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DIAGNOSIS OF PSE INCIDENCE ON A SLAUGHTER FACILITY IN NORTHWEST MEXICO

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INTRODUCTION

Production of quality pork meat is becoming a very important task to accomplish, especially for those countries which are focusing some of their production for export markets. It is well known that pale, soft and exudative (PSE) pork meat is of very poor quality (Anonymous, 1992; Kauffman *et al.*, 1992; Camou and Sebranek, 1991; Hofmann, 1988; Wirth, 1987). Export markets, like Japan, do not accept this kind of low quality meat. For this reason and because of the lower price that PSE meat has in the domestic meat processing industry, slaughter plants in México are attempting to decrease the magnitude of the problem.

The objective of this study was to detect the incidence of PSE on *longissimus dorsi* (LD) muscle and the effect of modernizing the plant (a slaughter facility in the Northwest part of México) on this incidence.

MATERIALS AND METHODS

pH Determination

This parameter was measured with a stainless steel pH meter (SENSOPTIC ISFET/REFET pH-SENSOR; Stork Nijhuis B.V., Lichtenvoorde Holland) directly in the loin (LD) between the 4th and 5th rib of the carcass at 45 minutes post-mortem.

Texture

Texture was evaluated using the Warner-Bratzler accessory on an Instron testing machine, Model 1132. Head velocity was 10cm/min, chart speed 20cm/min and a 50kg head. Square pieces (1cm²) of LD muscle were used, and the result was recorded in Kg/cm².

Water Loss

Ten grams of LD muscle, square pieces, were centrifuged (Beckman, model JA-21) in 29x104mm tubes. The liquid loss was expressed as percentage water loss based on the initial sample weight.

Colour Determination

A Hunter Lab (model D25-PC2) colorimeter was used on LD muscle samples of 1/2cm thickness.

Subjective Measurement

This was done visually on LD muscle at the plant according to their standards. PSE was pale pinkish grey colour, very soft texture and exudative. Normal was reddish pink, firm and moist. Double tone muscle had pinkish grey and reddish colour areas, soft texture and exudative.

Statistical Analysis

The Statistical Analysis System (SAS 1986) was used to determine means, standard errors and analysis of variance.

RESULTS AND DISCUSSION

Based on objective measurements a PSE incidence of 18.6% was found before remodelling the plant (Table 1). After reconstruction, the incidence of PSE decreased to 12.4%. LD muscle with normal characteristics benefitted from the decrease of PSE and dark, firm and dry (DFD) conditions. There was an increase of 11.4% of LD muscle with normal quality.

In Table 2, we can see that subjective measurements of the PSE condition was 36.6% before plant improvement. However, this incidence decreased after reconstruction to 25%. Double tone muscle (DTM) decreased from 22% to 16%. Under plant standards, DTM muscles are not good quality for export markets. Normal quality muscles increased 17.5% after reconstruction.

Table 3, shows objective parameters that were measured on normal and PSE muscles selected visually at the plant. Texture was softer for PSE than for normal, 3.68 and 4.44Kg/cm² respectively. Water loss was higher for PSE, 24.5%, than for normal, 14.7%. PSE muscle had a lighter colour, L=45.8, than normal, L=38.3, meanwhile normal muscle had a redder colour than PSE, a=3.36 and a=1.93 respectively.

CONCLUSION

Objective and subjective (visual) studies for PSE detection showed that remodelling of the reception, slaughter and cutting areas had a significant effect on decreasing the incidence of PSE at a slaughter plant in the Northwest part of México. These results show that PSE incidence can be controlled to some extent by improvement of handling and plant equipment.

Although, this plant is doing everything they can do to minimize quality variations, the highest quality will be impossible to achieve if farmers do not do their part. Farmers in this area of México have to start looking at using breeding stock free of the stress gene.

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Table 1. Objective measurement of the Longissimus dorsi quality in a commercial slaughter plant before and after remodelling.

	%	pH _{avg}	SD
Before			
PSE (pH≤5.89)	18.6	5.76	0.12
Normal (5.9≤pH≤6.4)	62.8	6.16	0.13
DFD (pH>6.4)	18.6	6.55	0.10
After			
PSE (pH≤5.89)	12.4	5.78	0.13
Normal (5.9≤pH≤6.4)	74.2	6.20	0.12
DFD (pH>6.4)	13.4	6.44	0.04

The study was carried out April - June, 1992. Data before plant remodelling were taken in April; data after remodelling were taken in June. During May the plant stopped for reconstruction. There was a significant difference of $P < 0.0001$ between plants. $n=2,180$ carcasses.

Table 2. Subjective measurement of the *m. longissimus dorsi* quality in a commercial slaughter plant before and after remodelling.

	%
Before	36.6
PSE (pH≤5.89)	41.4
Normal (5.9≤pH≤6.4)	22.0
DFD (pH>6.4)	
After	
PSE (pH≤5.89)	25.1
Normal (5.9≤pH≤6.4)	58.9
DFD (pH>6.4)	16.0

Subjective measurements were done according to the plant standards. They have three different degrees of quality: PSE, normal and double tone muscle (DTM). For DTM, the eye of the LD muscle shows two tones of colour, light and dark.

There was a significant difference of $P < 0.0001$ between plants.

* $n=2,180$ carcasses.

Table 3. Texture, colour and water loss of LD muscles from PSE and normal muscles visually detected at the slaughter facility.

	Normal	PSE
Texture (kg/cm ²)	4.44 (SE 0.21)	3.68 (SE 0.14)
Colour		
L*	38.33 (SE 0.81)	45.83 (SE 0.73)
a*	3.36 (SE 0.31)	1.93 (SE 0.22)
b*	6.99 (SE 0.15)	8.46 (SE 0.57)
Water loss (%)	14.75 (SE 1.68)	24.50 (SE 0.57)

There was a significant difference of $P \leq 0.005$ between normal and PSE. n for colour and water loss was 36 and for texture 90.