SOME ASPECTS OF THE HACCP SYSTEM AT LARGE IBERIAN PIG-SLAUGHTERING PLANTS

RIVAS PALÁ, T. and VIZCAÍNO GONZALEZ, J.A.

Dpto. de Microbiología y Genética. Edf.Departamental. Lab.208. Universidad de Salamanca. Salamanca. (Spain).*

BACKGROUND AND AIMS

Iberian pig plays an important economic role in a few vast regions of Spain, with a higher market value for manufactured products than those of the rest of swine breeds.

From the world current experience, it can be drawn that, in general, development and practical application of the HACCP System for swine slaughterhouses is a complicated task (1). Generic HACCP Models for Pork Slaughter (non-Iberian pigs) have been published in the U.S.A. (2) but no generic HACCP models have been published in Spain either for Iberian or non-Iberian pigs.

Normally, Iberian swine are slaughtered at between 12 and 18 months, with a live weight of some 150 Kg. This fact and a variety of circunstances, ranging from merely technical through idiosyncratic, entail a slaughtering and dressing process with certain peculiarities —which becomes apparent at the HACCP implementation step.

In a previous study (RIVAS and VIZCAINO, unpublished data), we observed that in Iberian swine, anal closure and evisceration were "Critical Control Points" (CCPs), in both cases the "hazard" lying in contamination by pathogenic microorganisms of fecal origin. As preventive measures, in both cases the introduction of Good Manufacturing Practices (GMP) was proposed for these phases (anal closure and evisceration) and also a manual washing of the carcasses at the end of the processing line.

The aim of the present work was to determine the effectiveness of these two preventive measures.

METHODS

Slaughterhouse

All samples were obtained from an industrial slaughterhouse dealing with Iberian pig at a rate of 200 animals/hour.

In this slaughterhouse, anal closure is carried out with a pistol-like device that sets up a negative pressure. Evisceration is then performed following the usual procedures.

Microbiological analysis

Carcasses: Samples were taken from carcasses processed before implementing GMP for anal closure and evisceration and without washing (unwashed, non-GMP carcasses) (n=36), from carcasses with GMP for anal closure and evisceration but without washing (unwashed, GMP carcasses) (n=54) and from carcasses with GMP for anal closure and evisceration, and washing (washed, GMP carcasses) (n=35).

Sampling: Samples were taken from the surface of the neck (50 cm^2) and abdomen (50 cm^2) with a sterile template using the double swab technique (3). The four swabs were placed in a flask containing 40 mL of 0,1% peptone water.

Bacteriological examination: The following bacteriological criteria were assessed by the usual methods: (a) Aerobic plate count at 37°C (APC at 37°C); (b) *Enterobacteriaceae* count and *Escherichia coli* count (*E. coli* count).

Mathematical analysis of data: Bacterial counts were converted to log (CFU+1)/cm^2. The ANOVA and Kruskal-Wallis statisical tests were applied.

Visual examination

A visual examination of the "unwashed, non-GMP carcasses" (n=1530) and of the "unwashed, GMP carcasses" (n=1585) was made to check whether any visible fecal matter remained on their surface.

RESULTS AND DISCUSSION

Microbiological analysis

The results of the microbiological analyses are shown in Table I.

Visual examination

The percentage of carcasses with visible fecal remains was 5,3% in the case of the "unwashed non-GMP carcasses" and 1,4% in the "unwashed GMP carcasses".

CONCLUSIONS

1. When "Good Manufacturing Practices" (GMP) were implemented in the operations involving anal closure and evisceration, the amount of carcasses displaying visible fecal remains decreased dramatically.

2. Application of "Good Manufacturing Practices" in anal closure and evisceration did not decrease the microbial load of the carcasses with respect to APC at 37°C ($p=0.4872$) but did reduce *Enterobacteriaceae* count ($p<0.0001$) and *E. coli* count ($p<0.0001$). Accordingly, it may be inferred that GMP are useful as preventive measures in these critical points to decrease microbiological contamination of fecal origin on the surface of the carcasses.

3. Final washing of the carcasses decreases both contamination by APC at 37°C ($p=0.0003$) and contamination of fecal origin (*Enterobacteriaceae* count ($p=0.0459$) and *E. coli* count ($p=0.0312$)).

LITERATURE

1- Borch, E., Nesbakken, T. and Christensen, H., (1996). "Hazard identification in swine slaughter with respect to foodborne bacteria". International Journal of Food Microbiology, 30. pp. 9-25.

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Table 1. APC at 37°C, *Enterobacteriaceae*-count and *E. coli* -count in carcasses (mean± standard deviation).

	Unwashed, non-GMP carcasses (n=36)	Unwashed, GMP carcasses (n=54)	Washed, GMP carcasses (n=35)
APC at 37°C	3,91 ± 0,26 [a]	3,96 ± 0,32 [a]	3,66 ± 0,50 [b]
Enterobacteriaceae-count	1,26 ± 0,70 [a]	0,36 ± 0,44 [b]	0,20 ± 0,35 [c]
E. coli -count	1,27 ± 0,51 [a]	0,31 ± 0,44 [b]	0,15 ± 0,36 [c]

[a,b,c] Means within a row with different superscripts are significantly different.

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