

## ASSESSMENT OF MEAT QUALITY CRITERIA BY THE SLAUGHTER AND RETAIL INDUSTRY

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### Background and Objectives

Quality is a complex term and is understood in different ways. For the consumer meat of high quality has to be tasteful after preparation. The meat technology expert is rather interested in the technological properties and hygienic status of meat (Hofmann 1987). For Hammond (1952) who is mainly emphasizing financial aspects quality is what consumers pay most for. Hofmann (1987) defined meat quality as the sum of all meat quality factors, which include sensoric, nutrient, hygienic and technological factors (Hofmann 1973, 1974). These factors are all objectively measurable and do not depend on the subjective appreciation of meat. The aim of this study was to investigate how experts in the slaughter and retail industry assess meat quality criteria. A questionnaire was sent to 1200 firms in the slaughter and retail industry. The results of this study are used in a project to adapt the breeding objective in the Swiss pig breeding program.

### Methods

#### Questionnaire

The respondents had to rank four definitions of the term 'meat quality' (see Table 1), seven measures to improve meat quality and six criteria which are important for the consumers when they buy meat. Nine different meat quality criteria had to be assessed as 'important', 'rather important', 'rather unimportant' or 'unimportant' for carcass grading. The nine criteria were ranked according to these assessments.

#### Statistics

For each definition, each measure of improvement, each consumers' criterion at purchase of meat and each meat quality criterion the rank-sum over the total number of questionnaires (N) was calculated. A Friedman-Two-Way-Analysis-Of-Ranks was applied to find out, whether there were any systematic differences between the rank-sums within the same question (global test). For  $N > 30$  this test follows approximately a  $\chi^2$ -distribution. If there has been any systematic difference between the rank-sums within the same question (i.e. the global null hypothesis could be rejected) each difference between rank-sums was tested separately. Differences between rank-sums were assumed to be normally distributed. The test for these differences was corrected for the number of tied observations and the number of tests within the same question (Siegel and Castellan 1987). The average rank method (Pratt and Gibbons 1981) was used to assign ranks to tied observations. For every test a global  $\alpha$ -level of 5% was used.

### Results and Discussion

There were 385 returned questionnaires, representing a response rate of 32.1%. The results are listed in Table 2. The Friedman-Test showed that the global null-hypothesis could be rejected for all the answers. So differences between the four definitions of meat quality, the seven measures to improve meat quality, the six criteria which are important for consumers when they buy meat and the nine meat quality criteria were significant.

#### Definitions of 'meat quality'

The respondents ranked definition 1 first (i.e. the lowest rank-sum) before definition 2, definition 3 and definition 4 (i.e. the highest rank-sum). All differences between the rank-sums were significant. Definition 1 which includes the sensoric, the nutrient and the hygienic factors from the definition of Hofmann (1973) was ranked best whereas the definition with the fourth quality factor of Hofmann (1973) (technological characteristics) was only in third rank. The second rank of definition 2 indicated that aspects of animal welfare such as species-specific housing, convenient transport and appropriate pre-slaughter handling were considered important in the context of meat quality. The selling price of meat was not associated very much to the term of meat quality.

#### Measures to improve meat quality

Price deductions for carcasses were regarded as the best measure to improve meat quality. Except from quality premiums and selection it differed significantly from all other measures. There was no significant difference between quality premiums, selection and feeding. Housing, transport and pre-slaughter handling were considered as rather inappropriate measures to improve meat quality. Pre-slaughter handling was ranked significantly worse than all other measures except transport. According to the slaughter and retail industry meat quality could be improved most efficiently by a differentiation of the carcass price (price reductions and quality premiums), by selection and by feeding. Housing, transport and pre-slaughter handling were classified as not very effective measures.

#### Criteria which are important for consumers when they buy meat

The respondents considered meat quality (colour, intramuscular fat content, taste and cohesiveness of meat) as the most important criterion for consumers when they buy meat. This criterion differed significantly from all other criteria. Presentation and housing were ranked second and third, respectively. The difference between these two criteria and the differences between housing, abnormalities in muscle (PSE/DFD) and pre-slaughter handling were not significant. The selling price of meat was ranked last and differed significantly from all other criteria. The first rank of meat quality and the second of presentation indicated the importance of the appearance of meat for the decision at purchase. This agrees with the literature where Sebranek (1982) and Barton-Gade et al. (1988) mentioned that the first impression a consumer gets when buying meat is appearance. Colour, together with the amount of visible fat and drip loss affect the appearance of meat. The lowest importance is attributed to the selling price of meat. This result does not agree with the fact that Swiss consumers spend more than 10% of the sales of the Swiss meat retail sector to buy meat in neighbouring countries (Wehrle, Ledermann 1995).

