PRELIMINARY EVALUATION OF SENSORY BEEF QUALITY IN YOUNG CATTLE

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Summary, keywords

Meat samples of 76 young cattle were evaluated by a panel for tenderness (TE), taste (TA) and smell (SM) after cooking. High level of quality and considerable variation existed in all traits. Meat from females was slightly better than from males and genetic groups were only different for TE. Low correlations between sensory and physical traits call for more investigations on beef quality.

Key words: meat quality, beef, sensory evaluation, tenderness, taste

Introduction

Beef production from suckling cows is a very natural production system and can be applied under the restrictions of nature production areas and protected landscapes. Therefore products from this system will be highly accepted on the consumer's side in the future. Such a high "production quality" should be matched with a high "product quality", i.e. high meat quality. There exist a number of physical measurements to assess meat quality in cattle. But the most important criterion is the direct sensory evaluation by the consumers. Therefore, in a cooperative project samples of meat from beef calves of different genetic origin were analysed for physical as well as sensory traits in order to get information on the level and variation in quality, on the differences due to factors like sex and genetic groups and on the relation between physical and sensory traits.

Material and methods

Meat samples of 76 male and female beef calves from suckling cow herds of the production cooperative "Prignitzer Weiderind" in the North West of the state of Brandenburg were collected in the years of 1998 and 1999 for analyses of meat quality. Three slices of the "best rib"-"Hochrippe" (9^{th} - 11^{th} rib, M. longissimus dorsi) were used to take the physical measurements and carry out the sensory tests. The material consisted of 11 genetic groups with 4 to 10 individuals and parental breeds Aberdeen Augus (AA), Charolais (CH), Fleckvieh/ Simmental (FV), Hereford (HE), Limousin (LI), Salers (SA), East German Dairy Breed (SB) and Uckermaerker (UM). In addition to the slaughter traits and physical measurements taken at 2 and 14 days after slaughter (p.m.) (table 1) a panel of four persons evaluated samples of the meat after freezing, defreezing and ageing for 8 days, and vacuum packaged cooking for 60 minutes for tenderness (TE), taste (TA) and smell (SM) on a five point scale. The scores were appropriately combined for the traits of taste and smell (TAS) and overall score (OS).

Calculation of analyses of variance and correlations was done using the appropriate procedures of the SAS programme package (Release 8.01 TS Level 01M0).

Results and discussion

Means and coefficients of variation (table 1) for age and weights indicate that the production goal was a 250 to 280 kg animal, which was achieved mainly by adjustment in age. The original sensory traits (TE, TA, SM) show relative high means for this sample and signify a high level of meat quality. The coefficients of variation (7 to 9%) were not unduly small as one could expect in such a panel evaluation. Compared to the requirements given by ENDER and AUGUSTINI (1998) for veal and ENDER (1995) for beef the values for the physical traits were well within the limits for veal except for the meat colours L1 and L2, which were too low, i.e., too dark for veal. But for calves raised by suckling cows on the pasture this deviation is natural. The absence of the light colour, usually thought to be a deficiency should be turned into an advantage and proof of high quality natural veal: the red coloured meat. Meat of females showed better quality than of males (figure 1), the difference being non-significant for tenderness (TE). Meat quality did not differ much between genetic groups (figure 2) except for tenderness (TE). However, even for this trait the differences were quite small. The correlations between original sensory traits (table 2) were intermediate, but high for taste (TA) and smell (SM) which is very well known. The high correlations between taste and smell (TS) and overall score (OS) and their composite traits were of course to be expected. The correlations between sensory traits and slaughter traits (table 3) were in general small. Slightly higher negative correlations were calculated for the commercial standard score and positive correlations for the fat score on the carcass. There was also an intermediate positive correlation between age at slaughter and tenderness, which indicated that with age and a higher fat deposition tenderness increased. The correlations between sensory traits and physical measurements were also quite small. The only correlations significantly different from zero were between tenderness and shear force1and 2 as well as the composite overall score (OS) for meat quality. Obviously, in this investigation, the physical measurements had no relation to the sensory traits. This could be due to the high quality of the meat sample,the low variation and the correct treatment of the meat after slaughter. On the other hand it shows that the physical measurements are not yet investigated well enough, and that better indicators for sensory traits should be developped in the future.

