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OPPORTUNITIES FOR USING MALE KIDS OF DAIRY TREND AS A RESOURCE IN MEAT PRODUCTION

ABSTRACT OF

D I S E R T A T I O N

for awarding an educational and scientific degree

«***Doctor***»

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The numbering of the sections, tables and figures in the Abstract of Dissertation does not correspond to the numbering in the dissertation work.

The defence of the dissertation will take place on 28.03.2025 at 11:00 .o'clock in Conference room No 2 at the Research Institute of Mountain Stockbreeding and Agriculture of Troyan. The materials related to the defence are available from the scientific secretary of RIMSA - Troyan.

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1. INTRODUCTION

The future of male kids born on dairy farms is vague. Their breeding, in most cases, contradicts the principles of animal welfare and humane treatment, and very often, they are exterminated immediately *post partum*. This requires an accurate assessment and adequate solutions to find a balance between humane treatment and farmers' profits.

Worldwide, consumer preferences are increasingly changing towards meat consumption from animals with a lower live weight. The term "Capretto" is used for meat obtained from young kids. This opens up opportunities for selling male kids and transforming "waste" products into a by-product for an innovative, independent and economically sustainable niche for producing high-quality kid goat meat. For this to happen, consumers in Bulgaria must be convinced of the quality and benefits of kid meat. Effective management requires accurate knowledge of its taste and technological characteristics.

In Bulgaria, dairy goat farming is mainly developed. Research on the quality of kid meat in Bulgaria is very scarce. There have been none for the last 20-30 years. Moreover, the realisation and quality of male animals have not yet been studied.

In this dissertation, the opportunity of utilising male kids in the dairy sector has been studied by applying an interdisciplinary approach.

We believe this type of animal could be successfully utilised through the production of high-quality kid meat. To achieve the set purpose, a comprehensive analysis of the quality of goat kid meat is planned through modern methods of assessment and analysis.

2. PURPOSE AND OBJECTIVES

The purpose of the present dissertation work is to present the opportunities for the realisation of male kids of the dairy trend by analysing the impact of age, as well as alternative feeding with cow's milk, on the quality and composition of their meat in the conditions of the contemporary dairy goat farming.

To achieve the given purpose, the following tasks have been set:

Task 1. Study the impact of age at slaughter on the meat quality of male kids of the Anglo-Nubian and Bulgarian White Dairy breeds - slaughter characteristics, technological properties, chemical composition and fatty acid profile.

Task 2. Study the impact of feeding on goat and cow’s milk on the meat quality of male kids of the Anglo-Nubian and Bulgarian White Dairy breeds - slaughter characteristics, technological properties, chemical composition and fatty acid profile.

3. MATERIAL AND METHODS

1. Experimental animals

The research was conducted on the goat farm of the Scientific Experimental Base of the Research Institute of Mountain Stockbreeding and Agriculture of Troyan, located at 380 m above sea level in the foothill region of the Central Balkan Mountain.

The research was conducted from February to June 2021 and included 42 clinically healthy male kids of the Anglo-Nubian and Bulgarian White Dairy breeds.

The experimental animals were equal concerning their age, birth type, breed and weight and were distributed into groups of 7 kids, as follows:

I. kids until weaning (90 days) of the Bulgarian White Dairy breed
II. kids until weaning (at 90 days) of the Anglo-Nubian breed
III. kids after weaning and raised till 120 days of the Bulgarian White Dairy breed
IV. kids after weaning and raised till 120 days of the Anglo-Nubian breed
V. kids until weaning (90 days) of the Bulgarian White Dairy breed fed on cow's milk

VI. kids until weaning (at 90 days) of the Anglo-Nubian breed fed on cow's milk

The kids were born in February, and each newborn underwent a routine examination and disinfection of the navel. The animals were weighed with an electronic scale with an accuracy of 0,001kg. Each kid was given an individual ear tag. Until the third day after parturition, the kids were left with their goat mother; then they were moved to group boxes of 7 animals each. All zoo hygiene requirements according to Regulation 44 of 20.04.2006 are met. Until 90 days, all kids were fed from a bucket with teats with goat milk (groups I, II, III, IV) and cow's milk (groups V and VI) in norms corresponding to their age. After the 60th day, high-quality meadow hay and concentrated feed Lamb Starter 23 (Melhran company) were gradually added to the groups of kids that would be raised for up to 120 days. After 90 days, kids from groups III and IV were weaned and switched to free-range feeding with concentrated feed and meadow hay.

Task 1 examines the impact of age at slaughter on the quality and composition of meat of male kids of the Anglo-Nubian and Bulgarian White Dairy breeds - groups I, II, III and IV.

Task 2 compared the impact of feeding different types of milk (goat and cow) on the composition and quality of meat of male kids up to weaning from the Anglo-Nubian and Bulgarian White Dairy breeds – groups I, II and V, VI.

2. Feeding of the experimental animals

For quality control, samples of the milk fed to the experimental animals were tested every ten days. The values reported for the tested parameters varied within small limits and remained within the norm throughout the entire period of the study (Table 1)

Table 1: *Physicochemical parameters and fatty acid profile of milk*

Parameters	**Milk**		
	Goat		**Cow**
Milk fat (%)	**Mean**	**3,65**	**4,58**
	SD	0,53	0,73
Protein (%)	**Mean**	**3,13**	**3,13**
	SD	0,09	0,13
Lactose (%)	**Mean**	**4,67**	**4,72**
	SD	0,19	0,20
SNF (%)	**Mean**	**8,53**	**8,57**
	SD	0,28	0,36
Solid substance (%)	**Mean**	**12,18**	**13,26**
	SD	0,76	0,51
Salts (%)	**Mean**	**0,68**	**0,70**
	SD	0,06	0,03
Acidity (T°)	**Mean**	**12,89**	**16,22**
	SD	1,36	0,67
Casein (%)	**Mean**	**2,09**	**2,03**
	SD	0,21	0,26
NCP (%)	**Mean**	**1,11**	**1,10**
	SD	0,26	0,20
Density (g/cm^3)	**Mean**	**1,0282**	**1,0287**
	SD	0,01	0,00
Ca (mg%)	**Mean**	**0,162**	**0,174**
	SD	0,01	0,01

Fatty acids (%)	**Milk**	
	Goat	**Cow**
C8:0	1,07	1,32
C10:0	6,44	6,20
C12:0	3,18	3,74
C14:0	9,16	11,42
C15:0	0,60	1,24
C16:0	25,16	26,89
C16:1	1,31	1,46
C17:0	0,73	1,51
C18:0	16,58	11,62
C18:1n-9	30,13	29,45
C18:2n-6	3,55	3,11
C18:3n-3	0,97	0,87
CLA	0,38	0,42
C20:2n-6	0,07	0,08
C20:3n-6	0,03	0,04
C20:4n-6	0,39	0,38
C20:5n-3	0,03	0,02
C22:5n-3	0,18	0,2
C22:6n-3	0,02	0,03

Chemical analysis and fatty acid profile of hay and concentrated feed are presented in Table 2 and Table 3.

***Table 2**: Chemical analysis of feed and hay*

%	Protein		Crude fiber		Ash		Crude fat		NFE		Ca		P		Total solids		Moisture	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Concentrated feed	18,77	2,57	11,74	1,75	6,48	2,41	2,57	0,43	51,24	5,35	2,25	0,89	1,29	0,05	90,80	1,01	9,20	1,01
Hay	8,87	1,34	40,21	2,44	5,78	1,00	1,46	0,28	35,45	2,96	1,34	0,15	0,94	0,13	91,78	0,29	8,22	0,29

***Table 3:** Fatty acid profile of hay and feed*

Fatty acids	Hay	Feed
C14:0	0,80	0,25
C15:0	0,86	-
C16:0	24,24	10,70
C16:1	5,39	0,69
C17:0	0,49	-
C18:0	1,53	1,82
C18:1	7,30	26,18
C18:2n-6	20,68	57,66
C18:3n-3	38,72	2,71

The absolute gain of the kids was calculated as the difference in the weight of the animals at birth and the end of the experiment (90 and 120 days).

The average daily gain was determined as the ratio between the absolute gain and the age of the experimental animals.

3. Carcass analysis

After reaching the appropriate age (90 and 120 days), the experimental animals from the groups were not fed for 24 hours, after which their live weight was recorded. Slaughter was conducted in compliance with all animal welfare requirements.

The carcass analysis was performed according to the methodology of Zahariev and Pinkas (1979), as follows:

The head was weighed without the skin.

The four legs were weighed together, skinned and without the hoof capsule.

The internal organs were weighed: heart, lung (without trachea), liver, spleen, kidneys, stomach, small intestine, large intestine, and testicles.

The pH values were measured **45min** *post mortem*. A pH meter (pH 3110 SET 2-Wissenschaftlich Technische Werkstatten) was used. The pH was measured on the m. *Longissimus thoracic et lumborum* at the 11th thoracic vertebra, 3cm lateral to the median thoracic line on the left half and the m. *Semimembranosu*s in its glycolytic part. Incisions were previously made with a scalpel to a depth of 3cm. The electrode of the pH meter was placed directly in the muscle. After that, three consecutive measurements were made. The average value of the three measurements was recorded.

The weight of the warm carcass was measured, after which the carcasses were stored for 24 h at a temperature of 2-4 ° C. After cooling, at the twenty-fourth hour, the carcasses were weighed again, and **the weight of the cold carcass** was recorded.

The following **linear measurements** were made on the left half of the chilled carcass:

1. Carcass length: measured from the anterior end of the symphysis pelvis to the middle of the anterior end of the first rib.

2. Leg length: measured from the points where the tarsus is separated to the anterior end of the symphysis pelvis.

3. Chest width: measured with a tape at the level of the 5th thoracic vertebra on the ventral side of the spine on the caudal side of the vertebra itself, to the caudal end of the sternum on the ventral side.

4. Subcutaneous fat thickness: measured at the sternal line at the most prominent part of the sternum (in the region of the 3rd thoracic vertebra).

The carcasses were divided into two halves along the medial line, with the vertebrae cut exactly in the middle. The left half of each carcass was weighed and cut into six parts: neck, shoulder, chest, belly, loin and leg (Figure 1a and Figure 1b).

a

b

Figure 1a: *Carcasses before cooling*
Figure 1b: *Left half cut of a carcass*

Each part was weighed and deboned, after which muscles, bones and fat were weighed separately.

