

CONNECTION OF LINEAR AND WEIGHT MEASURES OF LAMBS CARCASSES
WITH GRADE OF CONFORMATION

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SUMMARY: The objective of this study was to determine relations and interdependences of the conformation grades, as most important subjective indicators, and chosen linear and weight measures, as objective indicators of lamb carcasses quality and value. Examinations were performed on 80 carcasses of different races (20 carcasses for each of four grades of conformation). Besides variation measures (standard deviation and coefficient of variation), existence of statistically very significant ($p < 0,01$) and mainly medium and high correlative dependences was established by correlative analysis between conformation grades and investigated weight and linear measures - on the first place for the carcass weight ($r_{xy} = 0,952$), % loin ($r_{xy} = 0,741$), leg circumference ($r_{xy} = 0,852$), depth of breast ($r_{xy} = 0,824$) and surface of m. longissimus dorsi ($r_{xy} = 0,783$).

INTRODUCTION: For estimating quality and value of carcasses on the slaughter line and their commercial classification, methods that are used are based on selected objective measurements (weight, linear measures) and subjective indicators of carcass quality (conformation, carcass surface covered with fat tissue, colour, structure and consistency of muscle and fat tissue, etc.). Regarding that carcass conformation is one of the most important and mostly used quality indicator and that reliability of subjective indicators are doubted, conformation as well, aim of our experiments were that for lambs carcasses we establish relations and interdependences between different conformation

grades and chosen linear and weight measures as objective indicators. Eventually presence of interdependences would justify using conformation grades as, just conditionally, subjective indicator of quality, but would point out those objective measures that could be used as additional criteria in commercial classification of carcasses, or as standard for conformation grades control.

MATERIAL AND METHODS: Examinations were performed on 80 lambs carcasses of different domestic races (Pramenka; Cigaja), foreign races (Il de France; Merino precos; Caucasus merino) and F_1 hybrids (Il de France x Merino precos; Il de France x Caucasus precos; Caucasus precos x Cigaja). Age of animals was 90-120 days. Carcass conformation were evaluated from 1 (bad) to 5 (excellent), on basis of which four experimental groups with 20 carcasses each of the same conformation grades were formed. Otherwise, in experiment there were no carcasses with bad conformation grade. Several linear measures were taken on not chilled left sides: symp.pubis-1 st rib; symph.pubis-atlas; articulus genus - articulus scapulo-humeralis; calcaneus-tuber ishiadicum; leg circumference (in the area of caudal edge of 3 th tail vertebra); depth of breast (in the area of caudal edge of 3 th rib); surface of m.longissimus dorsi (on the caudal surface of 12 th rib). Besides the weight of not chilled and chilled ($0 - +4^{\circ}\text{C}/24 \text{ h}$) carcasses, weight of chilled left sides and weight of all primal cuts (long leg - hind shank on; loin; rack; shoulder; neck; breast - fore shank on), obtained from cutting left sides, was measured (Figure 1). Statistical data processing (variation measures; correlation analysis) were done by methods described by Snedecor, 1959. For statistical importance "t - test" was used.

RESULTS AND DISCUSSION: Results of correlative analysis, established between conformation grades and selected linear measures of lambs carcasses, are reviewed the first (Table 1). In all cases positive, medium or high and stati-

Figure 1.- Left side cutting scheme

stically important ($p < 0,01$) correlative dependences was established.

Table 1. - Correlative dependences between conformation grades (X) and some linear measures (Y) of lambs carcasses

Linear measures	r_{xy}
Symph.pubis - 1 st rib	0,654**
Symph.pubis - atlas	0,569**
Articulus genus-artic. scapulo-humeralis	0,818**
Calcaneus - tuber ischiadicum	0,726**
Leg circumference	0,852**
Depth of breast	0,824**
Surface of m.long.dorsi	0,783**

** - $P < 0,01$

Particularity we point out leg circumference that is, at least in our experiment, in the highest dependance with the carcass conformation grade ($r_{xy} = 0,852$). Corresponding determination coefficient ($r^2 \times 100$) of 72,6% confirms influence of muscular fulfilment of leg, thus its greater volume, on carcass

conformation grade. Also, from examined linear measures, satisfying indicators of carcass conformation are surface of m.longissimus dorsi ($r^2 \times 100 = 61,3\%$), measure articulus genus - articulus scapulo-humeralis ($r^2 \times 100 = 66,9\%$) and depth of breast ($r^2 \times 100 = 67,9\%$). The same or similar linear measures, for estimating quality and value of lambs carcasses, also were used by other authors (Khandekar et al., 1965; Spurlock et al., 1966; Hawkins et al., 1981; Lirette et al., 1984; Barron et al., 1987).