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Table 1: Means, standard deviations and coefficients of variation (n = 76)

Trait	Mean	Stand. dev.	Coeff. of var. (%)
1. Age (AG) (days)	228.00	34.00	14.9
2. Live weight (LW) (kg)	264.20	18.10	6.9
3. Carcass weight (CW) (kg)	150.60	12.60	8.4
4. Commercial standard score (CS)	2.75	0.49	17.8
5. Fat score (FS)	2.13	0.47	22.1
6. Tenderness (TE) (points)	4.30	0.40	9.3
7. Taste (TA) (points)	4.32	0.36	8.3
8. Smell (SM) (points)	4.44	0.33	7.4
9. Taste / Smell (TS) (points)	8.75	0.62	7.1
10. Overall score (OS) (points)	8.67	0.60	6.9
11. Colour L1 (CL1)	35.69	5.16	14.5
12. pH- value 1 (pH1)	5.57	0.18	3.2
13. Shear force 1 (SF1) kp/cm^2	4.41	1.25	28.3
14. Colour L2 (CL2)	36.25	5.24	14.5
15. pH- value 2 (pH2)	5.52	0.17	3.1
16. Shear force 2 (SF2) kp/cm^2	4.00	1.47	36.8
17. Shear force cooked (SFC) kp/cm2	3.92	1.45	37.0
18. Intra. musc. fat (IMF) (%)	1.86	1.26	67.7

Table 2: Correlations between sensory traits (n = 76)

	Score				
Trait	Tenderness	Taste	Smell	Taste/Smell	Overall
Tenderness	1	0.42*	0.38*	0.45*	0.88*
Taste		1	0.62*	0.91*	0.75*
Smell			1	0.88*	0.71*
Taste/Smell				1	0.81*

* significantly (P < 0.05) different from 0

Table 3: Correlations of sensory and other traits (n=76)

	Score				
Trait	Tenderness	Taste	Smell	Taste/Smell	Overall
Age	-0.33*	-0.06	-0.06	-0.07	0.18
Live weight	0.14	-0.13	0.10	-0.03	0.08
Carcass weight	0.12	-0.08	0.09	0.00	0.08
Commercial standard	-0.26*	-0.16	-0.18	-0.19	-0.27*
Fat score	0.20	0.20	0.21	-0.23*	-0.25*
Colour L1	-0.13	0.10	0.15	0.14	-0.01
pH- value 1	0.19	-0.08	-0.12	-0.11	0.06
Shear force 1	-0.27*	0.05	0.09	0.08	0.22
Colour L2	-0.06	0.16	0.19	0.19	0.06
pH- value 2	0.13	-0.11	-0.16	-0.15	0.01
Shear force 2	-0.33*	0.09	0.09	0.10	-0.27*
Shear force 2 (cooked)	0.14	-0.06	-0.02	-0.04	0.07
Intra musc. fat	0.14	0.09	0.14	0.13	0.16

