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Pale Exudative Pork and its Influence on Finished Product Quality.Introduction

The occurrence of poor quality pork gives rise to quality defects in finished products in particular canned hams 1) and cooked cured loins.

In the period from end-August 1967 until mid-March 1968 9,5 % of the total production of cooked loins in casing had to be rejected because of soft spots that made them unsalable.

Moreover, the average rejected loins showed a 1,7 % lower mature yield and a 3,0 % higher cooking loss than did good ones.

These facts constitute a severe loss to our factory and possibilities to reduce this had to be investigated.

Materials and methods

The pH<sub>2</sub> and the degree of rigor mortis 2) were measured in the M. semimembranaceus of Dutch Landrace pigs at the slaughter-line, approximately 45 minutes after death under production conditions. Carcase-halves were stored overnight under refrigeration and next day the fresh loins were judged visually on colour and texture after dissection from

the carcass and deboning. The loins were stitch pumped twice with a 10-minute interval by means of an Anco multi-needle injector with a polyphosphate containing brine. After maturing for three days the loins were stuffed into artificial collagen casings, lightly smoked and pasteurised to a centre temperature of approximately  $67^{\circ}\text{C}$ . After cooking and cooling the loins were stored at approx.  $12^{\circ}\text{C}$ ; the next day they were judged by hand on the presence of weak spots. Two series of experiments were carried out, one in May and one in July 1967; 50 pigs were taken at random on five successive days, each test thus comprising 250 pigs and 500 loins. In normal practice four loins are made from five muscles. Loins with the same colour and texture, originating from carcasses with identical  $\text{pH}_1$  (24 hours post-slaughter), were used to obtain the required degree of filling of the casings.

### Results and discussion

In table 1 the percentages of carcasses and rejected loins in each  $\text{pH}_1$  or rigor group are shown. To give an idea of the usefulness of both parameters as selection criteria for carcasses, also cumulative percentages are given. In exp. I 396 and in exp. II 411 loins were involved.

Table 1

pH <sub>1</sub>	% of carcasses per pH <sub>1</sub> group				% of re- jected loins per pH <sub>1</sub> group		cumul. % of total rejected loins		Rigor value 45 mi- nutes post- mortem	% of carcasses per rigor va- lue				% of re- jected loins per rigor val.		cumul. % of total reje- cted loins			
	Exp. I	Exp. II	cumul.		I	II	I	II		I	II	I	II	I	II	I	II		
			I	II														I	II
5,3	0,25	-	0,2	-	-	-	-	15	-	-	-	-	-	-	-	-			
5,4	0,75	2,0	1,0	2,0	70	88	3	6	14	2	1	2	1	-	-	-			
5,5	5,3	2,7	6,3	4,7	76	91	30	15	13	8	7	10	8	37	54	20			
5,6	4,8	2,0	11,1	6,7	52	75	46	21	12	16	11	26	19	27	50	48			
5,7	5,5	7,0	16,6	13,7	32	69	57	39	11	15	12	41	31	25	31	72			
5,8	5,5	7,5	22,1	21,2	27	55	67	54	10	15	11	56	42	16	31	89			
5,9	9,8	11,7	31,9	32,9	8	40	72	71	9	10	12	66	54	8	31	94			
6,0	11,1	14,6	43,0	47,5	16	25	84	85	8	9	12	75	66	3	20	95			
6,1	13,9	14,1	56,9	61,6	7	12	90	91	7	9	8	84	74	5	15	98			
6,2	11,6	13,2	68,5	74,8	7	13	95	97	6	6	7	90	81	-	18	98			
6,3	11,6	9,7	80,1	84,5	4	2,5	98	98	5	6	8	96	89	5	19	100			
6,4	8,3	7,0	88,4	91,5	-	7	98	100	4	3	4	99	93	-	17	100			
6,5	7,0	4,4	95,5	95,9	4	-	100		3	1	3	100	96	-	-				
6,6	1,8	2,0	97,5	97,9	-	-			2	0	2	100	97	-	-				
6,7	2,3	1,7	99,8	99,5	-	-			1	-	2		99	-	-				
6,8	-	0,5	99,8	100,0	-	-			0		1		100		-				
6,9	0,25	-	100,0		-	-													
	100	100	100	100	15	27	100	100			100		100	15	27	100			

From the table it can be concluded that  $pH_1$  is a better selection criterion than is rigor value.

