

CHANGES IN THE CARCASS COMPOSITION OF INTENSIVELY FED GERMAN FLECKVIEH BULLS AND STEERS

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The tissue composition of the carcass is determined by the regularities of the tissue growth. Influencing factors are first of all age, breed, sex and the fattening intensity. Precise knowledge of these changes in the fattening process is necessary to optimize the fattening method. Although there are extensive reports about this topic (a.o. Berg and Butterfield, 1968; Robelin et al., 1974), the data material about the dual purpose breed German Fleckvieh (35-38 % of the cattle population) is small and hardly differentiated (Schwarz et al., 1992). Thus, the changes in the carcass composition during the growth has been investigated on a defined group of the Fleckvieh population. Reported are results, obtained on intensive fattened bulls and steers.

Material and methods

There were 45 bulls and 45 steers involved in the experiment, spread in live weight groups of 200, 350, 500, 575 and 650 kg at slaughter with 9 bulls and 9 steers in each group. Starting with 200 kg live weight corn silage (*ad libitum*) and 1,8 kg grain were given individually. After reaching the intended live weight the animals were slaughtered. Subsequent to a 24 hours cooling, the left side has been cut into joints according to the German standard dissection method "DLG-Schnittführung" (compare Fig.). Afterwards a differentiation of tissues by lean, fat, bones and tendons within the cuts was carried out. The tissue weights of each cut were summed up and related to the carcass weight.

Results

The differentiation between bulls and steers begins very early at the **daily gain**. In the fattening stage 200 to 350 kg the highest daily increases have been found (1484 ± 87 g at bulls and 1337 ± 111 g at steers) and the lowest differences between the two categories. The average daily gains for the whole fattening period (200 to 650 kg) were 1210 ± 112 g and 1040 ± 116 g respectively. This makes a difference of about 15 % between the sex types and corresponds to a difference of 51 days in age (slaughtering age: 548 days for bulls; 599 days for steers).

The **tissue composition** of the carcass is distinctly influenced by the final weight and sex type. At **bulls** the lean proportion decreased only about 1 % (from 66.8 to 65.7 %), in spite of the high daily increase in weight and the high final weight of 650 kg (carcass weight 375 kg). The fat proportion increased significantly in this weight range from 7 % to 15 % and the bone proportion decreased from 20 % to 14 %. Thus the changes in the carcass composition of the bulls can be explained almost exclusively by the increase of the fat proportion and the decrease of the bone content. At the **steers** also the lean proportion was involved in the changes. It decreased from 66 % at 200 kg to 57.7 % at 650 kg. The fat proportion increased from 8 to 24 % and the bone proportion decreased from 19.4 to 13.6 %. The changes in all tissues from 350 kg live weight upwards were particularly distinct (Tab.).

Tissue composition (%) of carcasses of intensive fed bulls and steers (subgroup n = 9)

Tissue	Bulls				Steers			
	Lean	Fat	Bone	Tendons	Lean	Fat	Bone	Tendons
200 kg	66,8 ± 1,4	6,9 ± 0,8	20,1 ± 1,0	5,5 ± 0,5	66,0 ± 2,4	8,2 ± 1,8	19,4 ± 0,7	5,6 ± 0,6
350 kg	66,1 ± 1,5	11,2 ± 2,0	16,8 ± 1,0	5,4 ± 0,7	63,5 ± 2,0	14,0 ± 2,0	16,8 ± 0,4	5,0 ± 0,4
500 kg	65,6 ± 1,4	13,2 ± 1,8	15,5 ± 0,8	5,3 ± 0,4	61,8 ± 2,2	18,1 ± 2,6	14,8 ± 0,8	4,9 ± 0,3
575 kg	66,0 ± 2,0	14,6 ± 2,3	14,3 ± 0,7	4,9 ± 0,5	59,2 ± 1,6	21,0 ± 2,0	14,5 ± 1,1	4,9 ± 0,7
650 kg	65,7 ± 3,0	14,8 ± 3,1	14,2 ± 0,9	4,9 ± 0,7	57,7 ± 3,5	23,7 ± 3,7	13,6 ± 1,0	4,6 ± 0,6

The **allometric growth coefficient** clearly shows the different growth rates of the tissues at both categories. For the muscle tissue at bulls it was equivalent with that of the carcass, while at steers it was much lower (0,81). The fatty tissue had a distinctly higher relative growth as the carcass. The differences between bulls and steers by this tissue were the most obvious with coefficients of 2.5 and 3.5 respectively. The growth coefficient of the bones was 0,58 for both categories. The bones have their predominant growth prenatal and in the first postnatal months. In consequence of this situation the tissue proportions in the carcass change. Especially

concerned of this is the lean/fat ratio. It decreased at bulls from 9.5 : 1 at 200 kg to 4.5 : 1 at the final weight and at the steers even from 8 : 1 to 2.4 : 1, respectively.