4. Analysis of meat quality

4.1. Sampling and preparation of samples for analysis

After cutting the carcass parts, m. *Longissimus thoracis et lumborum* between the 11th and 13th thoracic vertebrae and m. *Semimembranosus* were dissected from its left side. Samples were analysed to determine the physicochemical parameters.

4.2. Physicochemical meat composition

pH 24h was measured analogously to pH 45 min.

Water Holding Capacity (WHC) Method of Grau and Hamm (1953)

Filter paper No. 388 is coated with some nail polish diluted with acetone (1:1). The coating is made in the center of the filter paper with a diameter of 4-5 cm. The paper thus prepared is dried in an oven at 60°C for 1h. 0.3g of the sample is weighed on an analytical balance with an accuracy of four decimal places. The sample is placed on the varnished center of the filter paper, then pressed between two glass plates for 5min with a weight of 5kg. Immediately after 5 minutes, the meat sample, which had adhered to the glass plate, was carefully removed and weighed again. The measurement is made in five replications. The weight of 5kg was placed simultaneously on the five samples.

Calculations

$$WHC = \frac{a - b}{a} .100$$

Where:

WHC is the percentage of released water
a is the weight of the sample before pressing
b is the weight of the sample after pressing

*** WHC is expressed as the percentage of released water, with its lower values being a parameter of better water-holding capacity of meat

The meat ***colour*** was measured three times on each muscle, with the muscle cut perpendicular to the direction of the muscle fibres (24 hours *post mortem*). The analysis was performed with a PCS-CSM4 colourimeter, using the CIE L*, a*, b* system.

Meat tenderness

The analysis was performed after rigor mortis, with the sample stored at 2 – 4oC for 24h The samples were prepared so they had the same cross-section. Strips of meat are cut along the fibres with a length of 50-70mm, a height of 10mm and a width of 10cm. This results in a cross-section of 1 cm2. Ten replications were made on each sample using a penetrometer. The result is taken as the arithmetic mean of the ten punctures. The result is expressed in P^o.

Losses during heat treatment (boiling and roasting)

The size and shape of the samples of m. *Semimembranosus* and m. *Longissimus thoracis et lumborum*, for the analysis performed, were approximately the same (cube with a side size of 3-4cm).

Losses during cooking

Each sample was in a separate, labelled, heat-resistant bag and was placed in water preheated to 80°C. The sample was boiled until it reached 72°C in its core. The samples were placed in ice to avoid the temperature rising above the specified value. The samples are removed and dried on filter paper. After cooling, they were weighed again (Zahariev and Pinkas, 1979; Abhijith et al., 2021).

Roasting losses

The samples are placed in a pan with a grill on the bottom so that the separated liquids do not come into contact with them. After reaching a temperature of 72oC in the core, the samples are chilled, dried and weighed (Zahariev and Pinkas, 1979).

Protein content (Kjeldahl method)

Weigh 1g of sample, accurate to the fourth decimal place. Transfer to a Kjeldahl flask. Add 12,5 ml of K. H_2SO_4. Place the flask on a Kjeldahl stove and burn until the sample is completely digested (about 120 min). The sample was cooled. 5 ml of perhydrol is added to the chilled sample. The sample was heated until complete decolorisation (about 90 min), then cooled and quantitatively transferred to a 250ml volumetric flask. 50ml of the thus prepared sample was analysed on a UDK 149 (Kjeldahl) distillation apparatus. Neutralisation was conducted with 32-35% NaOH. Ammonia is released from the solution with an excess of 4% H_3BO_3.

Calculations:

$$P\% = N\% \cdot F$$

Where:
P% is the protein content, %
N% is the percentage of total nitrogen content obtained after the distillation of UDK 149 (Keldal).
F is the conversion factor = 6,25, equivalent to 0,16g N/g protein

Fat content in meat - (according to Soxhlet)

A sample of about 5g of meat was weighed precisely to the fourth decimal place, wrapped in filter paper and dried to constant weight: 24h in a dryer at 600 C, after which the temperature was increased to 105oC for several hours. The completely dried sample was weighed accurately to the fourth decimal place and placed in a Soxhlet flask for subsequent ether extraction. Extraction continued for 36h, after which the sample with the filter paper was dried at 105oC and weighed to constant weight.

Calculations:

$$F\% = \frac{(a-b).100}{v}$$

Where:
F% is the fat percentage in meat
a is the test sample weight with the filter paper before extraction
b is the test sample weight with the filter paper after extraction
v is the fresh meat sample weight

Meat moisture content

Glass crucibles with 3-5g of quartz sand and a glass stirrer were heated for 60 min at 60°C and tempered in a desiccator until room temperature (15-20°C) is reached. The tare of the tempered crucibles is measured (accurate to the fourth decimal place, together with the quartz sand and the glass stirrer). About 5g of the sample was placed in each crucible. Then, it was weighed again to the fourth decimal place. The crucibles were placed in a drying oven at 60°C for 24 h, after which the temperature of the drying oven was increased to 105°C, and the samples were left in the drying oven at this temperature until constant weight was reached. The crucibles were cooled in a desiccator and, after tempering, were weighed to a constant weight. The mass of the tempered crucibles was recorded with an accuracy to the fourth decimal place.

Calculations:

$$M\% = \frac{(a-б)}{в} . 100$$

Where:
M% is the moisture content in percentage
a is the gross weight: weight of the crucible, sand, stirrer and fresh meat sample
b is the gross weight after sample drying
v is the sample weight before drying

Meat ash content

Refractory crucibles were annealed for 60 min at 800oC, then tempered in a desiccator until they reached room temperature (15-20oC), weighed with accuracy to the fourth decimal place 2-5g of the sample was placed in them, weighing it accurately to the fourth decimal place. Before ashing, the sample was dried and then placed in a muffle furnace, which was heated to 600-800oC. The combustion continues for 2h. The crucibles were cooled in a desiccator and, after tempering, were weighed to a constant weight.

Calculations:

$$MS\% = \frac{a}{b} . 100$$

Where:

MS% is Mineral substances in percentage

a is the ash weight after combustion (without crucible weight)

b is the meat sample weight before combustion

Fatty acids

Total muscle lipids were extracted according to the method of Bligh and Dyer (1959) with minor modifications (Vargas-Ramella et al. 2020). The preparation of methyl esters was conducted according to the method described by Dominguez et al. (2015). Gas chromatography analysis was applied to determine the fatty acid composition of muscle tissue using a chromatograph (CSi 200 series, Cambridge Scientific Instruments Ltd., Ely, UK) equipped with a capillary column and hydrogen as carrier gas. Fatty acids are presented as a percentage of identified methyl esters. Individual fatty acids were used to calculate the atherogenic and thrombogenic index according to Ulbricht and Southgate (1991):

$AI = (4 \times C14{:}0 + C16{:}0) / [MUFA + \Sigma(n-6) + \Sigma(n-3)]$;

$TI = (C14{:}0 + C16{:}0 + C18{:}0) / [0.5 \times MUFA + 0.5 \times (n-6) + 3 \times (n-3) + (n-3)/(n-6)]$

Statistical analysis

The results obtained were statistically processed with the JMP v.7 software package. The data for the slaughter analysis of the animals were evaluated using the t-test. To evaluate the results for the meat technological characteristics, a two-factor analysis of variance was applied. The effect of the factors of age/diet and muscle type, as well as their interaction, was evaluated.

4. RESULTS AND DISCUSSION

Task 1. Study the impact of age at slaughter on the meat quality of male kids of the Anglo-Nubian and Bulgarian White Dairy breeds - slaughter characteristics, technological properties, chemical composition and fatty acid profile

1. Growth of kids of the Anglo-Nubian and Bulgarian White Dairy breeds

Determining the absolute and average daily gain of slaughtered animals is the basis for establishing their meat productivity. Table 4 shows the results obtained for these parameters in Anglo-Nubian kids of different ages at slaughter.

Table 4: *Growth of the Anglo-Nubian kids on 90 and 120 days*

Parameters (Kg)	**90 days**		**120 days**		**Sig.**
	Mean	**SD**	**Mean**	**SD**	
At parturition	3,314	0,445	3,700	0,65	NS
Absolute gain	12,186	1,026	15,786	1,89	**
Average daily gain	**90 days**		**120 days**		
	0,135	0,016	0,132	0,02	NS

***NS**–not significant; ** p < 0,01*

The difference in parturition weight of both compared groups is insignificant. The weight determined at the end of the experiment is logically higher in kids raised until the 120th day. Respectively, the absolute gain differs between animals of both age groups (p<0,01). For thirty days after weaning, kids raised until the 120th day gained an average of 3,986 kg. The average daily gain is very close between both age groups (Table 4).

Similarly to the Anglo-Nubian kids, absolute and average daily gain rates were determined for the Bulgarian White Dairy kids, the data of which are presented in Table 5.

Table 5: *Growth of the Bulgarian White Dairy kids at 90 and 120 days*

Parameters (Kg)	**90 days**		**120 days**		**Sig.**
	Mean	**SD**	**Mean**	**SD**	
At parturition	3,671	0,335	3,686	1,009	NS
Absolute gain	20,957	3,635	21,614	1,164	NS
Average daily gain	**90 days**		**120 days**		
	0,233	0,042	0,180	0,010	*

***NS**–not significant; * p < 0,05*

A small difference was observed between the values of live weight of BWD kids before slaughter at 90 and 120 days, which also explains the lower average daily gain rate of the animals raised for 120 days (p<0,05). The absolute gain rate was also close between both groups, but compared to that of the Anglo-Nubian kids at the same age was significantly higher (Table 5).

2. Carcass analysis

2.1. Linear measurements on carcasses of Anglo-Nubian and Bulgarian White Dairy Goat kids

After cooling the carcasses, linear measurements were made on their left half. In Anglo-Nubian kids at 90 and 120 days, the results are presented in Table 6.

Table 6: *Linear measurements of the carcass of Anglo-Nubian kids at 90 and 120 days of age*

Linear measurements (cm)	90 days		120 days		Sig.
	Mean	SD	Mean	SD	
Carcass length	42,00	2,16	47,14	1,86	***
Leg length	42,29	2,29	46,00	1,91	**
Chest width	17,23	1,11	18,14	1,35	NS
Subcutaneous fat thickness	0,08	3,15	0,17	2,20	***

***NS**–not significant; ******* $p < 0,001$; ****** $p < 0,01$*

Significantly higher values of carcass length (p<0,001), leg length (p<0,01) and subcutaneous fat thickness (p<0,001) were found in Anglo-Nubian kids raised to 120 days than kids of the same breed raised for 90 days.

