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RESEARCH ON THE QUALITY OF CATTLE CARCASSES BASED ON DIFFERENT INFLUENCE FACTORS

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Abstract

Among animal products, meat ranks first due to its high content of high-quality protein, high digestibility, and complex chemical composition that covers the needs of the human body. The notion of `quality` represents a combination of several factors such as sensory, nutritional, technological and hygienic. Regardless of the breed, the quality of cattle carcasses is influenced by internal factors related to the animal, namely the age of the animal - young animals have more tender meat at slaughter, sex - males give a greater amount of meat in the carcass, but the quality is superior to females, as they have a better feed conversion, the meat-to-fat ratio being better, health status - sick cattle lose weight, thus producing carcasses of poorer quality, and external factors such as nutrition - this influences the quality both through the type of feeding and its level, microclimate and exploitation conditions, the method of slaughter - starting from transport to slaughter.

Key words*: cattle, carcass, quality, slaughter indices.*

INTRODUCTION

Given that the human population is constantly growing and food requirements are high, their variety is increasingly vast and complex. Regardless of their nature, food products have particular importance depending on their origin (Hocquette et al., 2014; Jurco et al., 2020; Țenu et al., 2022; Davis et al., 2024).

Among animal products, meat ranks first due to its high content of proteins, fats, mineral salts, high content of essential amino acids, high digestibility and suitability for various culinary products. It is the main source of high-quality protein. Its nutritional value depends primarily on its chemical composition, therefore on the species. Balanced consumption of meat provides essential amino acids, which play a role in the formation of nucleoproteins and enzymes that activate the vital functions and processes of the human body. In the livestock sector, meat represents the main production in terms of protein, quantity and value (Davis et al., 2024).

Beef consumption is an important source of daily human consumption. Even though the price of beef is higher than other types of meat, the trend of diversification and consumption of meat and beef products is increasing, due to the multitude of benefits and elements that it contains (Soulat et al., 2018).

The quality of animals for meat after slaughter, respectively the assessment of the quality of carcasses, can be established by assessing the following elements: conformation, fattening status, fineness, color and consistency of the muscles. These elements of the quality of a carcass depend on invariable factors (species, breed, sex, age) and variable factors (maintenance conditions, nutrition, etc.) (Clinquart et al., 2022; Ianițchi et al., 2024).

MATERIALS AND METHODS

The research was carried out in a slaughterhouse in the north of Argeș County, which is equipped with slaughter lines for large and small ruminants, as well as for pigs. In order to carry out this work, visits were made to the slaughterhouse unit under study. It is a slaughterhouse with an uninterrupted activity

for over 30 years, having been established in 1993, during which time it has continuously developed, reaching the development of slaughtering and processing meat products, as well as their valorization in its own stores.

The actual research work consisted of analyzing stunning-bleeding methods, weighing animals before slaughter, determining the weight of the carcass when cold, when hot, determining the weight of organs such as the heart, lungs, liver, kidneys, intestines and gastric compartments, tongue, brain. Also, the organoleptic examination of the meat was carried out, which is used to determine the quality of the meat and carcass.

The actual analysis was carried out on 12 specimens from the female and male youth category aged 12-18 months, 12 adult female cattle specimens and 7 individuals from the adult male cattle category.

The slaughtered cattle came from farms with a semi-intensive breeding type, both young and adult cattle being exploited in a mixed fattening system, grazing and sheltered.

The cattle breeds analyzed and discussed were: Baltata Romaneasca, Belgian Blue and Aberdeen Angus.

The Baltata Romaneasca breed belongs to the meat-milk morphoproductive type, characterized by high adaptability to growing conditions, very good slaughter indices - quantitative and qualitative -, superior quality of meat, tasty and rich in nutrients and low subcutaneous fat content. Cows reach weights of up to 600 kg, while bulls can reach up to 900kg, and 12-month-old male youth reaches weights of up to 360-390 kg (euromeat.ro).

The Belgian Blue is a meat breed, with low milk production. The breed gets its name from its characteristic blue-gray coat color, but the color can vary from completely white to black. It surpasses all other beef breeds in carcass yield, reaching up to 80%. Adult cows weigh up to 900 kg, and some bulls can weigh up to 1300 kg (euromeat.ro).

The Aberdeen Angus cattle breed is recognized for the multiple advantages generated by its high adaptability to living conditions and presents excellent growth and high carcass performance, finishing Angus cattle being faster than other breeds. Females weigh on average around 550 kg, and bulls approx. 850 kg, most of the weight being given by the developed muscle mass (euromeat.ro).

The data recorded following the determinations carried out in the slaughterhouse were analyzed and interpreted statistically, and the following statistical indicators were obtained:

- arithmetic mean ($\bar{X}$):

$$\bar{x} = \frac{\sum x}{n}$$

$\sum x$ - represents the sum of the performances;

n - the number of individuals.

- the variance (S^2): $S^2=\sum x^{2/}n-1$

x - the measured value of each individual;

n - the number of individuals;

- the standard deviation (S):

$$S=\sqrt{S^2}$$

- coefficient of variability (CV %):

$$CV\ \% = \frac{S\bar{X}}{\bar{X}} * 100$$

- error of the mean ($S\bar{X}$):

$$S\bar{X} = \sqrt{\frac{S_{\bar{X}}^2}{n}}$$

The sensory analysis methods were the following: appearance, color, odor, fat characteristics and consistency.

