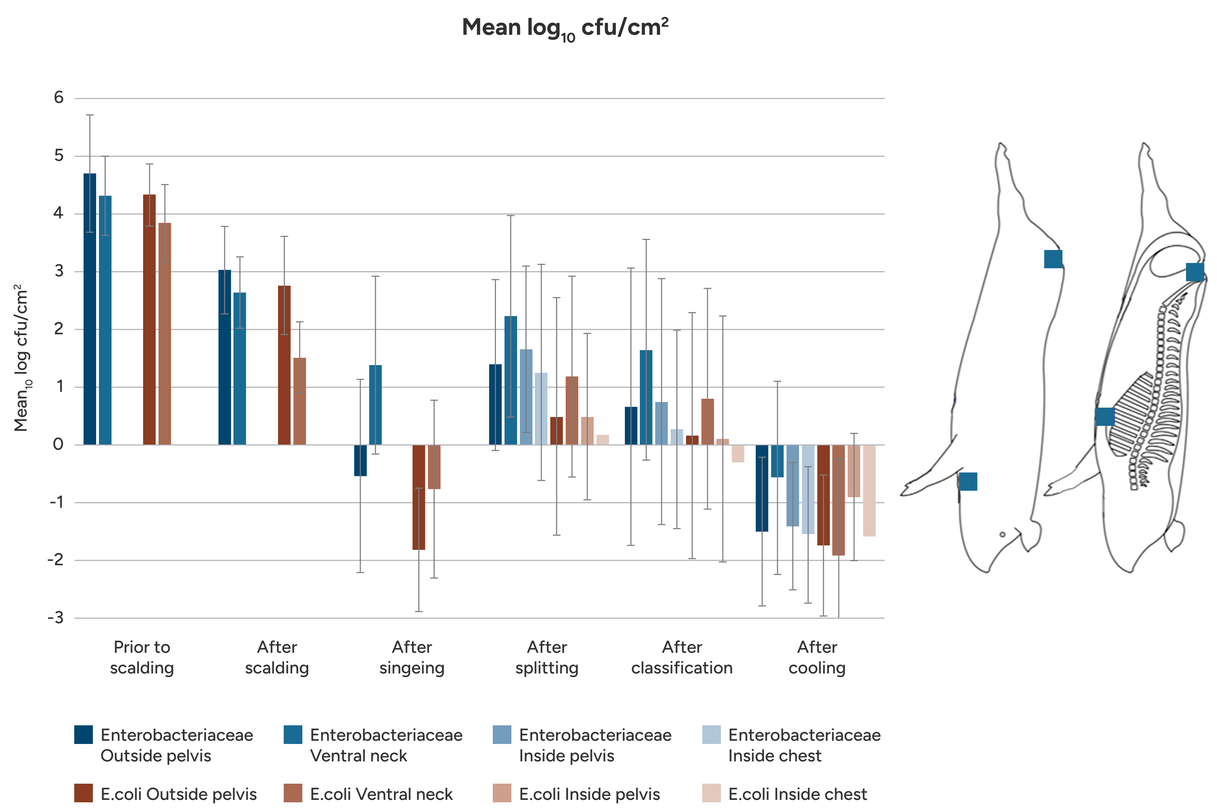

Figure 2: Enterobacteriaceae (blue) and E. coli (red) mean log cfu/cm2 at the different sampling sites on the carcass at the six sampling points along the slaughter line. Error bars illustrate ± standard deviation (SD).

Discussion and Conclusion

The levels of Enterobacteriaceae after classification/prior to chilling were acceptable in abattoir A and satisfactory in abattoir B according to Regulation (EC) No. 2073/2005. Both abattoirs were acceptable according to the Norwegian industry guidelines, which use E. coli after cooling as indicator. The effect of different slaughter operations varied between the two abattoirs. In both abattoirs, the stages singeing and cooling had the greatest reduction for both Enterobacteriaceae and E. coli. Choosing only external sampling sites on the carcass did not impact the results at the end of the slaughter line. This supports the sampling sites selected in the national industry guidelines.