

## VIDEO IMAGEING OF BEEF CARCASSES AND THE PROBLEM OF CATEGORY DEPENDENT ESTIMATION FORMULAE

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### Introduction

The video image analysis (VIA) seems to be the technique of choice to substitute the visual grading appointed by the EU and German regulations up to now. As it is well known from various investigations on the topic (MADSEN et al., 1996; BRANSCHEID et al., 1998), VIA is suitable for additional estimations of the commercial value of the carcass. Under German conditions the whole spectrum of estimations within the category 'young bulls' can be done with the same formulae for all breeds (SÖNNICHSEN et al., 1998). Now the question surges if different categories may have an influence on estimation accuracy.

### Objective

The aim of the study is to determine the performance of the VIA-system VBS 2000 (e & v Oranienburg, Lehnitzstr. 24; D-16515 Oranienburg) in predicting the grades and commercial value of beef carcasses from different categories. As steers are of only little importance in Germany (0.5 % market share) only young bulls, heifers and cows had been included.

### Methods

**Sample of carcasses.** In a first grading experiment a total of 2434 carcasses (for fat classes only 2297 carcasses) were selected from the slaughter line including 919 and 903 cows, 321 and 325 heifers as well as 1194 and 1069 young bulls, respectively. The sample contained a mixed genotype spectrum with a high proportion of German Friesian and Simmental and represents about 80 % of the German cattle population. Grading and VIA measurements had been done as described by SÖNNICHSEN et al. (1998) with the exception that the carcasses were generally classified by two experienced classifiers. The reference values were calculated by the interactive method of DOBROWOLSKI (1999) and then used for the developing of the definitive formulae for conformation and fat classes. Category specific formulae as well as common formulae for overall categories were calculated. In a second experiment, 301 young bulls, 86 cows and 46 heifers were dissected after video imaging, at first according to the German standard method and then by a commercial dressing. The weights of joints were determined as commercially saleable cuts.

**VIA-System and Statistical Procedure.** The technical equipment and the statistical procedure had been described in detail in the former study (SÖNNICHSEN et al., 1998). Special estimation formulae were calculated for all three categories in the case of the grades. For the commercial value only two formulae (heifers/cows vs. young bulls) were calculated.

### Results and discussion

The performance of VBS-2000 for the EC-grades is shown in Tab. 1 and 2. The results of category specific and common formulae can be seen. Generally, it may be stated that the common formulae in all three categories reach practically the same accuracy of estimation as the category specific formulae. However, the common formulae have a slight tendency to produce outliers (more than 3 and 4 classes deviation in the 15-point scale). There are only little differences between the categories (slight advantage for heifers in conformation and for young bulls in fat classes). As known from earlier studies (MADSEN et al., 1996; SÖNNICHSEN et al., 1998) the estimation of the fat classes generally reaches a relatively low level of accuracy.

Tab. 1: Estimation accuracy of conformation in the 15-point scale by VIA-system at different categories and using different formulae (n = 2.434)

Type of formula	Category	Deviation class, %			General accuracy
		0-1	2	3	
Category specific formulae	Young bulls	96.5	3.5		R <sup>2</sup> = 0.945 SEC = 0.61
	Heifers	98.8	1.2		
	Cows	97.6	2.4		
	Total				
Common formulae	Young bulls	96.3	3.5	0.2	R <sup>2</sup> = 0.943 SEC = 0.62
	Heifers	97.5	2.5		
	Cows	97.8	1.9	0.3	
	Total				

Tab. 2: Estimation accuracy of fat classes in the 15-point scale by VIA-system at different categories and using different formulae (n = 2.297)

Type of formula	Category	Deviation class, %			General accuracy
		0-1	2	3 (4)	
Category specific formulae	Young bulls	93.6	6.2	0.2	R <sup>2</sup> = 0.78 SEC = 0.97
	Heifers	89.0	9.8	1.2	
	Cows	84.4	13.4	2.0	
	Total				
Common formulae	Young bulls	90.7	8.5	0.8	R <sup>2</sup> = 0.768 SEC = 0.99
	Heifers	87.5	11.5	1.0	
	Cows	82.9	14.4	2.5 (0.2)	
	Total				

The prediction of the carcass composition as a further part of the commercial value has a considerably higher accuracy than the prediction of grades (Tab. 3 and 4). This is mainly due to the quality of the reference values, which have been used for the calculations. The visually taken reference values of the grades are under strong and inevitable subjective influences, while the reference values for the carcass composition are derived from an exact measuring process. However, depending on the item to be estimated, differences do exist. The correlation for the percentages drops drastically in comparison to the weight components, which is caused by the very limited variation in case of the percentages. But it doesn't have any effect on the estimation error (SEC). The prediction accuracy of the common formulae drops only slightly compared with the category specific formulae (not shown in the tables). In the most cases, this refers only to the second decimal place of estimation error if compared with the young bulls. But it should be mentioned that the formulae for the female categories generally have a 0.3 to 0.5 points lower estimation error (SEC), than the young bull and common formula. This could justify the use of sex specific formulae especially in the case of the weight components. However, as shown in Table 3 and 4, the sex specific bias is very low in all predictions.

Tab. 3: Prediction of carcass composition with common formulae for all categories - weights of main cuts (n = 433)

Item	x (kg)	s(kg)	R <sup>2</sup>	SEC (kg)	bias (kg)	
					Young bulls	Heifers/cows
Forequarter	74.3	18.5	0.98	1.81	< 0.01	-0.01
Pistol	61.3	12.4	0.98	1.71	+0.02	-0.03
Round	42.3	8.9	0.97	1.45	0	0
Roastbeef	19.7	4.7	0.97	0.84	+0.01	-0.01
Flank & short plate	13.0	4.0	0.91	1.18	-0.01	+0.03

Tab. 4: Prediction of carcass composition with common formulae for all categories - percentages of saleable meat, bones and fat trims (n = 433)

Item	x (%)	s (%)	R <sup>2</sup>	SEC (%)	bias (%)	
					Young bulls	Heifers/cows
Saleable meat	67.9	4.3	0.69	2.44	+0.03	-0.06
Bones	17.3	2.8	0.92	0.96	0	0
fat trims	14.6	4.7	0.79	2.22	-0.17	+0.40

### Conclusions

The present study confirms the reliability of the video imaging system VBS 2000 for beef classification and determination of carcass composition. It is possible to run the system with common formulae for young bulls, heifers and cows, while steers had not been tested. Sex specific formulae may have a little advantage in only some weight components of the carcass composition. To summarise, the calculation of estimation formulae, which are independent of the previous determination of genotype or sex, is a further important step to the broader applicability of VIA-system VBS 2000.

### Literature

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