* significantly (P < 0.05) different from 0

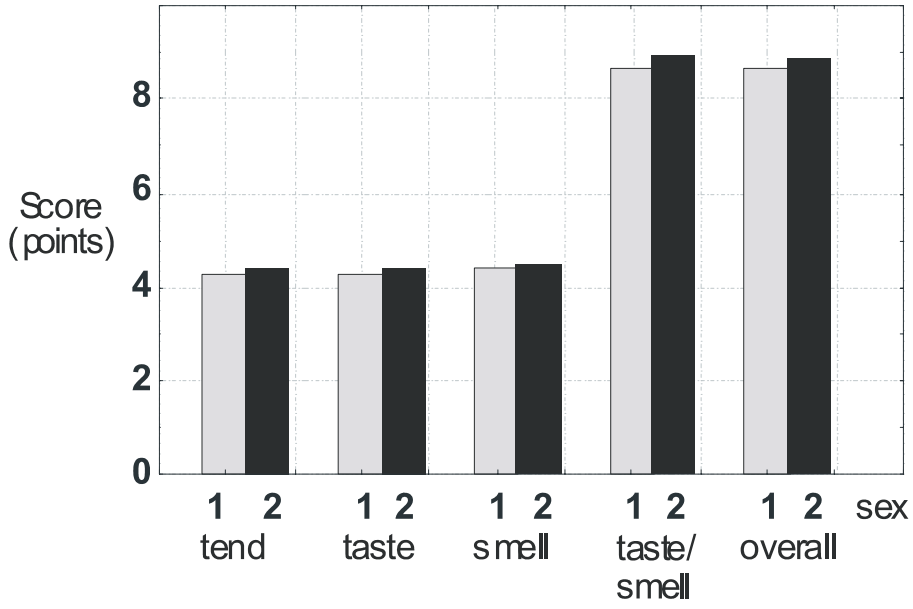

Fig.1: Means for males (1) and females (2)

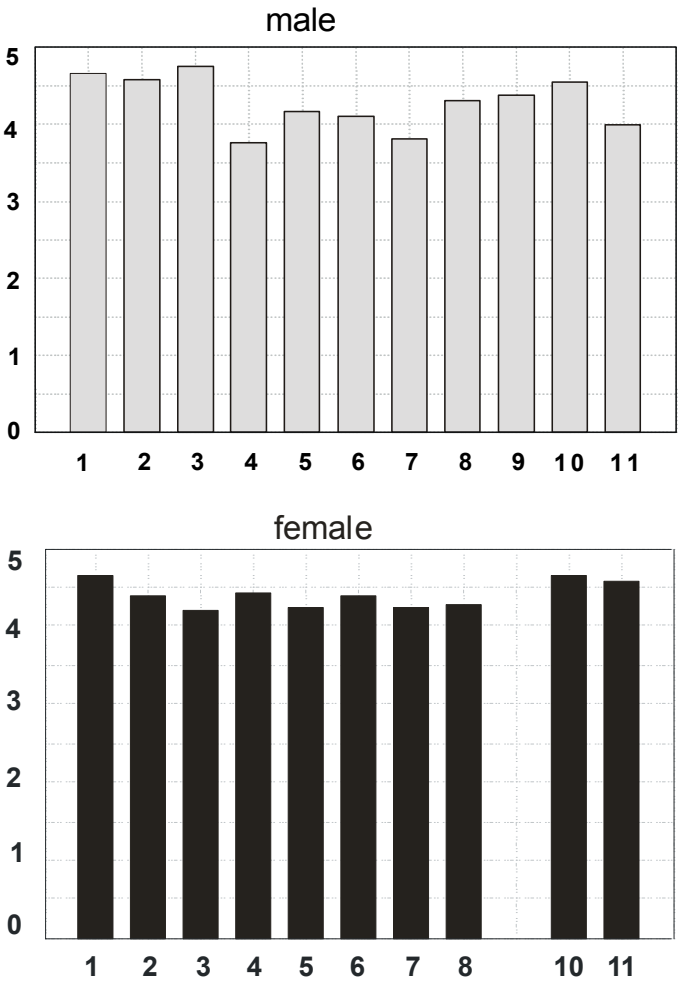

Fig. 2: Tenderness score for genetic groups

Genetic groups:

1 AA (SA x SB) 3 CH (SA x SB) 5 HE (SA x SB) 7 LI (UM x SB) 9 SA 11 SA x UM
2 CH (LI x SB) 4 FV 6 LI (LI x SB) 8 LI x FV 10 SA (LI x SB)