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DETECTION OF PSE HAMS BY pH_1 AND DIELECTRIC LOSS

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INTRODUCTION

In order to reduce quality defects in cured ham product PSE meat should be removed from raw material for cure, preferably before deboning of hams. Dielectric loss factor measured by MS Tester was proposed to detect PSE meat early post mortem in the intact carcass /1/. Dielectric loss tends to increase during post mortem storage of carcasses. Investigations were carried out to establish the most suitable post mortem time for detection of PSE loin and certain ham muscles/2, 3, 4, 5/.

In the present study the pH_1 and dielectric loss factor measured in m. semimembranosus at 3,5 and 22-24 hrs post mortem have been compared in detection of various degree of PSE ham.

MATERIALS and METHODS

In 5 commercial slaughterhouses 576 carcasses were investigated. pH_1 was measured in m. semimembranosus at 35-4o minutes post mortem. Dielectric loss factor /d/ was measured by MS-Tester /TESTRON, Vienna/ at 35-4o minutes, 3.5 hrs and 22-24 hrs post mortem. Both pH_1 and dielectric loss factor were measured in deep layer of muscle. At 22-24 hrs post mortem hams were removed from carcasses. Dielectric loss factor was measured immediately after removing the whole ham from the carcass.

Deboned hams were qualified visually at 24 hrs post mortem as extreme PSE /medium to very pale, soft, exudative area extending over the half part of m. semimembranosus-adductor/ and as moderate PSE /slight to moderate paleness and exudation in the deep layer of m. semimembranosus-adductor which appears as pale, exudativ spot or strip/.

DFD character was evaluated by ultimate pH of m. semimembranosus at 24 hrs post mortem: moderate DFD pH_{ult} 5.8-6.19, extreme DFD $pH_{ult} > 6.2$.

RESULTS and DISCUSSION

The frequency of PSE and DFD hams showed a great variation between populations. There is an obvious difference in frequency of PSE and DFD hams between A and E slaughterhouses due to different pre-slaughter conditions and slaughter technologies as well as to the genotype of pigs slaughtered. Genotype of population was generally unknown, except of A and E slaughterhouses- the former was a hybrid breed comprisig four breeds, the latter was a single crossbred of Large WhitexLandrace. Fig. 1. shows the frequency of PSE and DFD hams.

The effectiveness of pH_1 and dielectric loss factor in detection of PSE hams is shown in Fig. 2. The percentage of PSE hams, the percentage of hams above limit values / $pH_1 \leq 5.6$; $d_{3,5\ hrs} \geq 3.1$; $d_{22\text{-}24hrs} > 43$/ and percentage of misqualified hams are shown.

Dielectric loss factor did not detect well either moderate or extreme PSE hams when was measured at 35-4o minutes post mortem. Carcasses were available again for measurement at 3.5 hrs post mortem, when the intensive cooling periode finished. A limit of $d \geq 3.1$ for 3.5 hrs and $d > 43$ for 22-24 hrs post mortem were chosen for identification of PSE hams considering the most effective separation of PSE hams whithout large extent of overestimation.

PSE hams occurred in the whole population /n=576/ at 22,39% level including 8.85% of extreme PSE hams.

pH_1 was found to be less effective in detection of PSE ham as compared to dielectric loss factor measured at later post mortem periodes. Only 5o,98 % of extreme PSE hams was identified and the majority of moderately PSE hams

remained undetected when a limit of $pH_1 \leq 5,6$ was applied.

PSE character tended to develop not only in the case of low pH_1 /$pH_1 \leq 5,6$/, but also in muscles with very low ultimate pH /$pH_{ult} \leq 5,4$/ mainly which have pH_1 6.o-5.8 /Table 1./.

Table 1.: Te role of very low ultimate pH in development of PSE ham

	n	PSE /n/	PSE /%/
Low pH_1 /$pH_1 \leq 5.6$/	32	18	56.25
Very low ultimate pH /$pH_{ult} \leq 5.4$/	41	31	75.61
Higher pH_1 than 5.6 with very low ult. pH /$pH_1 > 5.6$, $pH_{ult} \leq 5.4$/	24	17	7o.83
Higher pH_1 than 5.6 but less than 6.o, very low pH_u /$6.o > pH_1 > 5.6$, $pH_{ult} \leq 5.4$/	16	14	87.5

/ 1. population slaughtered at the A slaughterhouse /n=98//

Higher limit than 5.6 would lead to large extent of overestimation, especially in population with high frequency of moderate DFD which has pH_1 6.o-5.8 and further reduction of pH does not take place /6/.

On the base of dielectric loss factor 7o.58% and 88.23% of extreme PSE hams were detected at 3.5 hrs and 22-24 hrs post mortem, respectively. Moderate PSE hams also were separated to a larger extent than those were with pH_1, especially at the late post mortem periode. This is partly due to the development of PSE as a consequence of very low ultimate pH. Obviously, MS-Tester seems to be more suitable for detection of this type of PSE.