The results obtained were compared with existing data in the specialized literature and with those obtained in similar research.

RESULTS AND DISCUSSIONS

Sensory analysis of meat. The organoleptic qualities of beef are influenced by several factors such as age, sex, rearing system, fattening level and anatomical regions. Following the organoleptic examination, the organoleptic characteristics of fresh meat, relatively fresh meat and spoiled meat were observed. For each sex and age category of the three breeds studied, the sensory analysis of meat was carried out using the same principle of the method (Tables 1, 2, 3). Regarding the analysis of appearance and color, these were performed in light as close to natural as possible, observing both the surface and the section, providing overall information on the examined meat. The smell provides information about the state of freshness of the meat and is determined by directly smelling the

meat both on the section and on the surface. The sensory analysis regarding the characteristics of the fat was carried out by observing its color and consistency when touched. The consistency of the meat was determined by touching it, by pressing with the finger in several areas, noting the characteristics of the fingerprint and the state of elasticity.

Table 1. Organoleptic characteristics of fresh meat - in all analyzed individuals

CHARACTERISTICS	YOUNG CATTLE	ADULT CATTLE
APPEARANCE	Glossy, slightly moist, colored surface, clean appearance, vascularized muscles, pearly white connective tissue, and elastic.	Glossy, slightly moist, intensely colored surface, clean appearance, intensely vascularized muscles, pearly white connective tissue, and elastic.
COLOR	Light pink-red color. In section, the color is characteristic of the anatomical portion.	Shades of red, to dark red depending on the body region. In section, the color is characteristic of the anatomical portion.
SMLELL	Pleasant, characteristic.	Pleasant, characteristic.
FAT CHARACTERISTICS	The fat is soft, greasy, does not crumble, and is yellowish-white in color.	The fat is soft, greasy, does not crumble, and is yellowish-white in color.
CONSISTENCY	soft and elastic both on the surface and in section. It does not leave an imprint when pressed with a finger and quickly returns to its original shape.	soft and elastic both on the surface and in section. It does not leave an imprint when pressed with a finger and quickly returns to its original shape.

Table 2. Organoleptic characteristics of meat in a relatively fresh state - in all analyzed individuals

CHARACTERISTICS	YOUNG CATTLE AND ADULT CATTLE
APPEARANCE	On the surface, it presents a dry film or is partially covered with a small amount of mucus, the fat has a matte appearance and low consistency, the connective tissue decreases in gloss.
COLOR	Both on the surface and in section, the color is darker than fresh meat.
SMELL	It has a slightly acidic odor, which can be perceived as a faint odor of mold or stale meat.
FAT CHARACTERISTICS	More intensely colored towards yellow, it decreases in consistency and takes on a matte appearance.
CONSISTENCY	The consistency is reduced, both on the surface and in section. Fingerprints return more slowly, but completely.

Table 3. Organoleptic characteristics of meat in an altered state - in all analyzed individuals

CHARACTERISTICS	YOUNG CATTLE AND ADULT CATTLE
APPEARANCE	It has a dry surface, sometimes wet and sticky, most often showing mold spots.
COLOR	It has a gray, dirty color with a rancid appearance.
SMELL	Characteristic smell of spoiled meat, unpleasant.
FAT CHARACTERISTICS	The fat has a matte appearance.
CONSISTENCY	The consistency is low, fingerprints persist.

Regarding the weight of various parameters according to breed, weighings of organs, such as the heart, lungs, liver, brain, tongue, stomach, intestine, kidneys, head, tail, blood, skin, digestive tract contents, were performed on individuals according to breed, sex and age.

I calculated the average of both live and organ weights of individuals weighed at the slaughterhouse.

Live animals were also weighed upon arrival at the slaughterhouse, as were warm and cold carcasses.

Regarding the hot carcass weight of the Baltata Romaneasca breed, it represents 55% of the total live weight, while the cold carcass weight represents 53.9%, the difference between the two being 1.1%. In the Belgian Blue breed, the hot carcass weight represents 65.87%, while

the cold carcass weight has a percentage of 64.43%, between the two being a difference of 1.43%. The hot carcass of young Aberdeen Angus represents 66% of the total live weight, and the cold carcass represents 64.47%, the difference between the two being 1.53%.
The hot carcass weight of adult female cattle of the Baltata Romaneasca breed represents 49% of the total live weight, and the cold carcass 48.16%, the difference between the two being 0.84%. Regarding adult females of the Belgian Blue breed, the hot carcass represents 60.55% of the live weight, and the cold carcass has a percentage of 59.32%, between the two being a difference of 1.22%. In the Aberdeen Angus breed, the hot carcass weight has a percentage of 60.67% of the live weight, and the cold carcass 59.46% of the live weight, the difference between the two being 1.20%.
The hot weight of adult males in the Baltata Romaneasca breed represents 49% of the live weight, while the cold carcass weight represents 47.93%, with a difference of 1.06%. As for the Belgian Blue breed, the hot carcass weight of males represents 60.50% of the live weight, while the cold carcass weight has a percentage of 59.29%, with a difference of 1.21%. The Aberdeen Angus breed males have a hot carcass weight of 60.01% of the live weight, and the cold carcass weight is 58.82%, with a difference of 1.87%.