The chest width in kids at 120 days is greater than that of those at 90 days, but the difference is not significant (Table 6).

The subcutaneous fat deposits on the sternum were 0,09 cm more in animals raised to 120 days.

Data on AN kids show that the carcass length has the greatest difference for the study period. It increases reliably by 5,14 cm up to 120 days of age (Table 6).

Similarly, linear measurements were made on the carcasses of Bulgarian White Dairy kids at 90 and 120 days of age, as the results are presented in Table 7.

Table 7: *Linear measurements of the carcass in Bulgarian White Dairy kids at 90 and 120 days of age*

Linear measurements	90 days		120 days		Sig.
	Mean	SD	Mean	SD	
Carcass length	48,06	2,00	52,86	2,12	***
Leg length	48,46	1,88	49,57	2,51	NS
Chest width	19,96	1,68	22,79	4,64	NS
Subcutaneous fat thickness	0,09	2,85	0,16	2,51	**

***NS**–not significant; ******* $p < 0,001$; ****** $p < 0,01$*

The carcass length (p<0,001) and the thickness of the subcutaneous fat (p<0,01) significantly increased in kids raised to 120 days.

The values of leg length are very close in both studied age groups, as kids raised to 120 days have the advantage (Table 7).

The chest width of the Bulgarian White Dairy kids is 2,83 cm more in kids of 120 days than those of 90 days.

The changes in the values of the linear parameters reported are similar for both breeds. The Bulgarian White Dairy kids outperform the Anglo-Nubian ones, both in linear and in weight parameters in both age groups.

2.2. Characteristics of the slaughtered carcass of the Anglo-Nubian and Bulgarian White Dairy kids

An analysis of the carcass composition of the experimental animals was conducted. Some main parameters characterising meat productivity were determined, such as yield, chilled weight, and weight of separate parts of the carcass. Our results are presented in Table 8.

***Table 8**: Carcass composition of Anglo-Nubian kids at 90 and 120 days of age*

AN Parameters (Kg)	90 days		120 days		*Sig.*
	Mean	**SD**	**Mean**	**SD**	
48 h live weight before slaugter	15,500	1,47	19,486	2,53	**
Hot carcass weight	7,342	1,07	9,516	1,22	**
Cooling loss	0,114	0,04	0,176	0,05	*
Yield %	47,370	3,66	47,970	1,71	*NS*
Chilled carcass weight	7,228	1,05	9,340	1,19	**
1/2 carcass weight	3,614	0,52	4,670	0,57	**
Total weight of all body parts	3,614	0,86	4,511	0,59	*NS*
Neck	0,413	0,10	0,557	0,08	*
Bones	0,108	0,03	0,120	0,02	*NS*
Muscles	0,283	0,07	0,331	0,05	*NS*
Fats	0,022	0,01	0,106	0,04	***
Shoulder	0,896	0,28	0,928	0,11	*NS*
Bones	0,234	0,07	0,236	0,02	*NS*
Muscles	0,610	0,22	0,603	0,09	*NS*
Fats	0,052	0,02	0,089	0,03	*
Loin	0,300	0,07	0,379	0,07	*NS*
Bones	0,114	0,01	0,131	0,02	*NS*
Muscles	0,166	0,05	0,219	0,04	*NS*
Fats	0,020	0,01	0,029	0,01	*
Leg	1,081	0,25	1,298	0,16	*NS*
Bones	0,352	0,08	0,340	0,04	*NS*
Muscles	0,689	0,20	0,901	0,13	*
Fats	0,040	0,01	0,057	0,01	*
Chest	0,683	0,09	1,011	0,17	***
Bones	0,271	0,04	0,336	0,04	**
Muscles	0,359	0,06	0,586	0,09	***
Fats	0,053	0,01	0,089	0,04	*
Abdominal part	0,241	0,09	0,338	0,06	*
Muscles	0,203	0,08	0,234	0,05	*NS*
Fats	0,038	0,01	0,104	0,03	***

***NS**–not significant; ******* $p < 0,001$; ****** $p < 0,01$; ***** $p < 0,05$*

The present study found significantly higher values of warm carcass weight ($p<0,01$) and carcass weight upon cooling ($p<0,05$) in AN kids at 120 days of age.

Slaughter yield calculated for both age groups is approximately similar, with insignificant differences – 47,37% for kids slaughtered at 90 days and 47,97% for those slaughtered at 120 days (Table 8). The values obtained for the chilled carcass weight and the half carcass weight are significantly higher for Anglo-Nubian kids raised for 120 days ($p<0,01$).

After cutting the left half of the carcasses, it was found that the neck weight, chest, loin, leg and abdomen are greater in Anglo-Nubian kids at 120 days than in those at 90 days. The shoulder weight in both groups is insignificant.

The neck weight in both studied groups was significantly higher ($p<0,05$) in AN kids at 120 days (Table 8). There is a large, significant difference ($p<0,001$) between chest weight in both age groups. The values reported for chest weight are 0,683 kg in kids at 90 days of age and 1,011 kg for those raised to 120 days (Table 8).

The largest amount of bones was observed in the legs of kids in both age groups (Table 8). The least amount of bones was weighed in the neck in AN kids at 90 and 120 days of age (Table 8).

The results obtained for the carcass composition of BWD kids are presented in Table 9.

Table 9: *Carcass composition in Bulgarian White Dairy kids at 90 and 120 days*

Parameters for BWD (Kg)	**90 days**		**120 days**		***Sig.***
	Mean	**SD**	**Mean**	**SD**	
Live weight 48 hours before slaughter	24,629	3,97	25,300	2,17	*NS*
Hot carcass weight	12,157	1,79	11,823	1,37	*NS*
Cooling loss	0,213	0,04	0,182	0,04	*NS*
Yield (%)	49,360	1,53	46,730	1,58	**
Chilled carcass weight	11,944	1,75	11,641	1,35	*NS*
1/2 carcass weight	5,972	0,88	5,820	0,68	*NS*
Total weight of all parts	5,910	0,89	5,757	0,70	*NS*
Neck	0,717	0,10	0,686	0,10	*NS*
Bones	0,150	0,03	0,179	0,03	*NS*
Muscles	0,441	0,05	0,395	0,05	*NS*
Fats	0,126	0,03	0,112	0,02	*NS*
Shoulder	1,286	0,20	1,205	0,16	*NS*
Bones	0,346	0,07	0,291	0,03	*NS*
Muscles	0,800	0,13	0,766	0,09	*NS*
Fats	0,140	0,02	0,148	0,04	*NS*
Loin	0,622	0,11	0,542	0,09	*NS*
Bones	0,242	0,04	0,178	0,02	**
Muscles	0,304	0,05	0,290	0,06	*NS*
Fats	0,076	0,02	0,074	0,02	*NS*
Leg	1,541	0,27	1,563	0,18	*NS*
Bones	0,481	0,08	0,489	0,08	*NS*
Muscles	0,959	0,20	0,969	0,10	*NS*
Fats	0,101	0,02	0,105	0,02	*NS*
Chest	1,248	0,18	1,322	0,17	*NS*
Bones	0,469	0,07	0,493	0,06	*NS*
Muscles	0,634	0,09	0,723	0,10	*NS*
Fats	0,145	0,03	0,106	0,01	*
Abdomen	0,496	0,06	0,439	0,07	*NS*
Muscles	0,334	0,04	0,299	0,06	*NS*
Fats	0,162	0,02	0,140	0,03	*NS*

***NS**–not significant; ** $p < 0,01$; * $p < 0,05$*

When analysing the data on slaughter characteristics of BBM kids at 90 and 120 days of age, no significant differences were observed in the values of pre-slaughter live weight, warm carcass weight and cooling loss. The difference in live weight before slaughter was 0,671 kg in favour of BWD kids slaughtered at 120 days. A significant difference in yield was found ($p<0,01$), which was higher in kids at an earlier age. No significant differences are observed in the values of the slaughter cuts. The difference in the leg weight in both studied groups of BWD kids is insignificant.

The slaughter characteristics in the present study were studied as a parameter of the meat productivity of the experimental animals. The results show that live weight increases with increasing age before slaughter. The values for the AN kids differ from those for BWD in both age groups, as those of the Anglo-Nubian breed have a lower live weight before slaughter and, accordingly, a smaller carcass than the kids of the BWD breed. The live weight of the BWD kids is greater by 9,129 kg at 90 days and by 5,814 kg at 120 days than the kids of the Anglo-Nubian breed of the same age.

The weight of **the hot and chilled carcass** is significant for determining **the chilled weight and slaughter yield**. In the Anglo-Nubian kids at the age of 90 days, the weight of the hot and chilled carcass is the smallest of all the studied groups, and in Bulgarian White Dairy kids at 120 days, it is the largest. The carcass weights at slaughter and after cooling in the present study are related to those for live weight before slaughter. Logically, the results that we report for the carcasses of the animals at the age of 120 days are higher than those at 90 days.

The difference in the values for **the cooling loss** in the Anglo-Nubian kids is reliably different between both age groups. However, in the experimental animals of the Bulgarian White Dairy, the difference is not significant. A higher value is reported for this parameter in the Bulgarian White Dairy kids at 90 days than in the experimental group at 120 days.

The lowest cooling loss was reported for AN breed kids at 90 days of age and the highest in BWD animals at 90 days. Significantly higher yield values were observed in BWD kids at 90 days than those at 120 days ($p<0,01$). The difference in the values of this parameter in AN kids was not significant (0,60%) between both age groups. The highest yield was obtained for the Bulgarian White Dairy kids at 90 days and the lowest in kids of the same breed at 120 days.

The **leg** weight logically increases with increasing slaughter age. It varies from 1,081 kg in AN kids at 90 days to 1,563 kg in BWD kids at 120 days. The greatest difference (0,217 kg) for this parameter was observed in Anglo-Nubian kids at 90 and 120 days.

The shoulder weight remained almost unchanged between both age groups, however, in BWD kids, the values were higher than in the Anglo-Nubian kids.