When, for instance, 90 % of the carcasses, expected to give a high incidence of poor quality finished product, have to be sorted out, with  $pH_1$  as the criterion for selection, the value is 6,2 or above in both experiments. The percentages of carcasses left for loin production are 43 and 38 % respectively. Using rigor, maximum values of 9 or 6 and percentages of carcasses of 44 or 26 would have been obtained. This indicates that this parameter is more variable and somewhat less selective than is  $pH$ . Combination of  $pH_1$  and rigor values in sorting out carcasses does not give a more satisfactory selection than does  $pH_1$  alone.

In experiment II the percentage of loins rejected is higher in  $pH_1$  groups up to and including 6,2, while the  $pH_1$  distribution is almost the same, as compared to experiment I. As far as rigor is concerned there also is a higher percentage of rejection, in particular at the lower values. The only known difference in conditions is the higher average temperature during exp. II.

Other possibilities for selection are colour and texture of the meat 24 hours after slaughter, before processing, judged visually. This procedure has been carried out in exp. II; the results are shown in table 2.

Table 2

Colour and texture of fresh loins	loins in each group % of total	rejected cooked, cured loins % of total	rejected cooked, cured loins % of group
dark colour; normal texture	12	0	2
average colour; normal texture	55,5	2,5	5
pale colour; normal texture	5	-	-
average colour; exudative	6,5	4,5	70
pale colour; exudative	21	20	94
pale and average colour, exudative texture together	27,5	24,5	89
T o t a l	100	27	27

From the table it follows that texture of the meat 24 hours after slaughter is more strongly related to finished product quality than is colour.

Meat colour, judged on carcasses at the slaughter-line, 45 minutes post mortem, proved unusable as a criterion for selection, as carcasses qualified "dark" or "average" often gave pale exudative meat afterwards.

Besides by complete rejection of the finished product more losses are suffered because of lower mature yields and higher cooking losses.

In table 3 the relationship between  $pH_1$  and cooking loss is given (total number of loins 396).

Table 3

pH <sub>1</sub>	5.3	5.4	5.5	5.6	5.7	5.8	5.9	6,0	6,1	6,2	6,3	6,4	6,5	6,6	6,7	6,9	to- tal
% of carcasses in each group	0,3	0,8	5,3	4,8	5,5	5,5	9,8	11,1	13,9	11,6	11,6	8,3	7,0	1,8	2,3	0,2	100
average cooking loss per group	8,0	11,9	11,3	12,2	11,2	10,7	9,8	10,4	9,5	9,8	9,3	8,6	9,6	7,8	9,1	8,1	10,1



It was found that on an average the rejected cooked loins showed a 1,7 % lower mature yield and a 3,0 % higher cooking loss than did acceptable ones under identical production conditions.

### Conclusions

1. Both  $\text{pH}_1$  and rigor value, measured in the *M. semimembraceus* 45 minutes post mortem, are reasonably useful criteria for the selection of carcasses, aimed at reducing the incidence of soft spots in cooked cured loins in casings.
2.  $\text{pH}_1$  in this respect is more reliable than rigor value.
3. Combination of  $\text{pH}_1$  and rigor value does not improve the possibilities of selection.
4. Texture of fresh loins before curing is more strongly related to finished product quality than is colour.

It is essential that, in interpreting the results mentioned, the following be kept in mind:

- a) the data in this report, and the conclusions drawn from them, only apply to conditions in the factory from which they originate.
- b) however useful selection of carcasses or fresh meat may be in solving acute difficulties in production, it does not improve overall situation.

### References:

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|---------------------------------------|---|
| 1. P.S. van Roon, J.A. Leest          | XIIIth European Meeting of Meat Research Workers, Rotterdam, 1967 |
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