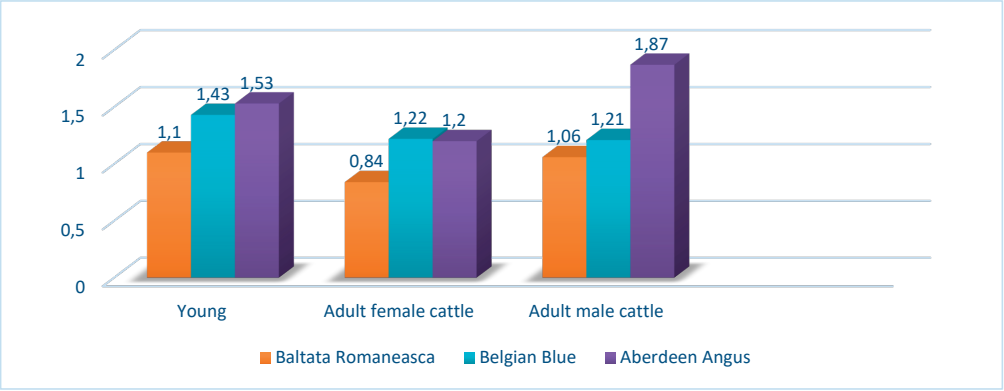

Figure 1. Percentage differences between hot and cold carcass weight according to age in the three breeds analyzed

Table 4. Calculation of statistical parameters for live and post-slaughter weight in young animals

Breed	Statistical parameters	Body mass analysis		
		Live weight (kg)	Hot carcass weight (kg)	Cold carcass weight (kg)
Baltata Romaneasca (age 12-18 months)	n	12	12	12
	$X \pm S_X$	364.5±1.09	201±0.19	197±0.20
	S	3.79	0.65	0.21
	CV (%)	1.03	0.32	0.11
Belgian Blue (age 12-18 months)	n	12	12	12
	$X \pm S_X$	409.4±0.94	269.7±0.20	263.8±0.26
	S	3.27	0.72	0.90
	CV (%)	0.79	0.27	0.34
Aberdeen Angus (age 12-18 months)	n	12	12	12
	$X \pm S_X$	423.3±0.48	279.4±0.16	272.9±0.25
	S	1.66	0.54	0.86
	CV (%)	0.39	0.19	0.32

Table 5. Calculation of statistical parameters for live and post-slaughter weight in adult male cattle

Breed	Statistical parameters	Body mass analysis		
		Live weight (kg)	Hot carcass weight (kg)	Cold carcass weight (kg)
Baltata Romaneasca (age 4-8 years)	n	7	7	7
	$X \pm S_X$	746.6±0.31	365.9±0.50	357.9±0.32
	S	0,82	1.32	0.85
	CV (%)	10.98	0.36	0.24
Belgian Blue (age 4-8 years)	n	7	7	7
	$X \pm S_X$	831.4±0.45	503±0.34	493±0.38
	S	1.21	0.91	1
	CV (%)	0.14	0.18	0.20
Aberdeen Angus (age 4-8 years)	n	7	7	7
	$X \pm S_X$	818.9±0.32	491.5±0.39	481.7±0.33
	S	0.86	1.03	0.88
	CV (%)	0.10	0.21	0.18

Table 6. Calculation of statistical parameters for live and post-slaughter weight in adult female cattle

Breed	Statistical parameters	Body mass analysis		
		Live weight (kg)	Hot carcass weight (kg)	Cold carcass weight (kg)
Baltata Romaneasca (age 4-8 years)	n	12	12	12
	$X \pm S_X$	519.1±0.58	254.4±0.26	250±0.35
	S	2.03	0.89	1.21
	CV (%)	0.39	0.35	0.48
Belgian Blue (age 4-8 years)	n	12	12	12
	$X \pm S_X$	561.8±0.59	340.2±0.33	333.3±0.31
	S	2.05	1.13	1.06
	CV (%)	0.10	0.33	0,32
Aberdeen Angus (age 4-8 years)	n	12	12	12
	$X \pm S_X$	545.7±1.04	331.1±0.29	324.5±0.34
	S	3.61	1.02	1.17
	CV (%)	0.66	0.31	0.36

Table 4 shows the statistical data calculated based on live weight, hot and cold carcass weight of the young of the three analyzed breeds.

Regarding live weight, for the young of the Baltata Romaneasca breed, the average live weight was 365.4 kg and the coefficient of variability was 1.03%, for the Belgian Blue breed, the young had an average live weight of 409.4 kg and the coefficient of variability was 0.79%, and for the young of the Aberdeen Angus breed, the average live weight was 423.3 kg, resulting in a coefficient of variability of 0.39%. Considering the value of the coefficient of variability in all three situations (<15%), it is considered that there is a low degree of variability in the respective sample, and the average established at the sample level is representative of the entire population of individuals under discussion.

Analyzing the values of the hot carcass weights, for the Baltata Romaneasca breed the average weight value was 201 kg, and the coefficient of variability 0.32%, for the Belgian Blue breed the average weight was 269.7 kg and the coefficient of variability 0.27%, and for the Angus breed, the average value of the hot carcass weight was 279.4 kg, the coefficient of variability being 0.21%. Observing the value of the coefficient of variability in all three situations (<15%), it is considered that in the respective sample there is a small degree of variability and the average established at the sample level is representative for the entire population of individuals under discussion.