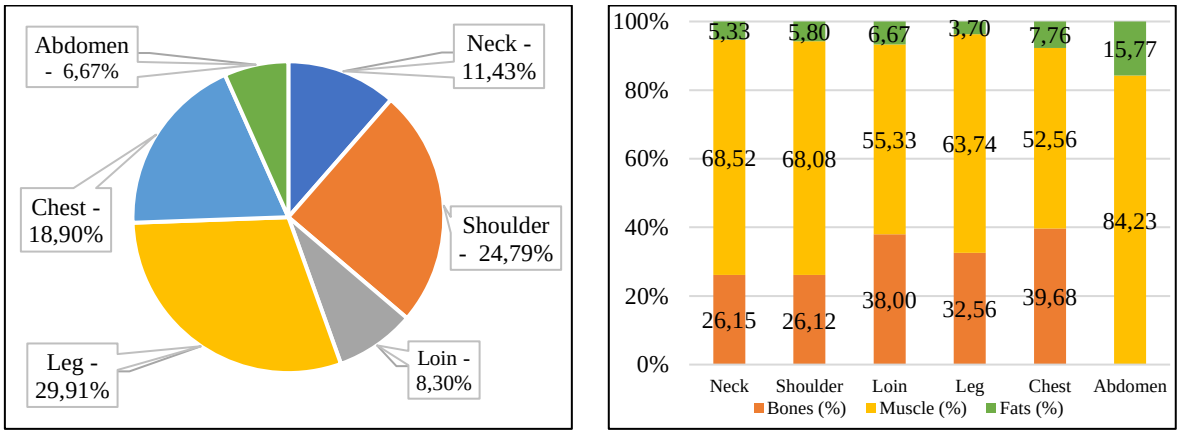
The **neck** weight varied, both between the groups of different ages and between the different breeds. There is an increase in its weight in the Anglo-Nubian kids by 0,144 kg for the period between the 90th and 120th day. The difference established for this period was insignificant in the BBM kids.

The **abdomen** is the smallest part of the cut in all the studied groups of kids. A reliable increase in the weight of this cut was observed in the Anglo-Nubian kids raised to 120 days of age. In contrast, in the experimental animals of the Bulgarian White Dairy breed, no significant change in the weight of this cut was observed. The results in the present study for the loin weight ranged between 0,300 kg in AN kids at 90 days and 0,622 kg in BWD kids at 90 days.

The present study has shown that in the thoracic part, a weight increase was observed over the thirty days in both studied breeds. The analysis of the slaughter characteristics of Anglo-Nubian and Bulgarian White dairy kids at 90 and 120 days shows that the studied animals have high yield and meat productivity, not inferior to other breeds placed under similar conditions.

2.3. Ratio of carcass parts and their constituent tissues in Anglo-Nubian and Bulgarian White Dairy kids

The left half of the carcasses of Anglo-Nubian kids, aged 90 and 120 days, was cut into six parts, and their percentage ratio was determined relative to the corresponding half of the carcass. After the complete dissection of the cuts, the ratio of the three main tissues in them was determined, the results obtained are presented in Figures 2a and 2b, expressed in percentages.



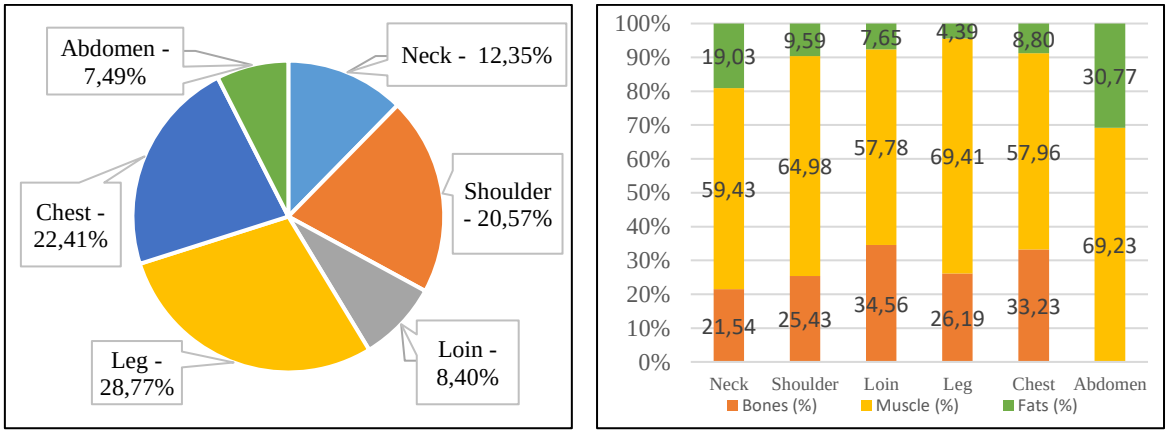
a **b**

Figure 2a. *The ratio of carcass parts in Anglo-Nubian kids at 90 days*
Figure 2b: *The Ratio of tissues in carcass parts in Anglo-Nubian kids at 90 days*

Figure 2a shows that the smallest share of the cuts is the abdomen part, whereas the leg is the largest, followed by the shoulder and the chest.

The neck has the largest share in the smaller cuts, such as the abdomen, neck and loin. The least fat amount is observed in the leg and the highest in the abdomen. The bones in the individual parts of the carcass vary between 26,12% in the shoulder and 39,89% in the chest (Figure 2b). Muscles represent the largest share of the individual parts of the carcass and occupy values from 52,56% to 84,23% (Figure 2b).

The ratio of cuts in the carcasses of AN kids at 120 days and the content of fat, bone and muscle in them is presented in Figures 3a and 3b.



a **b**

Figure 3a. *The ratio of carcass parts in Anglo-Nubian kids at 120 days*
Figure 3b: *The Ratio of tissues in carcass parts in Anglo-Nubian kids at 120 days*

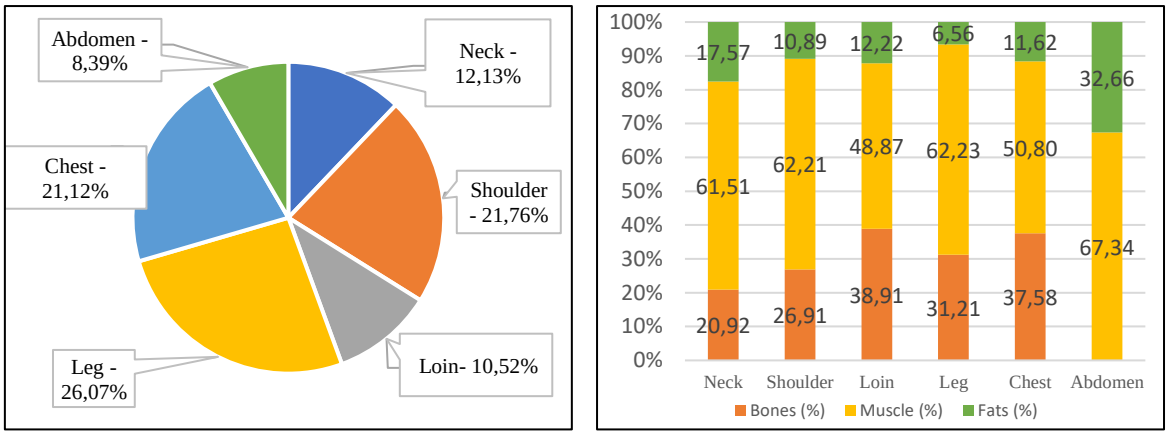
The percentage ratio of carcass parts in Anglo-Nubian kids raised for 120 days is similar to that found for the same at 90 days. Figure 3a shows that the abdominal part occupies the smallest share, unlike the leg.

The difference in the ratio of individual carcass parts in animals raised to 90 and 120 days is also striking. Higher values were found for the neck, loin, chest and abdomen in kids slaughtered at 120 days. The other cuts retained approximately equal percentages of the carcass during the experimental period of 30 days.

Each cut of the carcass was deboned, and the three main tissues were separated. The results are presented in Figure 3b.

The percentage ratio of tissues in the parts of the carcass in Anglo-Nubian kids raised for 120 days was similar to what we found for kids of the same breed raised for 90 days.

Muscles are the largest share in all parts of the carcass, and fat varies from 4,39% to 30,77% (Figure 3b). The largest amount of bones are contained in the loin and the least in the neck. When comparing the cuts of the carcasses of both age groups, it is evident that in all parts of the carcass, fat increases when fed with concentrated feed 30 days after weaning. The main energy sources for the animals are carbohydrates, fat and protein. Hay has a lower content of protein, minerals, and nitrogen-free extractable substances, Ca and P, than their content in the feed. The feed offered to the kids is of high quality and contains all the substances necessary for their health and development, as the percentage of protein in their ration is 18,77% (Tables 2 and 3).

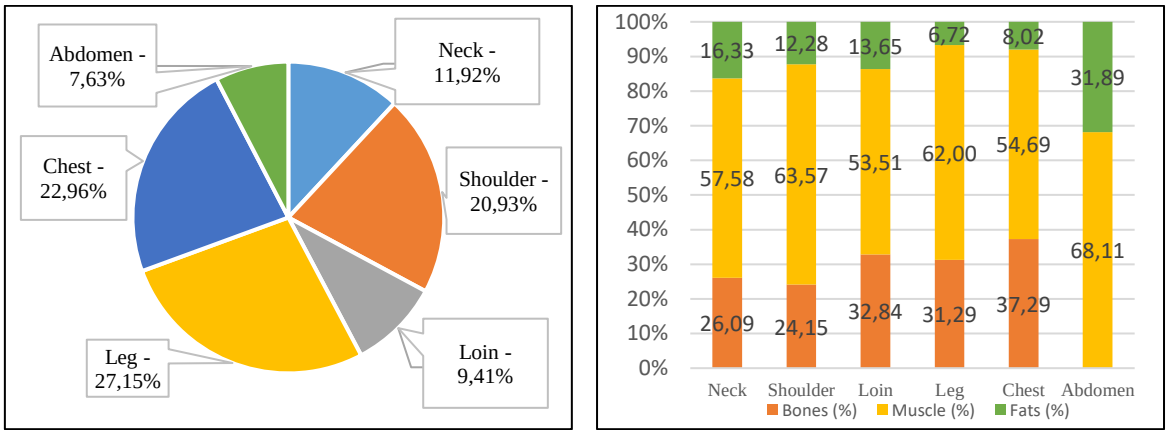


a **b**

Figure 4a: *The ratio of carcass parts in 90-day-old Bulgarian White Dairy kids*
Figure 4b: *The Ratio of tissues in carcass parts in 90-day-old Bulgarian White Dairy kids*

After cutting the left half of the carcass of a 90-day-old BWD kid, it is reported that the shoulder and the leg are the largest parts, occupying 21,76 and 26,07%, respectively (Figure 4a). In these two cuts, the highest muscle tissue content and the lowest fat content are observed (Figure 4b). The abdominal part and the neck have the lowest values in the ratio of half of the carcass (Figure 4a). They also have the highest content of intermuscular fat A complete dissection was performed on the same carcass cuts, and the main tissues that compose them were separated. The results are presented in Figure 4b.The highest amount of bones was found in the loin, whereas the lowest was found in the neck. The muscle content is over 50% in all examined cuts, except for the loin, where the muscle tissue is 48,87% (Figure 4b).