In the composition of the primal cuts appeared partly significant differences, that even increased during the growth (Fig.). So the lean proportion increased at bulls in the neck and slightly in the fore rib and shanks till the final weight stage. It remained constant in the shoulder and decreased slightly in the rest of the cuts. The decrease (12 %) was significant only in the flank. The same systematics was found at the steers. However, the decrease of lean proportion was significantly stronger within the weight range from 200 to 650 kg. Extreme decreases were found in the flank by 22 %, in brisket and flat ribs by 13 % and in sirloin/best ribs/tender loin by 9 %.

The differences in the fat proportion between cuts and sex types were more distinct and increased with the weight. The highest increments were found in the flank as well as in the brisket and flat ribs, the lowest increase showed the neck, the round and the shanks, at bulls the neck. The growth rates of the fat proportion in sirloin/best ribs/tender loin at bulls were comparable with that of the carcass.

The individual cuts differed also in the bone proportion. The average bone percentage of the carcass decreased from 20 % at 200 kg to 14 % at 650 kg. The fall in shoulder and brisket/flat ribs corresponded to this average, above the average were the fore ribs and sirloin/best ribs (22/16 and 19/16 %). In the neck and round on the other hand the bone proportion was lower than in the carcass (17/10 and 15/12 %). At steers the bone proportions in all cuts were somewhat lower (0,5 to 1,0 %).

Conclusions

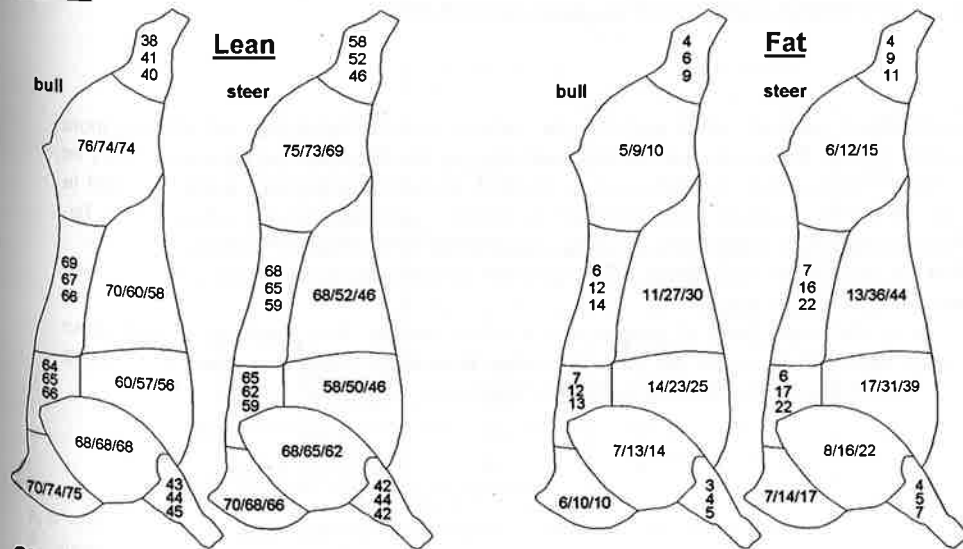
Growth means not only increase in weight, but also changes of the body proportions and shifting the tissue percentages. Bulls and steers differ herein considerably. Although the average daily gain of the bulls was about 1200 g, the lean proportion of the carcass was barely reduced till the final weight of 650 kg. With this performance the dual purpose breed Fleckvieh is equal with the meat type breeds. The demands of the market for lean beef are excellent fulfilled. The fat proportion exceeded only in the flank and the brisket/flat ribs that of the carcass.

At the steers the lean proportion fell already at 350 kg under the initial value. The high fattening intensity led to a fat proportion of 24 % in the carcass at 650 kg. Because of the different intensity of fatty tissue formation in the cuts, an extremely high increase was registered in the ventral area of the carcass. Thus, at 650 kg, an average fatty tissue proportion of 44 % was found in the flank and 39 % in the brisket/flat ribs. These fat proportions are rejected in the market and lead to considerable losses in the payment. From the results it can be concluded, particularly in regard to the different demands of the market, that in cattle fattening the breed- and sex-specific energy demand should be more emphasized and taken into consideration.

Literature

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Figure



Changes of lean and fat proportion (%) of primal cuts of intensively fed bulls and steers (200, 500, 650 kg live weight; subgroup n=9)