The cold carcass weight recorded average values such as: 197 kg for the young of the Balata Romaneasca breed and the coefficient of variability 0.11%, 263.8 kg for the young of the Belgian Blue breed and the coefficient of variability 0.34%, and for the young of the Aberdeen Angus breed the cold carcass had an average weight of 272.9 kg, and the coefficient of variability was 0.32%. The value of the coefficient of variability in all three situations was less than 15% and it is considered that

there is a low degree of variability in the respective sample, and the average established at the sample level is representative of the entire population of individuals under discussion.

Table 5 shows the average values of live weights, hot carcasses and cold carcasses of the males of the three analyzed breeds. Thus, the live weight for the males of the Baltata Romaneasca breed was 746.6 kg, and the coefficient of variability was 10.98%, for the Belgian Blue breed the average weight was 831.4 kg and the coefficient of variability was 0.14%, and for the Angus breed, the males had an average live weight of 818.9 kg and the coefficient of variability was 0.10%.

Regarding the average weight of the hot carcasses, it is observed that for the Baltata Romaneasca breed, their average value was 365.9 kg, and the coefficient of variability 0.36%, for the Belgian Blue breed the average weight was 503 kg and the coefficient of variability 0.18%, and for the Aberdeen Angus breed, the average weight was 491.5 kg, and the coefficient of variability 0.21%.

The average weight of the cold carcass was 357.9 kg for the Baltata Romaneasca males and the coefficient of variability 0.24%, 493 kg and the coefficient of variability 0.20% for the Belgian Blue males, and for the Aberdeen Angus males, 481.7 kg and the coefficient of variability 0.18%. Analyzing the value of the coefficient of variability for all three categories of weights analyzed in males - live, hot carcass and cold carcass, it is observed that it is less than 15% in all three cases and it is considered that in the respective sample there is a small degree of variability, and the average established at the sample level is representative of the entire population of individuals under discussion.

Table 6 illustrates the data obtained from the statistical analysis of live weights, hot carcass weights and cold carcass weights of adult females of the three breeds analyzed. Regarding live weight, average values were obtained as follows: 519.1 kg and a coefficient of variation of 0.39% for females of the Baltata Romaneasca breed, 561.8 kg and a coefficient of variation of 0.10% for the Belgian Blue breed and 545.7 kg and a coefficient of variation of 0.66% for females of the Angus breed.

Hot carcass weight. For the Baltata Romaneasca breed, the hot carcass weight was 254.4 kg, and the coefficient of variability was 0.35%. For the Belgian Blue females, its value was 340.2 kg, and the coefficient of variability was 0.33% and for the Aberdeen Angus breed, the hot carcass weight was 331.1 kg, and the coefficient of variability was 0.31%.

The cold carcass weight values were 250 kg for the Baltata Romaneasca breed and the coefficient of variability 0.48%, for the Belgian Blue breed 333.3 kg and the coefficient of variability 0.32%, and for the Angus females the average cold carcass weight was 324.5 kg and the coefficient of variability 0.36%.

Analyzing the value of the coefficient of variability for all three categories of weights analyzed in females, it is observed that in all three situations it was less than 15% and it is considered that in the respective sample there is a small degree of variability, and the average established at the sample level is representative for the entire population of individuals under discussion.

Tables 7, 8 and 9 show the data obtained from the statistical analysis of the mass of the organs studied for the three breeds, depending on age and sex.

Thus, regarding the youth of the three breeds, data such as: blood for the Baltata Romaneasca breed the average weight was 12.0 kg and the coefficient of variability was 4.33%, for the Belgian Blue breed, the average weight was 13.65 kg and the coefficient of variability was 2.19% of the average weight, the Aberdeen Angus; 14.40 kg, corresponding to the coefficient of variability of 2.27%; tail, for the Baltata Romaneasca breed its average weight was 1.85 kg and the coefficient of variability 8.10%, for the Belgian Blue breed 1.87 kg and the coefficient of variability 14.43%, and for the Angus breed, the average weight was 2.54 and the coefficient of variability 12.5%. The average head weight was 13.31 kg in the young Baltata Romaneasca breed, and the coefficient of variability 1.68%, for the Belgian Blue breed it was 14.85 kg and the coefficient of variability 1.68%, and for the Angus breed, the average weight was 15.40 kg and the coefficient of variability 2.01%. For the tongue,

