INFLUENCE OF ANIMAL HUSBANDRY PRACTICES ON DIFFERENT QUALITY PARAMETERS OF AUSTRIAN BEEF

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INTRODUCTION

In recent years the press increasingly focused attention on the so-called health problems with respect to the consumption of food of animal origin which - in particular for meat - has led to its bad image. Information was represented in a distorted fashion and the advantages and disadvantages of meat, poultry and fishing in the human diet were not reported in a balanced manner. The basis of such negative press releases were out-dated data analyses of the composition of meat and most were determined from cuts which were commercially unsuitable. A correct representation of the facts would benefit market, trade and consumer and it would help to provide better argumentation and reduce the consumers' disquiet. Finally it would assist meat industry to produce meat and meat products of good and constant quality.

Aim of this work was therefore to investigate whether significant differences in composition can be found between conventionally fattened and free-range beef as favoured by some consumers.

MATERIAL and METHODS

Animal Material

Quality traits of three traditional Austrian cuts [„Beiried" (loin, 1st to 6th lumbar vertebrae), „Schwarzes Scherzel" (part from round of beef) and „Rostbraten"(prime rib, 7th to 13th rib)] from each of 20 free-range Limousin cattle (8 and 10 months old, predominantly female animals) were compared with traditionally fattened Fleckvieh-Simmental cattle (approx. 20 months old, bulls).

Methods for measuring physical-chemical quality traits

Determination the content of water, fat, protein and collagen were carried out according to the "Official Methods for the Examination of Food" of Germany (BGA 1980). Cholesterol was determined enzymatically using a test kit of BOEHRINGER MANNHEIM, the water holding capacity according to GRAU and HAMM (1952) using the „Braunschweiger" device (ROEMMELE et al., 1961). The results of the water holding capacity were evaluated evaluation according to the general administration regulation of the meat hygiene law (VwFLHG, 1986). Shear force was measured with the testing machine by WOLODKEWITSCH (GRÜNEWALD, 1957). The analysis results were determined in double determination. Mathematical analysis was conducted with the U-Test after MANN, WHITNEY and WILCOXON (SACHS, 1992).

RESULTS and DISCUSSION

The investigation results are represented in Tables 1 and 2. In Table 1 includes the various parameters (example), Table 2 includes the statistically evaluated differences only.

Differences in pH-values and the content of water, fat and ash were generally negligible or small significant ($0,01<p\leq0,05$). The raw protein content was an exception. The differences of the collagen contents and the collagen values were highly significant for „Rostbraten" and „Schwarzes Scherzel" but not for „Beiried" ($p>0,05$). Only collagen free (muscle) protein differed significantly for all three cuts. Water holding capacity was only significantly different in the „Schwarzes Scherzel", the cholesterol content in „Beiried" and „Schwarzes Scherzel" while shear force was different significantly at all cuts but the p-levels of significance varied considerable.

Beside the statistical evaluation the actual differences between the individual parameters (mean values) should be of interest. Differences greater than 10% could only be found in the case of shear force, fat and collagenous protein. On the other hand, free-range meat was characterised by smaller fat and collagen content as well as by lower shear force values. However, their cholesterol content was higher than the traditional beef.

The examined samples differed not only in its keeping but also regarding to slaughter weight, race and sex, but the praised characteristic is the outdoor keeping of the animals and in such a way the meat is offered to the consumer. The obvious differences in the case of shear force, fat and collagen can be connected with - at least to certain degree - the age of the animals when slaughtered.

CONCLUSION

It is doubtful that the small, albeit occasionally significant differences are related to the husbandry practises. On the other hand these differences are unlikely to be recognised sensorically, as best can only be recognised in a direct comparison with a reference sample. Furthermore, we assume that the differences measured in this study will be smaller or non-existent at similar age and hence slaughter weight.

Tab.1: Quality parameter of „Beiried"

Beiried	breed	n	x	s	s_{rel}	med.	min	max.
pH	Lim	25	5,5	0,1	1,5	5,5	5,4	5,8
	Fleck	20	5,5	0,1	0,9	5,5	5,4	5,6
Ash (%)	Lim	25	1,1	0,1	13,2	1,1	0,9	1,7
	Fleck	20	1,1	0,1	12,1	1,0	0,9	1,4
Water (%)	Lim	25	71,6	2,6	3,6	71,4	61,8	75,0
	Fleck	20	70,9	2,0	2,8	70,9	66,3	73,9
Fat (%)	Lim	25	5,0	3,4	67,6	5,0	1,0	18,6
	Fleck	20	6,5	2,3	35,8	5,9	2,9	11,5
Protein (%)	Lim	25	22,0	0,9	4,0	22,2	18,4	22,9
	Fleck	20	21,3	0,9	4,0	21,5	19,1	22,7
Collagen (%)	Lim	25	2,0	0,4	20,7	2,0	1,1	2,6
	Fleck	20	2,1	0,5	23,1	2,1	1,6	3,5
Water/Protein	Lim	25	3,3	0,1	2,1	3,3	3,1	3,4
	Fleck	20	3,3	0,2	4,8	3,3	3,1	3,7
Fat/Protein	Lim	25	0,2	0,2	86,4	0,2	0,0	1,0
	Fleck	20	0,3	0,1	43,3	0,3	0,1	0,5
Collagen free protein (%)	Lim	25	20,0	0,8	4,0	20,1	17,1	20,9
	Fleck	20	19,2	0,9	4,9	19,1	17,0	21,2
Collagen value	Lim	25	9,1	1,8	19,3	9,0	5,0	11,9
	Fleck	20	9,9	2,3	23,5	9,7	7,0	16,5
Water holding-capacity (Q)	Lim	25	0,5	0,1	11,8	0,5	0,4	0,7
	Fleck	20	0,5	0,1	8,2	0,5	0,4	0,6
Cholesterol (mg/100g)	Lim	25	54,6	4,2	7,8	54,0	47,6	63,2
	Fleck	20	50,8	3,8	7,4	51,1	45,6	61,9
Shear force (kg/cm^2)	Lim	24	8,7	5,5	63,5	6,6	2,4	25,1
	Fleck	20	13,7	8,5	62,1	10,5	3,6	39,2

n = number of samples
x = arithmetic mean
s = standard deviation
s_{rel} = relative standard deviation
med. = median
min. = minimum value
max. = maximum value
water/protein = % water/%protein
fat/protein = %fat/%protein
collagen free protein =
% protein - % collagen
collagen value =
%collagen x 100/%protein
Q = meat area/total area

Table 2: Statistically evaluated differences of the quality parameters

	Beiried	Rostbraten	Schwarzes Scherzel
pH	—	—	—
Ash	*	—	—
Water	—	—	—
Fat	**	—	—
Protein	**	*	—
Collagen	—	***	***
Water/Protein	—	—	*
Fat/Protein	*	—	—
Collagen Free Protein	***	**	***
Collagen Value	—	***	***
Water holding Capacity	—	—	**
Cholesterol	**	—	***
Shear Force	**	*	***

— = $p > 0,05$
* = $0,01<p\leq0,05$;
** = $0,001<p\leq0,01$;
*** = $p\leq0,001$

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