

HYGIENIC CONDITIONS OF PIG CARCASSES IN SLAUGHTERHOUSES ACCORDING TO THE 2001/471/CEE DECISIONVergara A.¹, Losito P.¹, Giacomoni S.¹, Colavita G.², Ambrosone L.² and Ianieri A.¹¹Dip. di Strutture, Funzioni e Patologie Animali e Biotecnologie, Università di Teramo, 64100, Italy²Dip. di Scienze e Tecnologie Agro-Alimentari, Ambientali e Microbiologiche, Università del Molise, 86100 Campobasso, Italy**Key words:** pig carcasses, destructive method, wet swab sampling method**Background**

The future meat inspection system should take into account all relevant food safety hazards existing in the meat production chain. The Commission Decision 2001/471/CE of 8 June 2001 lays down rules for the regular checks on the general hygiene carried out by the operators in establishments on the basis of HACCP methodology principles, introducing compulsory testing and evaluation of the Total Viable Count (TVC) and *Enterobacteriaceae* on working surfaces and carcasses for all types of slaughter animals.

Objectives

The purpose of this study was to check the easy application of the Decision and to assess the hygienic performances of pig carcasses in high- and low-capacity slaughterhouses in the province of Teramo (Italy). The results are discussed in relation to the different sites of the carcasses tested and to the different sampling techniques performed.

Methods

This study was carried out on different-sized swine abattoirs. Samples were taken from four slaughterhouses (1 low-capacity + 3 high-capacity). We made two inspections in each abattoir at intervals of 30 days. Five carcasses were sampled during each inspection, according to the operating rules laid down by the Commission Decision 2001/471/CE. The destructive method and the wet swab sampling method were performed. The ham site was not tested with destructive method since in Italy the whole part is traditionally processed with salt. This kind of process is mainly carried out by Italian producers and typical brands on a national scale are "Prosciutto di Parma" and "San Daniele" reflecting the methods and procedures adopted even by local manufacturers.

The regression of the means obtained by the set of samples coming from each "region" were analysed with a linear least square procedure. Mathematical computations were performed on Matlab version 5.3 for PC, using the subroutine LSQUARE, whose mathematical details are reported in ref. (6).

In the light of the foregoing trials (7), the sampling by dry swabs was not performed because this procedure allowed an inferior microbial recovery to that by wet swab.

Results and discussion

The Commission Decision 2001/471/CE, reports daily log mean values for "acceptable" ($<10^4$ cfu/cm² for TVC and $<10^2$ cfu/cm² for *Enterobacteriaceae*), "marginal" and "unacceptable" ($>10^5$ cfu/cm² for TVC and $>10^3$ cfu/cm² for *Enterobacteriaceae*) results for bacterial performance criteria only for samples obtained with the destructive method. The levels of both TVC and *Enterobacteriaceae* were always included in "acceptable" results range. Data concerning *Enterobacteriaceae* could not be used for a statistical approach since in most samples the level of these bacteria was not detectable.

The data obtained with both sampling methods show that the ham and jowl sites had higher TVC values.

The histograms reported in Figs 1-2 and 4-5 and related to TVC values, illustrate the behaviour of the means as a function of the sampling site. Comparing Fig. 1 with 2, for low-capacity slaughterhouses and 4 with 5, for high-capacity slaughterhouses, one sees that the trend is qualitatively similar, independently of type of slaughterhouses. This indicates that the two methods used give an equivalent scientific information. The idea is better explained by the regression plots of Figs 3-6, where one may see that the correlation coefficient is very high. Furthermore this coefficient is practically the same for the high and low-capacity slaughterhouses.

During sampling, we ran into some operating difficulties; the number of samples on each carcass did not allow the regular flow of slaughter line; this is a real problem especially in slaughterhouses where the carcasses are dissected immediately. Destructive sampling on ham, moreover, causes a remarkable depreciation of the whole part traditionally used for salted ham production.

Conclusions

The 2001/471/CE Decision represents an important innovation in the field of meat inspection. For the first time procedures based on the principles of the HACCP system have to be designed, implemented and maintained in slaughterhouses, in order to obtain an objective and quantitative monitoring of hygiene. Monitoring is, in fact, considered a pre-requisite for a risk-based meat inspection.

The statistical treatment of data here presented shows a high correlation between the destructive method and the wet swab sampling method. This circumstance can be advantageously used to analyse carcasses uninvassively. The competent authority, however, should establish and approve the microbiological performance criteria in order to relate the wet swab sampling method to the destructive method.