The deposited intermuscular fat ranges from 6,56% in the leg to 32,66% in the abdominal part (Figure 4b). Figure 5a presents the individual cuts on the carcass of Bulgarian White Dairy 120-day-old kids. As well as the distribution of their constituent tissues (Figure 5b).



a b

Figure 5a:. *The ratio of carcass parts in 120-day-old Bulgarian White Dairy kids*
Figure 5b: *The Ratio of tissues in carcass parts in 120-day-old Bulgarian White Dairy kids*

In the Bulgarian White Dairy kids, the highest values are also observed in the leg and the lowest in the abdominal part. The chest and shoulder are in close values, occupying 22,96 and 20,93%, respectively (Figure 5a). As with the results obtained so far, in all studied groups, the abdomen, neck and loin occupy the smallest share of the carcass and have close values, respectively, 7,63, 11,92 and 9,41% (Figure 5a).

Figure 5b presents the ratios that determine the content of the three types of tissue – muscle, bone and fat in the six separate cuts. The muscle takes the largest amount, whereas fat takes the smallest.

The leg is the largest cut of the carcass in all groups of kids, varying from 26.07% in 90-day-old BWD kids to 29,91% for the AN kids of the same age (Figure 4a and Figure 2a). In 90-day and 120-day-old BWD kids, a lower percentage of values was reported than AN kids at the same age. The fats in the leg are the least of all the cuts examined. They vary from 1,081 kg in 90-day-old AN kids to 1,563 kg in 120-day BWD kids. The bones in this cut of the carcasses are in the range of 26,19 to 32,56%, whereas the muscles are in the largest amount from 62,00 to 69,41%.

The shoulder is the second largest part of the carcass cut after the leg. The results obtained for this parameter ranged between 20,57-24,79%. The values occupied by the shoulder are lower in 90-day-old BWD kids than AN kids at the same age (Figure 4a and Figure 2a). The results in kids of both breeds at 120 days of age are approximately equal. In the shoulder, similar to the leg, a low-fat amount is reported, which varied from 5,80 to 12,28% in 90-day-old AN kids and 120-day-old BWD kids, respectively. The bones in this part of the carcass ranged from 24,15 to 26,12%, and the muscles were in the greatest amount from 62,21 to 68,08%.

The percentage valuesfor **the neck** are very close in all studied groups of both breeds of kids. The results vary from 11,43 to 12,35%. The least fat amount is reported for the neck, as in all other carcass cuts, whereas the greatest amount is reported for the muscles.

The abdominal part occupies values from 6,67 to 8,39%.

The results show that **the loin** occupies values from 8,30 to 10,52% No significant change is observed in the results for the 30-day study period in both breeds.

The chest part of the carcasses occupies 18,90% of 90-day-old AN kids and 22,96% of 120-day-old BWD kids (Figure 2a and Figure 5a).

The data, presented as **a percentage of the carcass parts**, represent the distribution of commercial cuts in the carcasses, which would encourage farmers raising dairy goats to sell the production of male kids as meat on the market. It has been proven that goat meat cuts have a higher percentage of beneficial fats, which are valuable for human health.

The study on the **distribution of individual tissues in kid carcasses** is conducted to improve the profitability of farming systems. It is important to know the interaction among feeding conditions, age and weight of animals before slaughter, and other factors that affect meat productivity and meat quality.

2.4. Internal organs and non-slaughter characteristics of Anglo-Nubian and Bulgarian White Dairy kids

The weights of internal organs and parts of the carcass, such as head, legs and skin, were measured. The values are shown in Table 10.

Table 10: *Weight of internal organs in 90 and 120-day-old Anglo-Nubian kids*

Parameters (Kg)	Age				Sig.
	90 days	SD	120 days	SD	
Heart	0,056	0,01	0,079	0,02	**
Lungs	0,243	0,04	0,282	0,07	*NS*
Liver	0,301	0,04	0,400	0,03	***
Spleen	0,037	0,01	0,054	0,02	*
Kidneys	0,029	0,01	0,037	0,01	**
Stomach	0,441	0,11	0,477	0,07	*NS*
Small intestines	0,527	0,09	0,499	0,21	*NS*
Large intestine	0,470	0,10	0,581	0,13	*NS*
Testis	0,080	0,02	0,089	0,04	*NS*
Head	0,769	0,04	0,902	0,14	*
Perirenal fat	0,027	0,01	0,079	0,01	**
Skins	0,860	0,04	1,343	0,15	***
Feet	0,707	0,05	0,777	0,07	*

NS*–not significant; *** p < 0,001; ** p < 0,01; * p < 0,05*

A significant increase in the weight of the heart ($p<0,01$), liver ($p<0,001$), spleen ($p<0,05$) and kidney ($p<0,01$) was observed in the kids at a later age. The perirenal fat content was significantly higher in 120-day-old AN kids. The differences between the values measured in the head ($p<0,05$), skin ($p<0,001$) and legs ($p<0,05$) were also significant.

Table 11*: Weight of internal organs in 90 and 120-day-old Bulgarian White Dairy kids*

Parameters (Kg)	Age				Sig.
	90 days	SD	120 days	SD	
Heart	0,097	0,01	0,102	0,01	*NS*
Lungs	0,442	0,15	0,394	0,07	*NS*
Liver	0,501	0,46	0,652	0,15	*
Spleen	0,068	0,01	0,060	0,01	*NS*
Kidneys	0,050	0,01	0,049	0,01	*NS*
Stomach	0,449	0,08	0,619	0,04	***
Small intestines	0,534	0,09	0,716	0,07	**
Large intestine	0,832	0,10	0,969	0,17	*NS*
Testis	0,185	0,02	0,190	0,03	*NS*
Head	1,320	0,23	1,240	0,25	*NS*
Perirenal fat	0,191	0,23	0,121	0,06	*NS*
Skin	1,414	0,16	1,666	0,35	*NS*
Feet	1,023	0,23	1,023	0,23	*NS*

NS*–not significant; *** p < 0,001; ** p < 0,01; * p < 0,5*

When analysing the characteristics of the carcass, a comparison was made between the weights of the internal organs of both age groups of Bulgarian White Dairy kids. The results are shown in Table 11.

In BWD kids of different ages, a significant difference was observed in the weight of the stomach ($p<0,001$), intestines ($p<0,01$) and liver ($p<0,05$). There were no significant differences for the other parameters in both age groups. In the present study, the heart of 90-day-old BWD kids was 0,097 kg, and at 120 days was 0,123 kg (Table 11).

The results show that the perirenal fat was less in 120-day-old kids than those at 90 days. The weight of the four feet, measured in BWD kids in both groups, remained unchanged. The same is observed for the head, whose values remained very close.

The head weight of AN kids was significantly smaller than those of BWD kids.

In the present study, an increase in head weight was observed between both age groups. The values reported for this parameter ranged between 0,789 kg in 90-day-old AN kids and 1,320 kg in BWD kids of the same age (Table 10 and Table 11).

The skin of the experimental animals of both breeds and ages was from 0,860 kg to 1,414 kg.

The weight of the four **feet** remained unchanged for the thirty-day observation period but differed between breeds, as the values in BWD kids were significantly higher (Table 10 and Table 11).

The lungs in AN kids did not change for the studied period but were at lower values than those obtained in BWD kids (Table 10 and Table 11).

When measuring **liver** weight, we found an increase in the values for this parameter in both breeds (Table 10 and Table 11). Similar to the results obtained for the lung, higher values for the liver were found in the BWD kids.

The **kidney** weight was from 0,029 to 0,050 kg, as higher values were again observed in BWD kids.

The deposited **perirenal fat** differed significantly between both studied breeds, with the smallest amount found in 90-day-old AN kids and the largest in BWD kids at the same age – 0,027 and 0,191 kg, respectively (Table 10 and Table 11).

The heart weighed from 0,056 to 0,102 kg. Its weight increased during the study period as the values for BWD kids were higher (Table 10 and Table 11).

The gastrointestinal tract in the present study is represented as a complex **stomach and small and large intestines**. The weight of these organs is the largest of all considered in this study. The stomach weighs from 0,441 to 0,619 kg, the small intestine from 0,499 to 0,716 kg and the large intestine from 0,470 to 0,969 kg (Table 10 and Table 11). The lowest weight of the gastrointestinal tract is registered for 90-day-old AN kids and the highest for 120-day-old BWD kids. We found an increase in the weight of the stomach and small and large intestines for the observed period of thirty days. The study of the weights of internal organs and individual parts of the carcass that are not traditionally used for food would be of interest to consumers who consume by-products or practice local or traditional individual regions' cuisine.

3. Technological properties

3.1. pH, colour and water-holding capacity of meat from Anglo-Nubian and Bulgarian White Dairy kids

The pH, colour of meat and its water-holding capacity were studied in Anglo-Nubian and Bulgarian White Dairy Breed kids of both age groups, and the data obtained are shown in Table 12 and Table 13, respectively.

***Table 12**: pH, colour and water-holding capacity of meat from 90 and 120-day-old Anglo-Nubian kids*

Parameter	Age		Muscle		RMSE	Sig.		
	90 days	120 days	m. *LTL*	m.*SM*		Age	Muscle	Age x Muscle
pH_{45min}	6,58	6,42	6,37	6,62	0,15	*	***	*NS*
pH_{24h}	6,14	5,66	5,82	5,98	0,23	***	*0,07*	*NS*
L*	49,74	51,47	49,62	51,59	3,57	*NS*	*NS*	*NS*
a*	16,88	15,93	16,31	16,50	1,01	*	*NS*	*NS*
b*	9,05	8,68	8,46	9,27	0,93	*NS*	*	*NS*
c	18,96	18,20	18,33	18,83	1,18	*NS*	*NS*	*NS*
h	28,08	28,57	27,39	29,26	2,40	*NS*	*	*NS*
WHC	35,17	35,73	34,01	36,90	2,19	*NS*	*	*NS*

***NS**–not significant; *** **p** < 0,01; * **p** < 0,05*

When measuring pH twice in the muscles of Anglo-Nubian kids, a significant decrease in its values was observed, both at 45 min ($p<0,05$) and at 24 h *post mortem* ($p<0,001$) (Table 12), which is expected.