the average weight was 2.23kg for the young of the Baltata Romaneasca breed and the coefficient of variability 9.86%, 2.54 kg and 8.26% coefficient of variability for the Belgian Blue breed and 2.57 kg and 12.06% coefficient of variability for the Angus breed. The brain, with an average weight of 0.67 kg and a coefficient of variability of 29.8% for the Baltata Romaneasca breed, 0.71 kg and a coefficient of variability of 26.7% for the Belgian Blue breed and 0.78 kg average weight and 23.08% coefficient of variability. The heart had an average weight of 2.30 kg and a coefficient of variability of 9.56% for the young Baltata Romaneasca breed, for the Belgian Blue breed the average weight was 2.25 kg and a coefficient of variability of 10.19% and for the Angus breed, the average weight was 2.61 kg and a coefficient of variability of 11.46%. The lungs recorded values such as, 4.44 kg average weight and 5.18% coefficient of variability for the young Baltata Romaneasca breed, 5.0 kg average weight and a coefficient of variability of 10% for the Belgian Blue breed, and for the Aberdeen Angus breed, the average weight of the lungs was 5.13 kg and a coefficient of variability of 4.87%. The liver had an average weight of 5.54 kg for the Baltata Romaneasca breed and a coefficient of variation of 5.41%, 6.21 kg for the Belgian Blue breed and a coefficient of variation of 4.18%, and 6.40 kg for the Angus breed and a coefficient of variation of 3.43%. For the kidneys, the average weight was for the Baltata Romaneasca breed 1.02 kg and a coefficient of variation of 20.5%, for the Belgian Blue breed 1.12 kg and a coefficient of variation of 23.77%, and 1.09 kg for the Aberdeen Angus breed and a coefficient of variation of 19.26%. The stomach, for the Baltata Romaneasca breed, had an average weight of 7.75 kg and a 2.71% coefficient of variability, for the Belgian Blue breed, 8.70 kg average weight and 2.87% coefficient of variability, and 9.0 kg average weight and 3.33% coefficient of variability for the Aberdeen Angus breed. For the intestine, values such as: 7.79 kg average weight and 3.47% coefficient of variability for the Baltata Romaneasca breed, 8.65 kg and 3.47% coefficient of variability for the Belgian Blue breed and 8.98 kg average weight and 2.44% coefficient of variability for the Angus breed were obtained. For the skin, for the young of the Baltata Romaneasca breed the average weight was 22.10 kg and 1.18% coefficient of variability, for the Belgian Blue breed the average weight was 25.0 kg and the coefficient of variability 1%, and for the Angus breed, the average weight was 25.65 kg and 1.20% coefficient of variability.

Table 7. Weight of organs from the Baltata Romaneasca breed

Baltata Romaneasca breed	Statistical parameters	Organ weight analysis (kg)											
		Blood	Tail	Head	Tongue	Brain	Heart	Lungs	Liver	Kidney	Stomach	Intestine	Skin
Young	n	12	12	12	12	12	12	12	12	12	12	12	12
	$X \pm S_X$	12.0 ±0.15	1.85 ±0.05	13.31 ±0.05	2.23 ±0.06	0.67 ±0.06	2.30 ±0.07	4.44 ±0.06	5.54 ±0.08	1.02 ±0.06	7.75 ±0.06	7.79 ±0.08	22.10 ±0.08
	S	0.52	0.15	0.15	0.22	0.20	0.22	0.23	0.30	0.21	0.21	0.27	0.26
	CV(%)	4.33	8.10	1.13	9.86	29.8	9.56	5.18	5.41	20.5	2.71	3.47	1.18
Adult cattle - females	n	12	12	12	12	12	12	12	12	12	12	12	12
	$X \pm S_X$	15.10 ±0.08	2.01 ±0.06	19.0 ±0.09	3.01 ±0.06	0.74 ±0.06	2.93 ±0.09	5.70 ±0.07	7.56 ±0.07	1.10 ±0.06	16.04 ±0.06	15.99 ±0.08	42.45 ±0.08
	S	0.28	0.22	0.30	0.22	0.23	0.30	0.24	0.25	0.22	0.23	0.28	0.28
	CV(%)	1.85	10.94	1.56	7.31	31.08	10.23	4.21	3.31	20	1.43	1.75	0.66
Adult cattle - males	n	7	7	7	7	7	7	7	7	7	7	7	7
	$X \pm S_X$	22.40 ±0.12	2.49 ±0.13	27.39 ±0.14	3.75 ±0.13	0.90 ±0.11	3.75 ±0.12	5.72 ±0.11	8.72 ±0.14	1.50 ±0.13	21.81 ±0.14	21.77 ±0.15	62.20 ±0.13
	S	0.32	0.35	0.37	0.34	0.30	0.30	0.28	0.35	0.33	0.36	0.38	0.35
	CV(%)	1.43	14.05	1.35	9.06	33.3	8	7.50	4.01	22	1.65	1.74	0.56