Pertinent literature

1. Council Directive 64/433/EEC of 26 June 1964 on health problems affecting intra-Community trade in fresh meat (Official Journal L 21, 29/07/1964, p. 2012-2032).
2. Council Directive 91/497/EEC of 29 July 1991 amending and consolidating Directive 64/433/EEC on health problems affecting intra-Community trade in fresh meat to extend it to the production and marketing of fresh meat (Official Journal L 286, 24/09/1991, p. 0069-0104).
3. Council Directive 91/498/EEC of 29 July 1991 on the conditions for granting temporary and limited derogations from specific Community health rules on the production and marketing of fresh meat (Official Journal L 286, 24/09/1991, p. 0105-0106).
4. 2001/471/EC: Commission Decision of 8 June 2001 laying down rules for the regular checks on the general hygiene carried out by the operators in establishments according to Directive 64/433/EEC on the health conditions for the production and marketing of fresh meat and Directive 71/118/EEC on health problems affecting the production and placing on the market of fresh poultry meat (Official Journal L 165, 21/06/2001, p. 0048-0053).

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Low-capacity slaughterhouses

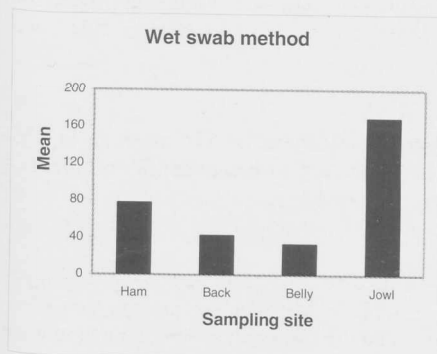


Fig.1 Mean distribution of TVC in pig carcasses using the wet swab sampling method

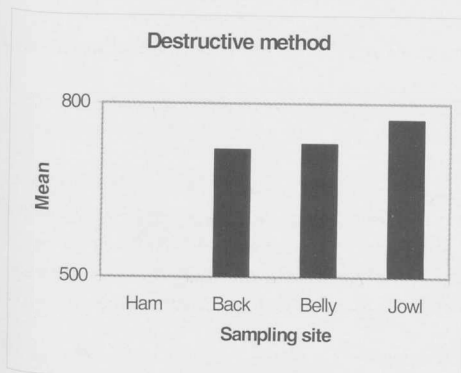


Fig.2 Mean distribution of TVC in pig carcasses using the destructive method

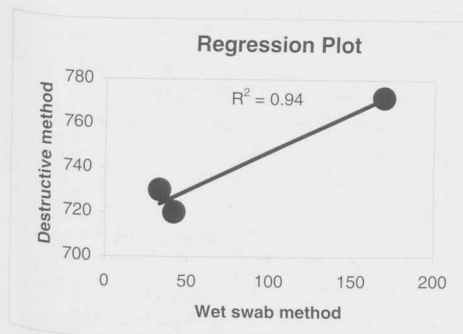


Fig.3 Plot for the regression of the two methods. The number in figure represents the correlation coefficient between the two methods

High-capacity slaughterhouses

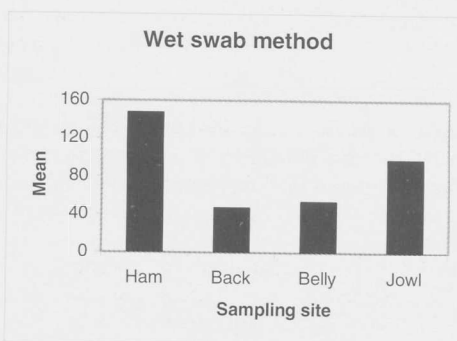


Fig.4 Mean distribution of TVC in pig carcasses using the wet swab sampling method

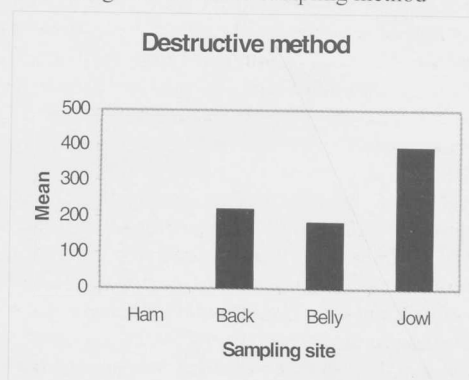


Fig.5 Mean distribution of TVC in pig carcasses using the destructive method

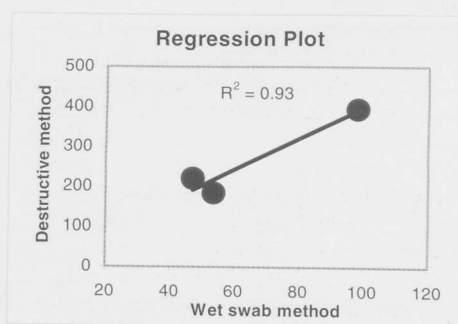


Fig. 6 Plot for the regression of two methods. The number in figure represents the correlation coefficient between the two methods