The values for meat brightness in both age groups are within close limits. The value for L* is slightly lower for m. *Longissimuss thoracis et lumborum* than m. *Semimembranosus*.

The values for the red colour in both age groups are significantly different ($p<0,05$). Approximately equal values are observed when comparing the coordinate a* for both muscles (Table 12).

Close values of the yellow colour in meat were found in both age groups. The differences in the values obtained for the b* parameter of both muscles are significant ($p<0,05$) (Table 12).

The results for the colour saturation of the meat are close in both age groups, and both considered muscles, with the values of c* being the highest in the meat of 90-day-old kids and the lowest in those at 120 days (Table 12).

The values obtained for h* are insignificantly different in the meat of both age groups but with a significant difference between m. *Longissimus thoracis et lumborum* and m. *Semimembranosus* ($p<0,05$) (Table 12).

When determining the water-holding capacity of the meat, the percentage of free water in the kid meat samples is greater in m. *Semimembranosus* than in m. *Longissimus thoracis et lumborum* (Table 12).

For all technological parameters studied, there is no interaction between both compared factors - age and muscle.

The results for pH, colour and WHC of meat from Bulgarian White Dairy kids are presented in Table 13.

***Table 13**: pH, colour and water retention capacity of meat from Bulgarian White Dairy kids at 90 and 120 days*

Parameter	Age		Muscle		RMSE	Sig.		
	90 days	120 days	m. *LTL*	m.*SM*		Age	Muscle	Age x Muscle
pH_{45min}	6,60	6,41	6,37	6,64	0,31	*NS*	*	*NS*
pH_{24h}	6,04	5,77	6,03	5,78	0,33	*	*	*NS*
L*	42,57	46,42	43,35	45,65	2,85	**	*	*NS*
a*	17,27	16,72	16,32	17,67	1,45	*NS*	*	*NS*
b*	8,09	7,76	7,41	8,44	1,01	*NS*	*	*NS*
c	19,24	18,48	18,11	19,61	1,63	*NS*	*	*NS*
h	24,86	24,57	24,19	25,25	1,67	*NS*	*NS*	*NS*
WHC	30,25	34,94	30,15	35,05	2,86	***	***	*NS*

***NS**–not significant; *** **p** < 0,001; ** **p** < 0,01; * p < 0,05*

A significant difference in pH values at 45min and 24h *post mortem* ($p<0,05$) was observed between the two examined muscles of the Bulgarian White Dairy kids, as well as their expected decrease during the twenty-four hours until the onset of rigor mortis. The pH45min values in 90 and 120-day-old kids did not differ significantly. In contrast, the final pH measured in both age groups differed significantly ($p<0,05$) (Table 13).

The brightness values of the examined meat samples were significant, both in the two age groups ($p<0,01$) and between the two examined muscles ($p<0,05$) (Table 13).

The red colour in the goat meat was significantly higher in m. *Semimembranosus* – 17,67, than m. *Longissimus thoracis et lumborum* – 16,32 ($p<0,05$) (Table 13). The values of the colour coordinate b*, measured in both muscles, differ significantly ($p<0,05$), as in m. *Longissimus thoracis et lumborum* it is 7,41, and in m. *Semimembranosus* – 8,44 (Table 13).

The saturation of the meat colour does not differ significantly between both age groups. The value of c* is significantly different between *Longissimus thoracis et lumborum* – 18,11 and m. *Semimembranosus* – 19,61 ($p<0.05$) (Table 13).

The results obtained for H* are without significant differences, both between age groups and between both studied muscles (Table 13).

The water retention capacity is significantly different in both age groups (90 days – 30,25%; 120 days – 34,94%) ($p<0,001$) (Table 13)

The results for WHC in samples from both analysed muscles significantly differ from each other ($p<0,001$), as their value in m. *Longissimus thoracis et lumborum* is 30,15%, and in m. *Semimembranosus* is 35,05% (Table 13).

There is also no interaction between both factors of the analysis observed in the statistical data processing.

One of the most important factors influencing the *post mortem* muscle processes is pH.

In all groups of kids, an expected decrease in pH values was observed for twenty-four hours.

The pH at the 45th minute after slaughter was from 6,60 to 6,41, and after measuring again at the 24th hour, the reported values varied from 6,14 to 5,66.

There was a significant difference between studied muscles in both genotypes, as well as in pH 45 minutes and pH 24 hours (Table 12 and Table 13).

The data obtained for the pH of m. *Longissimus thoracis et* lumborum and m. *Semimembranosus* are close values in both studied breeds of kids.

The brightness (L*) of meat varied from 42,57 in 90-day-old BWD kids to 51,47 in 120-day-old AN kids.

The results show that the values of this parameter are higher in m. *Semimembranosus* in both experimental breeds (45,65 – 51,59) than m. *Longissimus thoracis et lumborum* (43,35 – 49,62) (Table 12 and Table 13).

The red colour (a*) of meat is mainly due to oxymyoglobin in the muscle. The values of the red colour are from 15,93 to 17,27 in the kids of both studied genotypes. The results show that a* is affected by the examined muscle but not by the age of the animals. The values for this parameter in m. *Longissimus thoracis et lumborum* is lower than those in m. *Semimembranosus*.

The values determined for **the yellow colour (b*)** in the meat are higher in AN kids (9,05 – 8,68) than those of the BWD breed (8,08 – 7,76).

The values for this parameter in m. *Longissimus thoracis et lumborum* and m. *Semimembranosus* are also higher in the meat of the AN kids.

The results show that in the groups of 90-day-old kids, the values of b* are higher than those of 120-day-old.

At 90 days, **the colour saturation (c*)** was higher in kids of both breeds. Higher values for c* were found in m. *Semimembranosus*, than m. *Longissimus thoracis et lumborum* (Table 14 and Table 15).

The hue angle (h) ranged between 24,57 in 120-day-old BWD kids and 28,57 in AN kids of the same age. The values reported in the meat of AN kids were higher in both studied age groups, as well as in both analysed muscles.

The water holding capacity of meat of BWD kids was lower (30,25% - 34,94%) than AN kids (35,17 – 35,73%). Lower WHC values were found for *Longissimus thoracis et lumborum* and *Semimembranosus* muscles in BWD animals.

3.2. Tenderness and losses during thermal processing of meat of Anglo-Nubian and Bulgarian White Dairy kids

The results are presented in Table 14.

Table 14: *Tenderness and losses during thermal processing of meat of 90 and 120-day-old Anglo-Nubian kids*

Parameter	Age		Muscle		RMSE	Sig.		
	90 days	120 days	m. *LTL*	m. *SM*		age	muscle	A x M
Tenderness (P°)	117,92	127,28	121,85	123,34	4,96	***	*NS*	*NS*
Загуби %								
Boiling	61,37	58,26	60,75	58,89	4,52	*0,08*	*NS*	*NS*
Roasting	49,01	46,33	47,12	48,21	3,22	*	*NS*	*NS*

***NS**–not significant; *** p < 0,01; * p < 0,05*

The meat tenderness of 90-day-old Anglo-Nubian kids was significantly lower (117,92 °P) than those at 120 days (127,28 °P) (p<0,001) (Table 14). The values of tenderness of both muscles did not differ significantly. Losses during boiling showed a tendency towards lower values (p=0,08), whereas losses during roasting were significantly lower (p<0,05) in kids at a later age.

The values obtained for the studied parameters in the experimental animals of the Bulgarian White Dairy Breed are presented in Table 15.

Table 15: *Tenderness and losses during thermal processing of meat of 90 and 120-day-old Bulgarian White Dairy kids*

Parameter	Age		Muscle		RMSE	Sig.		
	90 days	120 days	m. *LTL*	m. *SM*		age	muscle	A x M
Tenderness (P°)	111,96	121,44	116,86	116,55	3,44	***	*NS*	*NS*
Losses %								
Boiling	57,70	53,96	58,55	53,11	4,14	*	**	*NS*
Roasting	44,93	42,93	40,56	47,30	4,81	*NS*	*	*NS*

***NS**–not significant; *** p < 0,001; ** p < 0,01; * p < 0,05*

A significant difference (p<0,001) was found in meat tenderness of *Longissimus thoracis et lumborum* and m. *Semimembranosus* of 90 and 120-day-old Bulgarian White Dairy kids, as a lower value was reported for the meat of animals slaughtered at 90 days (111,96 oP) and higher in those slaughtered at 120 days (121,44 oP). Comparing the values obtained for both studied muscles, no significant difference was observed (Table 15).

Higher losses were found during boiling than roasting in meat from *Longissimus thoracis et lumborum* and m. *Semimembranosus* from kids in both age groups. Losses during boiling were significantly higher in kids at 90 days than at 120 days (p<0,05). There is a reliable difference in the loss during boiling of both studied muscles m. *Longissimus thoracis et lumborum* – 58,55% and m. *Semimembranosus* – 53,11% (p<0,01) (Table 15). Losses during roasting are significantly lower in BWD kids raised for 90 days than in those raised for 120 days (p<0,05). Losses during roasting were significantly lower in m. *LTL* (Table 15).

Tenderness and losses during meat heat treatment are technological qualities that are important parameters for the processing industry and serve in the selection of raw materials to produce high-quality products. The values for tenderness increased for the period under consideration in both studied breeds. The data for this parameter ranged from 111,44 Po in 90-day-old BWD kids to 127,28 Po in 120-day-old AN kids. Higher values were found in Anglo-Nubian kids for both muscles.

The losses during thermal processing have high values. The losses during boiling ranged from 53,96 to 60,75% in 120-day-old BWD and AN kids at the same age, respectively.

The losses during roasting had lower values than those during boiling (42,93 – 49,01%).

4. Meat chemical composition

4.1. Meat chemical composition of Anglo-Nubian and Bulgarian White Dairy kids

The results for protein, fat, moisture and ash parameters in the Anglo-Nubian kids are shown in Table 16.

Table 16: *Meat chemical composition of 90 and 120-day-old Anglo-Nubian kids*

Parameter	Age		Muscle		RMSE	Sig.		
	90 days	120 days	m. *LTL*	m.*SM*		Age	Muscle	Age x Muscle
Protein	19,08	22,33	20,42	20,98	1,04	***	*NS*	*NS*
Fats	1,96	0,95	1,30	1,56	0,60	***	*NS*	*NS*
Moisture	75,93	77,67	77,24	76,36	0,93	*NS*	*	*NS*
Ash	1,07	1,07	1,04	1,10	0,07	*NS*	*	*NS*

***NS**–not significant; *** p < 0,01; * p < 0,05*

The protein content in meat ranges from 19,08% in kids slaughtered at 90 days to 22,33% in animals raised to 120 days of age and differs significantly between both age groups (p<0,001). No significant difference was observed between both muscles, as in m. *Longissimus thoracis et lumborum*, the protein percentage was 20,42%, and in m. *Semimembranosus* – 1,10%.