Table 8. Weight of organs from the Belgian Blue breed

Belgian Blue breed	Statistical parameters	Organ weight analysis (kg)											
		Blood	Tail	Head	Tongue	Brain	Heart	Lungs	Liver	Kidney	Stomach	Intestine	Skin
Young	n	12	12	12	12	12	12	12	12	12	12	12	12
	$X \pm S_X$	13.65 ±0.09	1.87 ±0.08	14.85 ±0.07	2.54 ±0.06	0.71 ±0.06	2.25 ±0.08	5.00 ±0.09	6.21 ±0.08	1.12 ±0.08	8.70 ±0.07	8.65 ±0.07	25.0 ±0.07
	S	0.30	0.27	0.25	0.21	0.19	0.26	0.30	0.26	0.29	0.25	0.25	0.25
	CV(%)	2.19	14.43	1.68	8.26	26.7	10.19	10	4.18	23.77	2.87	2.89	1
Adult cattle - females	n	12	12	12	12	12	12	12	12	12	12	12	12
	$X \pm S_X$	16.32 ±0.08	2.12 ±0.06	20.4 ±0.09	3.06 ±0.06	0.87 ±0.06	3.06 ±0.06	6.10 ±0.06	8.15 ±0.07	1.25 ±0.05	17.35 ±0.06	17.37 ±0.06	46.0 ±0.09
	S	0.28	0.22	0.30	0.20	0.22	0.22	0.23	0.24	0.18	0.19	0.21	0.30
	CV(%)	1.71	10.37	1.47	9.80	25.28	7.18	3.77	2.94	14.4	1.09	1.21	0.65
Adult cattle - males	n	715	7	7	7	7	7	7	7	7	7	7	7
	$X \pm S_X$	25.0 ±0.15	2.76 ±0.1	30.5 ±0.11	4.16 ±0.16	1.0 ±0.16	4.16 ±0.14	8.30 ±0.14	9.71 ±0.14	1.70 ±0.1	24.35 ±0.12	24.29 ±0.16	70.0 ±0.21
	S	0.41	0.28	0.31	0.43	0.41	0.36	0.37	0.36	0.27	0.31	0.41	0.57
	CV(%)	1.64	10.14	1.02	10.33	41	8.65	4.45	3.70	15.88	1.27	1.68	0.81

Table 9. Organ weight from Aberdeen Angus breed

Aberdeen Angus breed	Statistical parameters	Organ weight analysis (kg)											
		Blood	Tail	Head	Tongue	Brain	Heart	Lungs	Liver	Kidney	Stomach	Intestine	Skin
Young	n	12	12	12	12	12	12	12	12	12	12	12	12
	$X \pm S_X$	14.40 ±0.09	2.54 ±0.08	15.40 ±0.16	2.57 ±0.09	0.78 ±0.05	2.61 ±0.09	5.13 ±0.07	6.40 ±0.06	1.09 ±0.06	9.0 ±0.09	8.98 ±0.06	25.65 ±0.09
	S	0.32	0.28	0.31	0.31	0.18	0.30	0.25	0.22	0.21	0.30	0.22	0.31
	CV(%)	2.27	12.5	2.01	12.06	23.07	11.49	4.87	3.43	19.26	3.33	2.44	1.20
Adult cattle - females	n	12	12	12	12	12	12	12	12	12	12	12	12
	$X \pm S_X$	15.93 ±0.08	2.75 ±0.09	20.0 ±0.09	2.98 ±0.06	0.83 ±0.04	3.0 ±0.08	5.94 ±0.06	7.94 ±0.1	1.15 ±0.06	16.85 ±0.06	16.80 ±0.07	44.24 ±0.09
	S	0.28	0.32	0.30	0.22	0.16	0.31	0.23	0.32	0.20	0.23	0.24	0.30
	CV(%)	1.75	11.63	1.50	7.38	19.27	10.33	3.87	4.03	17.39	1.36	1.42	0.68
Adult cattle - males	n	7	7	7	7	7	7	7	7	7	7	7	7
	$X \pm S_X$	24.57 ±0.12	3.0 ±0.11	30.02 ±0.14	4.10 ±0.15	1.01 ±0.14	4.08 ±0.16	8.20 ±0.14	9.54 ±0.15	1.63 ±0.1	23.89 ±0.15	23.90 ±0.15	68.21 ±0.11
	S	0.33	0.31	0.36	0.42	0.37	0.43	0.38	0.42	0.26	0.40	0.41	0.29
	CV(%)	1.35	10.33	1.20	10.24	36.6	10.53	4.63	4.40	15.9	1.67	1.71	0.42

Analyzing the value of the coefficient of variability for blood, tail, head, tongue, heart, lungs, liver, stomach, intestines and skin, it is observed that these are less than 15% for all three breeds, which means that in the respective samples there is a small degree of variability, and the average established at the level of each sample is representative of the entire number of individuals analyzed.

For the brain and kidney organs, the coefficient of variability was between 15-30% and it is considered that the variability is medium, and the average is sufficiently representative.

Analysis of statistical parameters in adult female cattle, for the three breeds taken into study. Blood, for the Baltata Romaneasca breed had an average weight of 15.10 kg and a coefficient of variability of 1.85%, for the Belgian Blue breed, the average weight was 16.32 kg and a coefficient of variability of 1.71%, and for the Aberdeen Angus breed, the average weight was 15.93 kg, corresponding to a coefficient of variability of 1.75%; tail, for the Baltata Romaneasca breed its average weight was 2.01 kg and the coefficient of variability 10.94%, for the Belgian Blue breed 2.12 kg and the coefficient of variability

