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PROCESS CONTROL ON THE SLAUGHTER LINE FOR REDUCING THE MICROBIAL LOAD ON THE SURFACE OF PIG CARCASSES

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Background:

Increased hygienic standards of fresh meat require strict compliance with process, operational and personal hygiene along the entire production chain in order to prevent the transmission of pathogens and extend the storage life of meat (distribution period). The microbial load on the surface of the carcass is an essential quality parameter. As an important element in hygiene monitoring it is influenced by the slaughtering technology applied (scalding, singeing, trimming etc.) and the work hygiene observed (evisceration, processing etc). Inspections at various stages of the slaughtering procedure have shown that the singeing of carcasses after dehairing results in a significant decrease in the microbial load on the carcass surface. The following processing steps (dehairing machine), however, cause the microbial load to rise considerably (KONERMANN et al., 1992; HESSE and TROEGER, 1991).

Objectives:

As a first step of the research programme "Process Control in Pork Production" the average microbial load of pig carcasses after slaughtering was assessed at ten Styrian slaughterhouses licensed for intra-Community trade (PLESS and KÖFER, 1997). Slaughterhouses, where carcasses strongly exceeded the microbiological guideline values, were supported in their effort to reduce the microbial load on the carcass surface. The following two examples show ways and means to improve the hygienic quality of pig carcasses.

Material and Methods:

In slaughterhouse **A** the following technical improvements were implemented at the existing plant: replacement and extension of the scalding tunnel; installation of an additional singeing unit in the dehairing machine (double, horizontal); renewal of the prewasher, dehairing machine, singeing furnace (vertical) and trimming machine. In slaughterhouse **B** the processing equipment remained more or less unchanged. The existing plant was subjected to intensive maintenance (replacement of singeing nozzles and supply lines, increase in energy supply and singeing duration). Other improvement measures included regular cleaning of the gambrelling table, installation of a shower unit prior to the trimming machine and introduction of a training programme for employees working on the slaughter line.

For the purpose of examination skin samples of 20 cm^2 were taken from the jowl, shoulder, belly and ham of 30 carcasses in each slaughterhouse. The samples were taken at regular intervals during the first half of the slaughtering procedure by means of a destructive process (DIN 10112). Subsequently, the total viable count of aerobic mesophiles (DIN 10161) and the content of Enterobacteriaceae (DIN 10164) were determined in the laboratory of the Department of Veterinary Administration. Four examination series were conducted in the period from winter 1997 to summer 1998.

Results:

The first two examination series in slaughterhouse **A** yielded a total viable count of aerobic mesophiles on the carcass surfaces of log 4.24 and log 4.26 CFU/cm^2, respectively. For the parameter Enterobacteriaceae the respective values amounted to log 2.04 and log 1.93 CFU/cm^2 (median value). After the completion of technical modifications and the implementation of a staff training programme two further examination series revealed a considerable decrease in both the total viable count and the content of Enterobacteriaceae (log 3.78 CFU/cm^2 and log 1.00 - 1,48 CFU/cm^2, Fig. 1 and 2).

Contrary to slaughterhouse A, the improvement measures in slaughterhouse **B** were taken step by step, after discussion of the examination results with the quality manager of the plant and the veterinarian in charge of meat inspection. In the course of four examination series the microbial load on the surface of the carcasses was reduced from log 4.69 CFU/cm^2 to log 3.76 CFU/cm^2 (Fig. 3). A significant improvement was also observed for the content of Enterobacteriaceae (Fig. 4).

Conclusions:

The assessment of slaughtering hygiene in ten Styrian slaughterhouses showed that more than half of the plants investigated did not comply with the high quality standards required. The lack of process hygiene is primarily the result of the constant increase of line speeds combined with insufficient adaptation of the technical equipment.

Based on the examination results most slaughterhouses decided to take measures to implement both structural and technical improvements and to raise the standard of operational and personal hygiene. The example of the two slaughterhouses described shows that the corrective measures resulted in a significant improvement of the hygienic condition of the carcasses. Especially in slaughterhouse **B** the targeted corrections and improvements of the slaughtering process led to a significant decrease in the microbial load on the carcass surface. In addition, intensive staff training has helped to significantly reduce contamination with Enterobacteriaceae in particular. Through the establishment of a uniform examination standard, the identification of weak points and the continuous collection of quality data (NEUMANN et al., 1997) slaughterhouses can be provided with an effective control tool for safeguarding the hygienic quality of pork.