The meat fat percentage was significantly higher in kids at 90 days and lower in those at 120 days (p<0,001). A slight difference was observed when comparing the fat quantity between both muscles, as in m. *Longissimus thoracis et lumborum*, its amount was 1,30%, and in m. *Semimembranosus*, it was 1,56%.

The meat moisture content was lower in 90-day-old kids – 75,93% and higher in 120-day-old kids – 77,67%. The moisture content of both studied muscles was significantly different (p<0,05), as m. *Longissimus thoracis et lumborum* having a percentage of 77,24% and m. *Semimembranosus* has a percentage of 76,36%.

The total ash content in the meat of the Anglo-Nubian kids was very close, with a reliable difference (p<0,05) in both studied muscles: *Longissimus thoracis et lumborum* - 1,04% and m. *Semimembranosus* – 1,10%.

The meat values for the Bulgarian White Dairy kids are shown in Table 17.

Table 17: *Meat chemical composition of 90 and 120-day-old Bulgarian White Dairy kids*

Parameter	Age		Muscle		RMSE	Sig.		
	90 days	120 days	m. *LTL*	m.*SM*		Age	Muscle	Age x Muscle
Protein	19,55	21,69	20,41	20,84	0,94	***	*NS*	*NS*
Fats	2,27	3,24	2,86	2,65	0,59	***	*NS*	*NS*
Moisture	75,11	75,90	75,62	75,40	1,11	*0,07*	*NS*	*NS*
Ash	1,10	1,10	1,10	1,11	0,04	*NS*	*NS*	*NS*

***NS**–not significant; *** p < 0,001*

The difference in protein content is significant between both age groups (p<0,001) (Table 17). The fat content in the meat of 90-day-old kids is 2,27%, and in those raised for 120 days,

it is 3,24%, with reliable differences (p<0,001). The difference between both studied muscles is insignificant. The moisture content in the meat of Bulgarian White Dairy kids is between 75,11% at 90 days and 75,90% at 120 days and shows a tendency towards higher values in older kids (p=0,07). The ash content in m. *Longissimus thoracis et lumborum* and m. *Semimembranosus* of 90 and 120-day-old Bulgarian White Dairy kids is 1,10% in both studied groups. There was no interaction between the factors of age and muscle when analysing the meat chemical composition of the studied groups.

The protein content in the meat of small ruminants is from 16% to 22% (Marinova and Popova, 2011). The protein content in the present study, varies from 19,08% to 22,33% in 90 and 120-day-old AN kids, respectively. The presented data show that the protein content in the meat of kids increases in both studied breeds from 90 to 120 days of age. No significant differences were observed in the results of m. *Longissimus thoracis et lumborum* and m. *Semimembranosus*. The values for m. *Longissimus thoracis et lumborum* is approximately the same (20,41% – 20,42%). The same was found for m. *Semimembranosus* (20,84% – 20,98%) (Table 16 and Table 17). The muscle fat content is higher in the Bulgarian White Dairy kids (2,27 – 3,27%) than in the meat of Anglo-Nubian kids (0,95 – 1,96%). The amount of fat in both studied muscles is close, but higher values are observed in BWD kids. The amount of moisture in the meat of AN and BWD kids varies from 75,11% to 77,67%. No significant differences are observed, influenced by the age at slaughter and the muscle studied. The values we have established for the ash content in meat of both studied breeds of kids at different ages at slaughter vary within very narrow limits of 1,07-1,10%. No significant differences were observed in both studied muscles.

4.2. Fatty acid composition of meat of Anglo-Nubian and Bulgarian White Dairy kids

The fatty acid composition of meat of AN kids in both age groups was determined. The percentage values indicating the fatty acid content are shown in Table 18.

Table 18: *Meat fatty acid composition of 90 and 120-day-old Anglo-Nubian kids*

Fatty acids (%)	**Age**		**Muscle**		**RMSE**	***Sig.***		
	90 days	**120 days**	LTL	*SM*		**age**	**muscle**	**A x M**
C14:0	3,47	2,01	3,04	2,44	0,60	***	*	*NS*
C15:0	0,46	0,27	0,38	0,34	0,09	***	*NS*	*NS*
C16:0	22,02	17,96	20,94	19,04	1,52	***	**	*NS*
C16:1	2,33	1,54	1,96	1,91	0,63	**	*NS*	*NS*
C17:0	0,86	0,53	0,78	0,63	0,14	***	**	*NS*
C18:0	13,21	11,95	12,31	12,85	1,08	**	*NS*	*NS*
C18:1n-9	37,46	21,57	29,96	29,07	3,61	***	*NS*	*NS*
C18:2n-6	10,16	19,44	14,35	15,25	2,32	***	*NS*	*NS*
C18:3n-3	0,41	0,68	0,57	0,51	0,10	***	*NS*	*
CLA	0,39	0,29	0,37	0,31	0,12	*0,07*	*NS*	*NS*
C20:2n-6	0,55	1,07	0,80	0,83	0,23	***	*NS*	*NS*
C20:3n-6	0,49	0,92	0,72	0,70	0,21	***	*NS*	*NS*
C20:4n-6	6,67	17,38	11,24	12,80	2,44	***	*NS*	*NS*
C20:5n-3	0,29	0,97	0,59	0,66	0,14	***	*NS*	*NS*
C22:5n-3	1,04	2,85	1,64	2,25	0,52	***	**	*NS*
C22:6n-3	0,19	0,57	0,35	0,41	0,10	***	*NS*	*NS*

***NS**–not significant; *** p < 0,001; ** p < 0,01; * p < 0,5*

After weaning, changing the type of feeding and the older age at the slaughter of the animals, a significant decrease was observed in the percentage of C14:0 (p<0,001); C15:0 (p<0,001); C16:0 (p<0,001); C16:1 (p<0,01); C17:0 (p<0,001); C18:0 (p<0,01); C18:1n-9 (p<0,001), as well as the values of conjugated linoleic acids (p=0,07) (Table 18). C18:1n-9 takes the highest percentage in the fatty acid profile, followed by C16:0 (Table 18).

Polyunsaturated fatty acids (C18:2n-6; C18:3n-3; C20:2n-6; C20:3n-6; C20:4n-6; C20:5n-3; C22:5n-3; C22:6n-3) in intramuscular lipids in m. *Longissimus thoracis et lumborum* and m. *Semimembranosus* of kids slaughtered at 90 days of age was in low values, but a significant increase (p<0,001) was observed for thirty days in those slaughtered at 120 days (Table 18).

Table 19: *Total fatty acid content and lipid indices in meat of 90 and 120-day-old Anglo-Nubian kids*

Parameter	Age		Muscle		RMSE	Sig.		
	90 days	120 days	m. *LTL*	m. *SM*		age	muscle	A x M
SFAs, %	40,02	32,72	37,45	35,3	2,44	***	*	*NS*
MUFAs	39,79	23,11	31,92	30,98	3,63	***	*NS*	*NS*
PUFAs	20,19	44,17	30,63	33,72	5,21	***	*NS*	*NS*
n-6/n-3	9,26	7,65	8,61	7,72	1,11	**	*NS*	*
II/H	0,50	1,35	0,82	0,96	0,20	***	*0,08*	*NS*
AI	0,60	0,39	0,53	0,45	0,08	***	**	*NS*
TI	0,47	0,22	0,33	0,29	0,12	***	*	*NS*

NS*–not significant; *** p < 0,001; ** p < 0,01; * p < 0,5*

The total percentage of saturated and monounsaturated fatty acids significantly decreased in kids at older slaughter age (p<0,001) than those slaughtered at 90 days of age (Table 19).

An increase in the total amount of polyunsaturated fatty acids was observed in both age groups up to 120 days (p<0,001) (Table 19).

When analysing both muscles, it was found that the content of SFAs, MUFAs, and PUFAs were approximately similar in m. *Longissimus thoracis et lumborum* and m. *Semimembranosus*, with a significantly lower content of SFAs in m. *SM* (p<0,05).

The ratio of n-6/n-3 fatty acids in the present study was significantly lower in kids slaughtered at 90 days of age (p<0,01) than kids raised to 120 days – 9,26 and 7,65, respectively (Table 19).

The ratio of polyunsaturated to saturated fatty acids (P/S) determined in the Anglo-Nubian kids was significantly higher in kids slaughtered at 120 days than those slaughtered at 90 days of age (p<0,001) (Table 19).

The values for the atherogenic and thrombogenic indices decreased significantly with increasing age at slaughter (p<0,001). AI values in kids at 90 days were 0,60, and at 120 days, 0,39. For TI, the values obtained at 90 and 120 days of age were 0,47 and 0,22, respectively (Table 19). Regarding both studied muscles, significantly higher values of AI (p<0,01) and TI (p<0,05) were found in m. *Longissimus thoracis et lumborum* than m. *Semimembranosus* for (Table 19).

The content of fatty acids in the meat of the Bulgarian White Dairy kids at 90 and 120 days is shown in Table 20.

***Table 20**: Fatty acid composition of meat the Bulgarian White Dairy kids at 90 and 120 days*

Fatty acids	Age		Muscle		RMSE	Sig.		
	90 days	120 days	m. *LTL*	m. *SM*		age	muscle	A x M
C14:0	2,73	2,21	2,29	2,66	0,51	*	*0,07*	*NS*
C15:0	0,36	0,37	0,36	0,38	0,07	*NS*	*NS*	*NS*
C16:0	20,87	19,93	20,43	20,38	1,39	*0,08*	*NS*	*NS*
C16:1	1,96	1,97	1,95	1,98	0,38	*NS*	*NS*	*NS*
C17:0	0,77	1,16	1,01	0,92	0,19	***	*NS*	*NS*
C18:0	12,62	13,35	13,44	12,53	0,89	*	*	*NS*
C18:1n-9	41,41	43,49	44,85	40,05	5,29	*NS*	*	*NS*
C18:2n-6	10,18	9,83	8,50	11,51	2,71	*NS*	**	*NS*
C18:3n-3	0,39	0,37	0,34	0,41	0,09	*NS*	*	*NS*
CLA	0,38	0,47	0,42	0,42	0,11	*	*NS*	*NS*
C20:2n-6	0,52	0,44	0,42	0,54	0,17	*NS*	*0,07*	*NS*
C20:3n-6	0,41	0,34	0,31	0,44	0,14	*NS*	*	*NS*
C20:4n-6	6,14	4,97	4,67	6,45	2,36	*NS*	*	*NS*
C20:5n-3	0,27	0,22	0,19	0,29	0,08	*NS*	**	*NS*
C22:5n-3	0,86	0,77	0,72	0,90	0,37	*NS*	*NS*	*NS*
C22:6n-3	0,13	0,11	0,10	0,14	0,09	*NS*	*NS*	*NS*

***NS**– not significant; *** p < 0,001; ** p < 0,01; * p < 0,05*

The highest percentage of saturated fatty acids, determined in the fatty acid profile of lipids, is occupied by palmitic acid (20,87%) in 90-day-old kids (Table 20). In 120-day-old kids, C16:0 also has the highest content, than the other SFAs, but only a tendency to decrease in the content with increasing age is observed (p = 0,08).