10.37%, and for the Angus breed, the average weight was 2.75 kg and 11.63%. The average head weight was 19.0 kg for the Baltata Romaneasca breed and the coefficient of variability was 1.56%, for the Belgian Blue breed it was 20.4 kg and the coefficient of variability was 1.47%, and for the Angus breed, the average weight was 20.0 kg and the coefficient of variability was 1.50%. For the tongue, the average weight was 3.01 kg for the Baltata Romaneasca breed and the coefficient of variability was 7.31%, 3.06 kg average weight and 9.80% coefficient of variability for the Belgian Blue breed and 2.98 kg and the coefficient of variability was 7.38% for the Angus breed. The brain, with an average weight of 0.74 kg and a coefficient of variability of 31.08% for the Baltata Romaneasca breed, 0.87 kg and a coefficient of variability of 25.28% for the Belgian Blue breed and 0.83 kg average weight and 19.27% coefficient of variability for the Angus breed. The heart had an average weight of 2.93 kg and a coefficient of variability of 10.23% for the Baltata Romaneasca breed, for the Belgian Blue breed the average weight was 3.06 kg and a coefficient of variability of 10.19% and for the Angus breed, the average weight was 3.0 kg and a coefficient of variability of 10.33%. The lungs recorded values such as 5.70 kg average weight and 4.21% coefficient of variability for adult females of the Baltata Romaneasca breed, 6.10 kg average weight and 3.77% coefficient of variability for the Belgian Blue breed, and for the Aberdeen Angus breed, the average weight of the lungs was 5.94 kg and 3.87% coefficient of variability. The liver had an average weight of 7.56 kg for the Baltata Romaneasca breed and 3.31% coefficient of variability, 8.15 kg average weight and 2.94% coefficient of variability for the Belgian Blue breed and 7.94 kg average weight and 4.03% coefficient of variability for the Angus breed. For the kidneys, the average weight was for the Baltata Romaneasca breed 1.10 kg and the coefficient of variability 20%, for the Belgian Blue breed 1.25 kg average weight and 14.4% coefficient of variability and 1.15 kg average weight, and the coefficient of variability 17.39% for the Aberdeen Angus breed. The stomach, for the Baltata Romaneasca breed had an average weight of 16.04 kg and 1.43% coefficient of variability, for the Belgian Blue breed, 17.35 kg average weight and 1.21% coefficient of variability and 16.85 kg average weight and 1.36% coefficient of variability for the Aberdeen Angus breed. For the intestine, values such as: 15.99 kg average weight and 1.75% coefficient of variability for the Baltata Romaneasca breed, 17.37 kg and 1.21% coefficient of variability for the Belgian Blue breed and 16.80 kg average weight and 1.42% coefficient of variability for the Angus breed were obtained. For the skin, for the Baltata Romaneasca breed the average weight was 42.45 kg and 0.66% coefficient of variability, for the Belgian Blue breed the average weight was 46.0 kg and 0.65% coefficient of variability, and for the Angus breed, the average weight was 44.24 kg and 0.68% coefficient of variability. Analyzing the value of the coefficient of variability for blood, tail, head, tongue, heart, lungs, liver, stomach, intestines and skin, it is observed that it is less than 15% for all adult female cattle of the three breeds, which means that there is a low degree of variability in the respective samples, and the average established at the level of each sample is representative of the entire population of individuals analyzed. For the brain in the Belgian Blue and Angus breeds and the kidneys in the Baltata Romaneasca and Aberdeen Angus breeds, the value of the coefficient of variability was between 15-30% and it is considered that the variability is medium, and the average is sufficiently representative. The value of the coefficient of variability for the brain in the Baltata Romaneasca is greater than 30%, which means that there is a high degree of variability in the sample, and the average is low.

Analysis of statistical parameters in adult male cattle, for the three breeds studied. Blood, for males of the Baltata Romaneasca breed, had an average weight of 22.40 kg and a coefficient of variability of 1.43%, for the Belgian Blue breed, the average weight was 25.0 kg and a coefficient of variability of 1.64%, and for the Aberdeen Angus breed, the average weight was 24.57 kg, corresponding to a coefficient of variability of 1.35%; tail, for the Baltata Romaneasca breed its average weight was 2.49 kg and the coefficient of variability 14.05%, for the Belgian Blue breed 2.76 kg and the

coefficient of variability 10.14%, and for the Angus breed, the average weight was 3.0 kg and 10.33%. The average head weight was 27.39 kg for males of the Baltata Romaneasca breed, and the coefficient of variability 1.35%, for the Belgian Blue breed it was 30.5 kg and the coefficient of variability 1.02%, and for the Angus breed, the average weight was 30.02 kg and the coefficient of variability 1.20%. For the tongue, the average weight was 3.75 kg for the Baltata Romaneasca breed and the coefficient of variability 8%, 4.16 kg average weight and 10.33% coefficient of variability for the Belgian Blue breed and 4.10 kg and 10.24% coefficient of variability for the Angus males. The brain, with an average weight of 0.90 kg and a coefficient of variability of 33.3% for the Baltata Romaneasca breed, 1.0 kg and a coefficient of variability of 41% for the Belgian Blue breed and 1.01 kg average weight and 36.6% coefficient of variability for the Angus breed. The heart had an average weight of 3.75 kg and a coefficient of variability of 8% for the Baltata Romaneasca breed, for the Belgian Blue breed the average weight was 4.16 kg and a coefficient of variability of 8.65% and for the Angus breed, the average weight was 4.08 kg and a coefficient of variability of 10.53%. The lungs recorded values such as 5.72 kg average weight and 7.50% coefficient of variability for adult males of the Baltata Romaneasca breed, 8.30 kg average weight and 4.45% coefficient of variability for the Belgian Blue breed, and for the Aberdeen Angus breed, the average lung weight was 8.20 kg and the coefficient of variability 4.63%. The liver had an average weight of 8.72 kg in the Baltata Romaneasca breed and a coefficient of variability of 4.01%, an average weight of 9.71 kg and a coefficient of variability of 3.70% in the Belgian Blue breed and an average weight of 9.54 kg and a coefficient of variability of 4.40% in the Angus breed. For kidneys, the average weight was for the Romanian Greyhound breed 1.50 kg and the coefficient of variability 22%, for the Belgian Blue breed 1.70 kg average weight and 15.88% coefficient of variability and 1.63 kg average weight, and the coefficient of variability 15.9% for the Aberdeen Angus breed. The stomach, for the Baltata Romaneasca breed, had an average weight of 21.81 kg and a 1.65% coefficient of variability, for the Belgian Blue breed, 24.35 kg average weight and 1.27% coefficient of variability and 23.89 kg average weight and 1.67% coefficient of variability for the Aberdeen Angus breed. For the intestine, values such as: 21.77 kg average weight and 1.74% coefficient of variability for the Baltata Romaneasca breed, 24.29 kg and 1.68% coefficient of variability for the Belgian Blue breed and 23.90 kg average weight and 1.71% coefficient of variability for Angus. Skin, in the Baltata Romaneasca cattle breed the average weight was 62.20 kg and the coefficient of variability was 0.56%, for the Belgian Blue breed the average weight was 70.0 kg and the coefficient of variability was 0.81%, and in the Angus breed, the average weight was 68.21 kg, and the coefficient of variability was 0.42%.