Fig. 1. Occurrence of PSE and DFD hams at different slaughterhouses

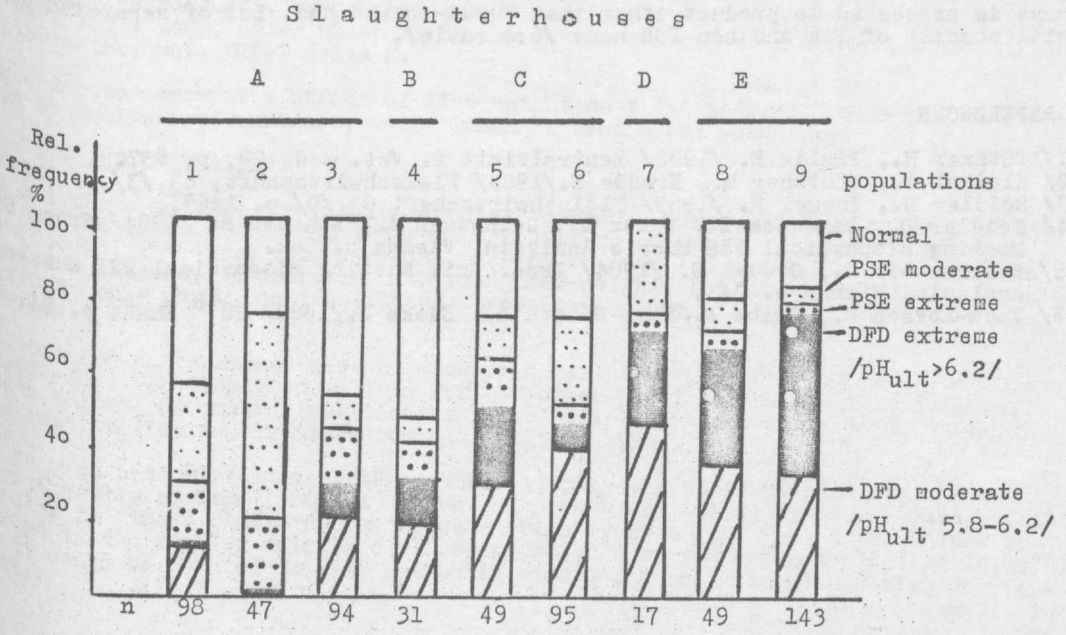
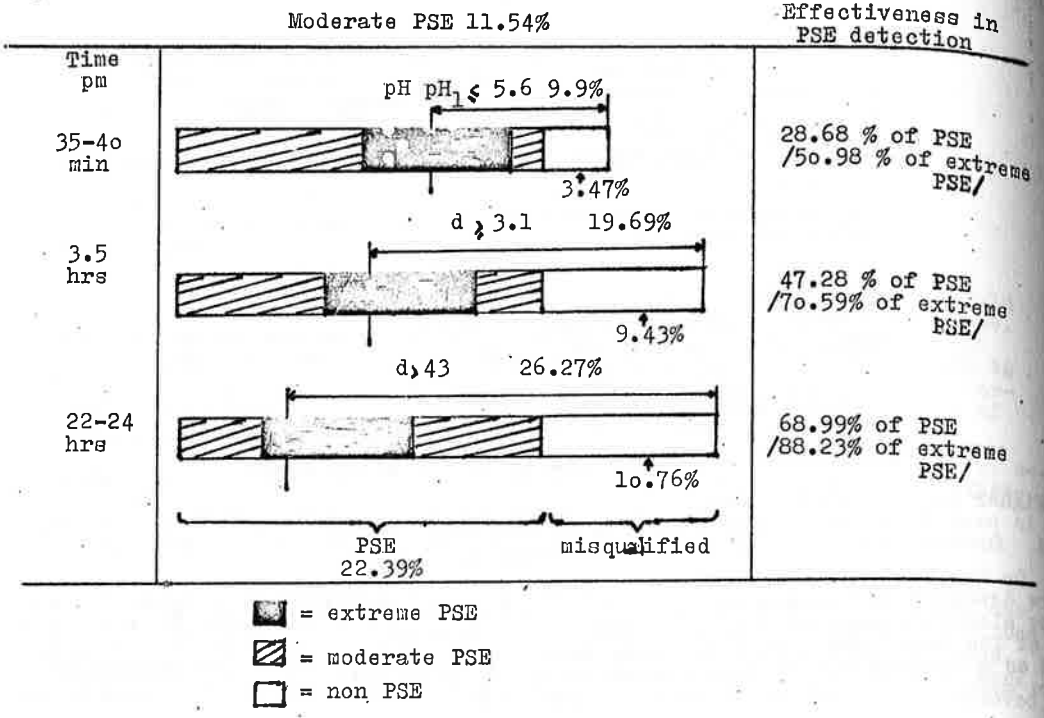


Fig. 2.: Detection of PSE hams by pH_1 and dielectric loss factor measured at 3.5 and 22-24 hrs post mortem



However, increasing effectiveness of detection by MS-Tester at the later post mortem periodes was accompanied by increasing overestimation of PSE - in the case of pH_1 only 3.47 % of the whole population was incorrectly qualified to PSE cathegory, in the case of dielectric loss factor misqualified hams accounted 9.43% at 3.5 hrs and 10.76% at 22-24 hrs, respectively.

Despite of these uncertainties, separation of PSE hams with MS-Tester on the day after slaughter may be applicable for technological purposes, in the case of alternative way of processing when a relatively large proportion of hams is processed to product other than cured-cooked ham. Lot of separated hams will consist of PSE and non PSE hams /6:4 ratio/.

REFERENCES

1/Pfützner H., Fialik E. /1982/ Zentralblatt f. Vet. med. 29, p. 637.
2/ Kleibel A., Pfützner H., Krause E./1983/ Fleischwirtschaft, 63,/3/ p. 322.
3/ Seidler D., Thumel H. /1983/ Fleischwirtschaft 63 /9/ p. 1465.
4/ Seidler D., Bartnick E., Nowak B., Gelhausen A., Kuhfuss R. /1984/ Proc. Sci. Meeting Biophysical PSE Muscle Analysis, Vienna p. 203.
5/ Scharnweber B., Greuel E. /1984/ Proc. Sci. Meeting Biophysical PSE Muscle Analysis, Vienna p. 243.
6/ Vada-Kovács M., Csiba A., Nagy-Németh A., Sáska J./1982/ 28th EMMRW p. 94.