

APPLICATION OF THE VIDEO IMAGE ANALYSIS FOR THE EVALUATION OF MEAT QUALITY OF CALVES OF DIFFERENT GENETIC ORIGINS

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INTRODUCTION

Due to the extension of the program for agricultural surfaces in the EU, the protection of natural surfaces, the necessity of management of absolute grassland for landscape preservation as well as the reduction of the dairy cattle stock the importance of the beef production from suckling cows in Germany and Europe will continue to increase. A lasting and sufficient profitability of this production however, can be secured only by the proof of a high product quality and thus by high meat quality. So far, the better meat quality is not evaluated at the market with higher prices, but one has to take into account the price increases in the future. Since breeding is a lengthy process, it must follow scientific bases to overcome possible fluctuations. The scientific investigation on this material from an ecologically oriented program shows, what kind of qualities can be produced in such a programme, which genetic groups are suited particularly well for high carcass and meat quality and whether the video image analysis can be used for faster and easier quality assessment.

MATERIAL AND METHODS

The material consisted of 334 calves from suckling cows, and 124 older animals originating from different fattening systems. The animals were crosses of a number of different paternal breeds (table 1).

Table 1. Structure of material

Paternal breed	Suckling cows	Different fattening systems
Aberdeen Angus (AA)	21	
Charolais (CH)	46	18
German Angus (DA)	14	20
German Fleckvieh (FL)	88	4
Herford (HE)	13	35
Limousin (LI)	58	29
Salers (SA)	88	
Uckermärker (UM)	6	18
Total (Σ)	334	124

The slaughtering took place in two slaughter houses. The carcasses were classified according to the EUROP system. The cattle halves were suspended during 48 hours in cold storage depot at approximately +4°C. Thereafter, the left halves were decomposed according to the German cutting scheme (DLG). For the investigation of the meat quality criteria, the three best ribs (9.

to 11. rib) without bone, which essentially consist of the *Musculus longissimus dorsi*, were taken as samples of the carcasses. Meat samples were analysed both after 48 hours and 14 days after slaughtering (*p.m.*). The organoleptic test was only performed on 80 animals because of the high personnel expenditure. The meat quality criteria and the methods used as well as the time schedule are specified in table 2.

Table 2. Characteristics of meat quality and methods of determination

Characteristics	Methods used	Time <i>p.m.</i>		
		48 h	14 d	Independent
* Physical Properties:				
Marbling	Video Image Analysis	X		
pH value	pH meter	X	X	
* Colour Properties:				
	Colour value, L*, +a*,+b*	X	X	
* Chemical Properties:				
Intramuscular Fat content	Soxhlet method			X
Protein content,	Difference method			X
Water (%) and Dry matter	Drying process at 103 C°			X
* Structure Properties:				
Shear force	Warner-Bratzler, 3 samples per animal and time	X	X	
* Sensory Properties:				
Smell	Cooked for 60' in vacuum-packs			X
Flavour	Evaluation, 5 points scale			X
Tenderness	Test team (4 persons)			X

RESULTS AND DISCUSSION

The slaughter characteristics are specified by means, standard deviations and coefficients of variation in table 3.

Table 3. Means (X), standard deviations (S) and coefficients of variation (CV) of slaughter characteristics

Characteristics	X	S	CV (%)
Age (d)	221	40	18.09
Live Weight (kg)	264	19	7.19
Carcass weight (kg)	150	13	8.66
Carcass dressing (%)	56.86	2.76	4.85
Commercial standard* (scores)	2.73	0.55	20.14
Level of fat (scores)	2.14	0.6	28.03

*E= 5...P=1

The results (table 4) show shearing force 48 h p.m values between (4.25) for Charolais and (4.96) for German Fleckvieh crossed calves. The values between the groups hardly differ, however they show altogether a good tenderness, which corresponds also to the values of Schöberlein and Golze (2000). The intramuscular fat content is in all groups very low as expected and indicates in fact a very lean meat. The meat colour is a critical point with the evaluation of the meat of calves, because the consumer decision depends strongly on the colour. The strong red colour of the calves meat of pasture calves (35.8 - 37.1) is a result and proof of the natural production system of suckled calves, while calves from the intensive rearing have brighter meat colour (40.00). In addition, genotypic differences are also observed. The meat of the Charolais calves is clearly brighter (38.26) than the meat of the calves of Salers (35.15).

Table 4. Meat quality of calves of different sire breeds

Paternal breed	Number	Shear force (kg)	Intramuscular fat (%)	Meat colour (L*)
CH	43	4.25	0.84	38.26
DA	15	4.37	2.15	38.05
FL	44	4.96	1.62	35.46
LI	65	4.63	1.84	35.87
SA	124	4.77	1.54	35.15

The meat of the female calves was significantly darker, but slightly more tender than the meat of male calves (table 5). The higher intramuscular fat content in the meat of the female calves and the tenderness are in close relationship and thus suggest particularly better meat quality of the female calves.

Table 5. Meat quality of male and female calves

Characteristics	Means		Difference
	Male	Female	
Meat colour 48 h p.m.	37.10	35.80	1.29*
pH value 48h p.m.	5.62	5.61	0.01
Shear force 14 d p.m. (kg)	4.00	3.90	0.10
Intramuscular fat content (%)	1.47	2.13	0.66*

*significant ($P < 0.05$)

Seventy six calves were examined for sensory quality, which seems to be correlated to the traits of carcass quality (table 6). The negative correlation of -0.26 between commercial standard and tenderness shows that commercial standard does not yet take into account meat quality. On the other hand fat score and flavour and smell as well as total sensory score show some positive relation (0.23 and 0.25, respectively), indicating the expected coherence.

Table 6. Correlation between sensory scores and carcass characteristics (n=76)

Characteristics	Score			Flavour/ Smell	Total
	Tenderness	Flavour	Smell		
Age	0.33*	-0.06	-0.06	-0.07	0.18
Commercial standard	-0.26*	-0.16	-0.18	-0.19	-0.27*
Fat score	0.20	0.20	0.21	0.23*	0.25*
Live Weight	0.14	-0.13	0.10	-0.03	0.08
Carcass weight	0.12	-0.08	0.09	-0.00	0.08

*significantly ($P < 0.05$) different from 0

CONCLUSION

The meat of the calves in this investigation was a high quality product. Since these are products from a natural suckling cow production system with pink meat colour the colour can be taken as a proof and guarantee for high meat quality. With most combinations of breed, sex and age it should be possible to produce good quality meat.

REFERENCES

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