Analyzing the value of the coefficient of variability for blood, tail, head, tongue, heart, lungs, liver, stomach, intestines and skin, it is observed that it is less than 15% for all adult male cattle of the three breeds, which means that there is a low degree of variability in the respective samples, and the average established at the level of each sample is representative of the entire population of individuals analyzed. For kidneys - in all three breeds studied, the value of the coefficient of variability was between 15-30% and it is considered that the variability is average, and the average is sufficiently representative. The value of the coefficient of variability for the brain - in adult males of the three breeds analyzed is greater than 30%, which means that there is a high degree of variability in the sample, and the average is poorly representative.

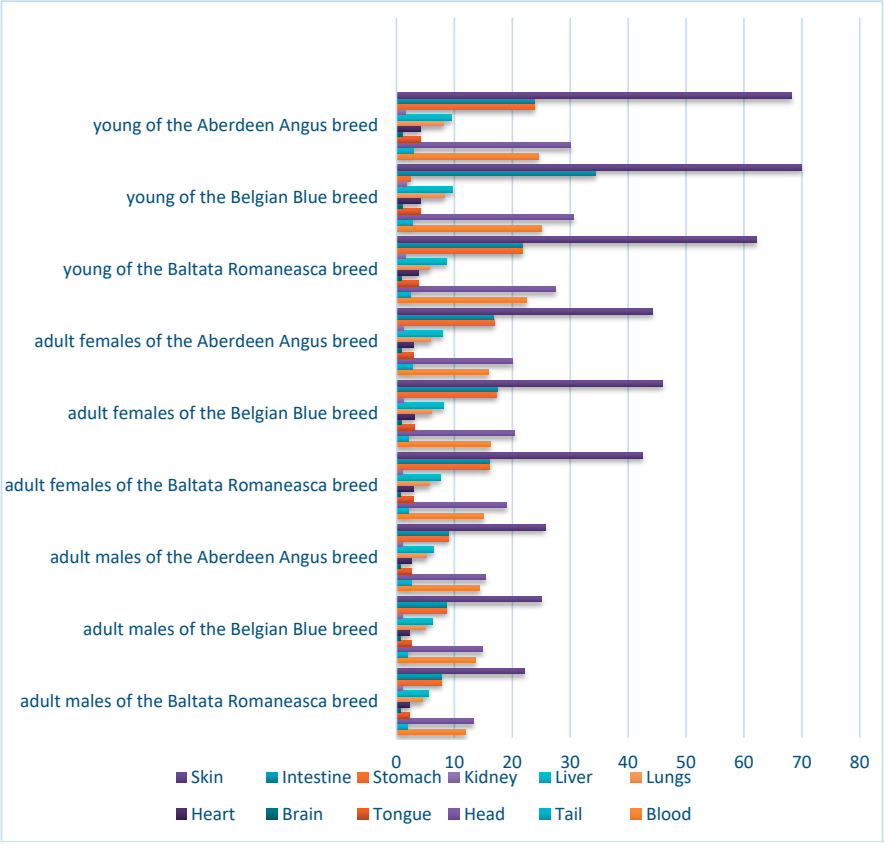

Figure 2. Average organ weights by race, age and sex

CONCLUSIONS

Analyzing the indices resulting from the slaughter of animals from small and medium-sized farms and raised in a semi-intensive system, the following conclusions can be drawn:

The weight of the organs is in relation to the body weight, with the body weight being higher and the organs having a higher weight.

The highest weights were recorded for indices such as the skin and head of the animals, and the lowest weights were recorded for indices such as the brain and kidneys.

The weighings carried out in the slaughter unit were represented as an average, with no representative differences in the first weighing stage.

The carcass characteristics, but also the organoleptic ones, are influenced by factors such as breed, sex, condition of fattening, age.

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