Pertinant literature:

HESSE, S. and TROEGER, K. (1991): Mikrobiologischer Aspekt eines neuen Nachbearbeitungsverfahrens für Schweineschlachtkörper nach dem Abflammen. Proc. 32. Arbeitstagung der DVG, Arbeitsgebiet Lebensmittelhygiene, Garmisch-Partenkirchen, Germany pp. 119-127. KONERMANN H., NEUMANN, H.-H. and PREDOIU, J. (1992): Mikrobiologische Prozeßkontrolle im Schlacht- und Zerlegebetrieb im Rahmen der integrierten Qualitätssicherung (IOS) in Westfalen-Lippe. Proc. 33. Arbeitstagung der DVG, Arbeitsgebiet Lebensmittelhygiene, Garmisch-Partenkirchen, Germany pp. 57-67. NEUMANN, H-H., WILKE, D. and LEYK, W. (1997): Integriertes Qualitätsmanagement vom Erzeuger bis zum Handel. 2. Aufbau und Einrichtung eines produktionsbegleitenden Untersuchungs- und Beratungssystems zur Steuerung der Schlachthygiene in Westfalen-Lippe. Fleischwirtsch. 77, 991-993. PLESS, P. and KÖFER, J. (1997): Oberflächenkeimgehalte von Schweineschlachtkörpern - eine IST-Zustandserhebung in 10 stei-rischen Schlachtbetrieben. Proc. 38. Arbeitstagung der DVG, Arbeitsgebiet Lebensmittelhygiene, Garmisch-Partenkirchen, Germany pp. 531-536.

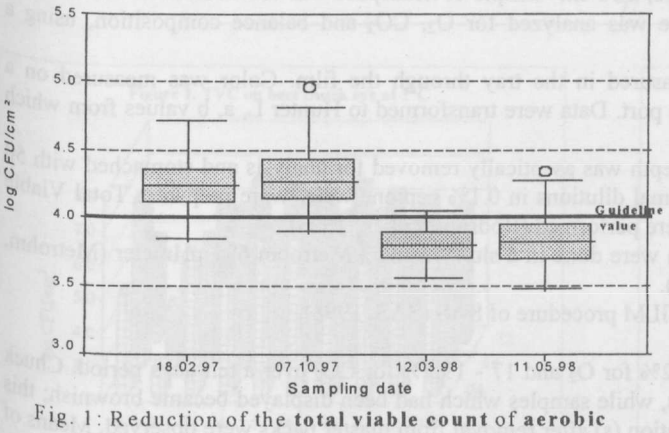

Fig. 1: Reduction of the **total viable count** of **aerobic mesophiles** on pig carcasses in **slaughter plant A**

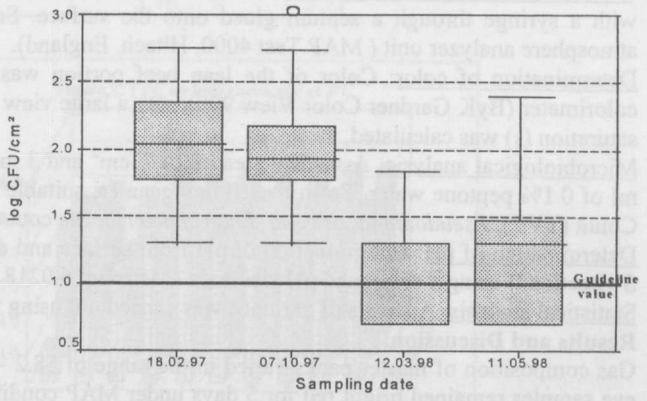

Fig. 2: Reduction of **Enterobacteriaceae** on pig carcasses in **slaughter plant A**

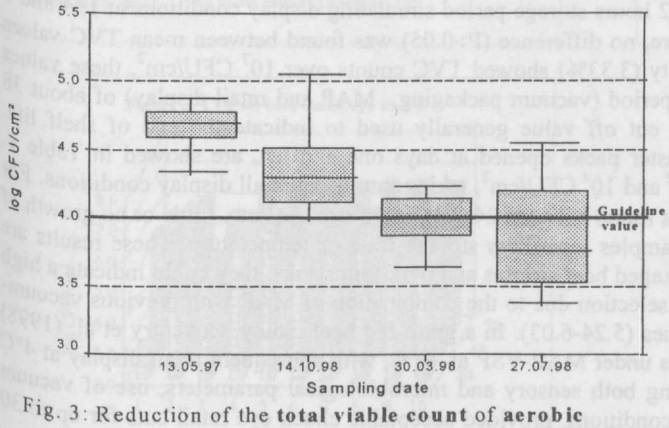

Fig. 3: Reduction of the **total viable count** of **aerobic mesophiles** on pig carcasses in **slaughter plant B**

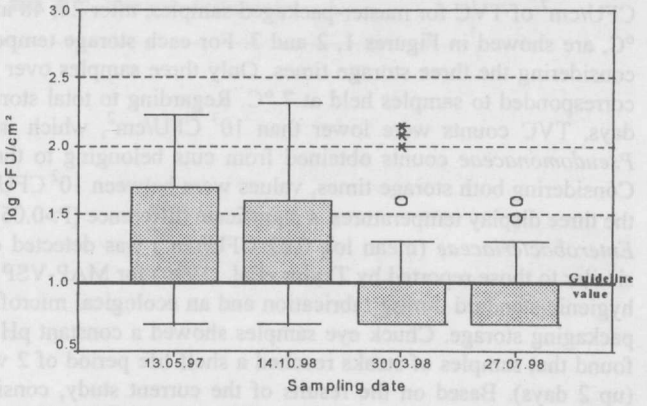

Fig. 4: Reduction of **Enterobacteriaceae** on pig carcasses in **slaughter plant B**