Results established for weight of chilled carcasses and left sides of different conformation grades and datas on participation (%) of primal cuts in weight of chilled left sides with different conformation grades, are presented in Table 2. Obvious tendency was expressed that lambs carcasses

Table 2.- Participation of primal cuts in lambs carcasses (sides) with different conformation grades

		C o n f o r m a t i o n g r a d e s							
		CG ₅		CG ₄		CG ₃		CG ₂	
		\bar{x}	Cv	\bar{x}	Cv	\bar{x}	Cv	\bar{x}	Cv
Weight of chilled carcass (kg)		16,28	8,28	11,51	8,50	7,89	7,82	5,48	7,59
Weight of chilled left side (kg)		8,11	7,16	5,67	9,82	3,95	8,45	2,73	8,94
P r i m a l (%*) c u t s	long leg	31,80	4,33	32,93	5,13	33,45	5,39	35,13	7,58
	loin	15,09	8,58	13,65	8,78	12,70	7,02	11,87	7,15
	rack	10,24	9,16	10,94	8,90	11,68	8,06	11,77	8,74
	shoulder	18,27	6,48	17,66	7,48	17,31	7,43	16,86	8,46
	breast	18,58	9,73	18,04	8,85	17,00	9,95	15,65	8,45
	neck	6,02	5,10	6,78	6,42	7,86	6,88	8,72	7,85
m.long.dorsi (%*)		5,12	8,69	5,05	7,22	4,96	7,82	4,63	7,99

* - % calculated on weight of chilled left side

(and their left sides) of greater average weight has significantly more favorable conformation grades ($p < 0,01$). With

decreasing conformation grades, average weight of carcasses (sides) is regularly decreased. Thus, related to average carcasses weight of excellent (CG₅) conformation, average carcasses (sides) weight of very good conformation (CG₄) is lower for about 30%, for good conformation (CG₃) about 51%, and for carcasses (sides) of the lowest (CG₂) conformation for about 66%.

This, certainly, confirms connection between weight of carcass and conformation grade, but also it confirms need of using both indicators for lambs carcasses quality evaluation. Regarding participation (%) of primal cuts in weight of carcasses (sides) of different conformation grades, similar tendencies to mentioned above were established. Namely, average participation of all primal cuts declines as conformation grades decline ($p < 0,01$). Exception is long leg (hind shank on) where completely opposite trend is expressed. Main role in this has greater part of hind shank in primal cuts (long leg) that comes from carcasses with poor conformation, which usually has longer and havier hind

Table 3.- Correlation interdependences between conformation grades and participations (%) of primal cuts in lambs carcasses

Conformation grades (X)	P r i m a l c u t s - %* (Y)			
	Weight (kg) of		long leg	loin
	carcass	side		
	0,952**	0,948**	0,522**	0,741**
	rack	schoulder	breast with fore shank	neck
	0,695**	0,538**	0,562**	0,503**

* - % calculated on weight of chilled left side;

** - $p < 0,01$

shank. Results of correlation analysis between conformation

grades and participations (%) of primal cuts of lambs carcasses are shown in the Table 3.

Very high and statistically significant ($p < 0,01$) correlation dependance was found between conformation grades and weight of chilled carcass ($r_{xy} = 0,952$), respectively weight of chilled left side ($r_{xy} = 0,948$). Corresponding determination coefficient for carcass weight - $r^2 \times 100 = 90,6\%$ and weight of left side - $r^2 \times 100 = 89,9\%$, only confirm that. Also, medium and statistically very significant ($p < 0,01$) correlation dependances between conformation and primal cuts participation (%) of chilled left sides we established. The greatest values were obtained for loin ($r_{xy}=0,741$) and rack ($r_{xy}=0,695$), and the smallest correlation dependance was obtained for neck ($r_{xy} = 0,503$). Otherwise, connection between weight of lambs carcasses and conformation grades, as weight of carcasses and primal cuts, also was established by other authors (James et al., 1971; Radovanović, 1974; Hawkins et al., 1981; Spradling et al., 1987; Powell et al., 1988; Žujović et al., 1989).

CONCLUSIONS: Based on the results, obtained in the conditions of our examinations, following conclusions may be drawn: 1. Weight of carcass as objective and conformation grade as subjective indicators are in very high ($r_{xy}=0,952$) and statistically very significant ($p < 0,01$) correlation dependence and they could be used as reliable indicators of line carcass evaluation. Regarding primal cuts, the greatest correlation dependance was established between conformation grades and participation of loin in weight of chilled left side ($r_{xy}= 0,741$; $p < 0,01$). 2. Among examined linear measures, the most reliable indicators of conformation are leg circumference ($r^2 \times 100 = 72,6\%$), depth of breast ($r^2 \times 100 = 66,9\%$) and surface of m.longissimus dorsi ($r^2 \times 100 = 61,3\%$).

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