### Meat quality criteria

Cohesiveness of meat, abnormalities in muscle such as PSE and DFD, water holding capacity and lean meat content were ranked first to fourth. Differences between these four criteria and differences between lean meat content, intramuscular fat content and cohesiveness of fat were not significant. Intramuscular fat content and cohesiveness of fat which were ranked fifth and sixth did not differ significantly from the seventh and eighth criterion durability of adipose tissue and colour of meat. Colour of fat was ranked last with a significant difference to all other criteria. Carcass grading by the respondents and the decision at purchase by the consumers might not be comparable directly. But it is astonishing that colour of meat and colour of fat are ranked last in this question, whereas appearance was considered very important in the former question.

### Conclusions

The high ranking of definition 1 and the great importance of meat quality traits and presentation for consumers when they buy meat indicates the dominant role of appearance which was already pointed out by Sebranek (1982) and Barton-Gade et al. (1988). With the second place of definition 2 the respondents admitted quite a high priority to aspects of animal welfare such as housing, transport and pre-slaughter handling whereas in the question regarding the measures of improvement and the criteria for the consumers the ranking of transport and pre-slaughter handling was rather low. The selling price of meat was regarded as the worst definition and the least important criterion for consumers when they buy meat. This is in contradiction with the results of the study by Wehrle and Ledermann (1995) which shows the importance of cross-border shopping. A differentiation in price was considered as the best measure to improve meat quality. This indicates that meat quality traits might become more important for carcass grading in the future. Therefore Swiss pig breeders should continue to select for good meat quality and low frequencies of PSE and DFD.

### Literature

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**Table 1: Definitions of meat quality:**

Definition 1	Definition 2	Definition 3	Definition 4
taste, content of nutrients, hygiene	animal welfare (hou, tra, psh)	technological characteristics	selling price

**Table 2: Results of the comparison of the rank-sums (\* different letters indicate significant differences)**

Definitions of meat quality	N	df	$\chi^2$	p-value					
Friedman-Test-Statistic	351	3	249	<10 <sup>-5</sup>					
Test between definitions	def 1	def 2	def 3	def 4					
Rank-sums *	634 a	797 b	978.5 c	1100.5 d					
Measures to improve meat quality	N	df	$\chi^2$	p-value					
Friedman-Test-Statistic	326	6	299	<10 <sup>-5</sup>					
Test between measures	pdc	qup	sel	feed	hou	tra	psh		
Rank-sums *	1032 a	1061 ab	1125.5 ab	1206 b	1482 c	1571 cd	1650.5 d		
Criteria which are important for the consumers	N	df	$\chi^2$	p-value					
Friedman-Test-Statistic	346	5	499	<10 <sup>-5</sup>					
Test between criteria	mqt	pre	hou	abm	psh	spr			
Rank-sums *	694 a	1089.5 b	1221.5 bc	1242 c	1339 c	1680 d			
Meat quality criteria	N	df	$\chi^2$	p-value					
Friedman-Test-Statistic	347	8	376	<10 <sup>-5</sup>					
Test between criteria	chm	abm	whc	lmc	imf	chf	dat	com	cof
Rank-sums *	1417.5 a	1490 a	1514.5 a	1598 ab	1763.5 bc	1826 bc	1860.5 c	1973 c	2172 d

### Abbreviations

abm	abnormalities in muscle, such as PSE and DFD	feed	feeding	pre	presentation
chf	cohesiveness of fat	hou	housing	psh	pre-slaughter handling
chm	cohesiveness of meat	imf	intramuscular fat content	qup	quality premiums
cof	colour of fat	lmc	lean meat content	sel	selection
com	colour of meat	mqt	meat quality traits such as colour, taste, imf and chm	spr	selling price
dat	durability of adipose tissue	pdc	price deduction for carcasses	tra	transport
def	definition			whc	water holding capacity