The effect of age is expressed by a significant difference between both age groups in myristic (p<0,05), margaric (p<0,001) and stearic fats (p<0,05), with an increase in the content of C17:0 and C18:0, and a decrease in the values of C14:0.

***Table 21:** Total amount of fatty acids and lipid indices in the meat of 90 and 120-day-old Bulgarian White Dairy kids*

Parameter	Age		Muscle		RMSE	Sig.		
	90 days	120 days	m. *LTL*	m. *SM*		Age	Muscle	A x M
SFAs, %	37,35	37,02	37,53	36,87	1,77	*NS*	*NS*	*NS*
MUFAs, %	43,37	45,46	46,8	42,03	5,48	*NS*	*	*NS*
PUFAs, %	19,28	17,52	15,67	21,1	5,76	*NS*	*	*NS*
n-6/n-3	10,45	10,60	10,30	10,89	1,83	*NS*	*NS*	*NS*
P/S	0,52	0,47	0,42	0,57	0,16	*NS*	*	*NS*
AI	0,51	0,46	0,47	0,49	0,06	*	*NS*	*NS*
TI	0,44	0,46	0,50	0,41	0,13	*NS*	*	*NS*

***NS**– not significant; * -p < 0,05*

The ratio of n-6/n-3 fatty acids in the meat of BWD kids does not change with increasing slaughter age and is in very close values in both studied muscles. The content of saturated fatty acids in both muscles remained at similar values in both age groups. Only the content of stearic acid significantly differed in both muscles: m. *Longissimus thoracis et lumborum* – 13,44 % and m. *Semimembranosus* – 12,53% (p<0,05), whereas in C14:0, a tendency towards an increase in the content in m. *Semimembranosus* was found (Table 20).

The content of CLA increased for the studied period from 0,38% at 90 days of age to 0,47% at 120 days (p<0,05). Regarding both muscles, the content of conjugated linoleic acid was the same (Table 20). P/S decreases its value at an older age of slaughter, the results obtained for

P/S of m. *Longissimus thoracis et lumborum* are lower than those obtained for m. *Semimembranosus* – 0,42 and 0,57 respectively ($p<0,05$) (Table 21). The atherogenic index decreases significantly with increasing age ($p<0,05$), and AI is in very close values in both muscles (Table 21). The thrombogenic index in the Bulgarian White Dairy kids remains in close values in both age groups. Significantly higher values for TI were found in m. *Longissimus thoracis et lumborum* than m. *Semimembranosus* – 0,50% and 0,41%, respectively ($p<0,05$) (Table 21). The content of myristic acid (C 14:0) varies from 2,01% to 3,47% in the experimental animals, as the content found by us in the meat of BWD kids is higher. We found a decrease in it during the study period from 90 to 120 days of age in kids from both breeds. The amount (C 14:0) in m. *Longissimus thoracis et lumborum* is higher in 90-day-old AN kids, and its content is lower in m. *Semimembranosus* from the same breed at 90 days of age.

The content of heptadecanoic acid (C 15:0) is 0,27-0,37%. In AN kids, the values for C 15:0 significantly decreased over the observed period of 30 days, in m. *Longissimus thoracis et lumborum* and m. *Semimembranosus*, the values reported for pentadecanoic acid were approximately equal in both breeds and both age groups of BWD kids.

The values of palmitic acid (C 16:0) in the present study were 17,96 -22,87%. A significant decrease in the content of this fatty acid was observed with increasing slaughter age. The values of C 16:0 remained approximately equal in both muscles and both breeds.

Stearic acid (C 18:0) ranged from 11,95 to 13,35% in BWD kids at 90 and 120 days of age, respectively. A significant difference was observed with increasing slaughter age in stearic acid (C 18:0). In both muscles, the content of (C 18:0) was in close values at different slaughter ages and in both breeds. The amount of oleic acid (C18:1n-9) was from 21,57 to 41,41%. It was significantly higher in the Bulgarian White Dairy kids. In both muscles, the content of this fatty acid was again higher in the animals of the BWD breed. It is striking that while in the latter, no difference was found in the content of this fatty acid in the age groups, in the AN kids, a decrease in the content was found in the older animals. This corresponds to the lower fat content in the muscles.

The content of conjugated linoleic acids (CLA) in the fatty acid profile of the meat of AN and BWD breed kids is from 0,29 to 0,47%.

In the meat of *Longissimus thoracis et lumborum* and m. *Semimembranosus*, no significant differences were observed, but the CLA values were higher in both muscles of BWD kids.

The polyunsaturated fatty acids constitute from 19,28% to 44,17% of the fatty acid profile of the meat of AN and BWD kids. Their content in both muscles is higher than those of the Anglo-Nubian kids. A higher amount of PUFAs is found in m. *Semimembranosus* than m. *Longissimus thoracis et lumborum*. This is due to the metabolic differences of both muscles.

The content of monounsaturated fatty acids is from 23,11% in 120-day-old AN kids to 45,46% in Bulgarian White Dairy kids at the same age. A decrease in the values of MUFAs is observed for the 30-day-study period in the studied muscles for both breeds. The content of MUFAs is higher in m. *Longissimus thoracis et lumborum* and m. *Semimembranosus* of the BWD breed animals. The saturated fatty acids contained in the meat of AN and BWD kids occupy values from 32,72 to 40,02%.

SFAs are approximately the same for both muscles in the studied breeds of kids. The ratio of n-6/n-3 fatty acids was determined from the content of fatty acids in the meat profile of AN and BWD kids, which is from 7,65 to 10,60. Lower values for this parameter were recorded for both muscles in the AN kids. The ratio between polyunsaturated and saturated fatty acids varies from 0,47 to 1,35. In m. *Longissimus thoracis et lumborum*, lower values are observed than in m. *Semimembranosus*, but in both muscles, the values are higher for the AN breed animals. The atherogenic index in the present study varies from 0,39 to 0,60. We observe a decrease with increasing slaughter age, which relates to the decrease in SFAs and the increase in PUFAs. Very close values are observed in both muscles at different slaughter ages and in both breeds.

Task 2. Study the impact on meat quality when feeding male kids of the Anglo-Nubian and Bulgarian White Dairy breeds with different types of milk. A study on slaughter characteristics, technological properties, chemical composition and fatty acid profile.

1. Growth of kids of the Anglo-Nubian and Bulgarian White Dairy breeds

Pre-slaughter parameters, live weight, and absolute and average daily gain of AN kids fed goat and cow's milk were recorded. The results obtained are presented in Table 22. The average daily gain was recorded for the 90 days of raising the kids.

Table 22: *Growth of Anglo-Nubian kids fed on different types of milk*

Kg	**Goat**		**Cow**		Sig.
	Mean	**SD**	**Mean**	**SD**	
Kg at birth	3,314	0,445	3,325	0,263	NS
Live weight before slaughter	15,500	1,471	17,436	1,795	**
Absolute gain	12,186	1,026	14,111	1,532	*
Average daily gain	**90 days**				
	0,135	0,016	0,157	0,020	NS

***NS**–not significant; ** p < 0,01; * p < 0,05*

The birth weight was approximately equal for the studied Anglo-Nubian kids in both groups. The absolute gain rate is significantly higher in kids fed on cow's milk than animals fed on goat's milk ($p<0,05$). Therefore, the average daily gain rate of kids fed cow's milk is higher than that in the other group. The same parameters were determined for the Bulgarian White Dairy kids fed goat's and cow's milk, which are presented in Table 23.

Table 23: *Growth rate of kids of the Bulgarian White Dairy Breed fed on different types of milk*

Kg	**Goat**		**Cow**		Sig.
	Mean	**SD**	**Mean**	**SD**	
At birth	3,671	0,34	3,740	0,23	NS
Live weight before slaughter	24,629	3,97	23,082	3,15	NS
Absolute gain	20,957	3,63	19,342	2,92	*
Average daily gain	**90 days**				
	0,233	0,04	0,215	0,03	NS

***NS**–not significant; * p < 0,05*

The birth weight is with similar values for BWD kids. The live weight before slaughter is higher in animals fed on goat's milk. Therefore, the absolute growth rate is significantly higher in the group of BWD kids fed on goat's milk. The average daily growth rate is within similar limits. However, it is slightly higher in the group of kids fed on goat's milk. The kilograms at birth of the animals from the four considered groups vary in similar values.

2. Slaughter analysis

2.1. Linear measurements of Anglo-Nubian and Bulgarian White Dairy kids

Linear measurements are a parameter determining meat productivity, which is investigated in the present work. The data obtained for the parameters, such as carcass length, leg length, chest width and subcutaneous fat thickness in the Anglo-Nubian kids, are presented in Table 24.

Table 24: *Linear measurements of the carcass in Anglo-Nubian kids fed on different types of milk*

Linear measurement (cm)	**Goat**		**Cow**		***Sig.***
	Mean	**SD**	**Mean**	**SD**	
Carcass length	42,00	2,16	47,80	1,73	**
Leg length	42,29	2,29	47,25	0,50	**
Chest width	17,23	1,11	19,75	1,50	*
Subcutaneous fat thickness	7,57	3,15	13,00	2,16	*

*** p < 0,01; * p < 0,05*

The linear measurements on the left half of the chilled carcasses of male Anglo-Nubian kids fed on goat's and cow's milk showed higher values, therefore, larger carcasses in the animals fed on cow's milk. When measuring the carcass length of the animals of both groups, a significant difference was observed ($p<0,01$), as in the kids fed on cow's milk, the carcasses were longer than those fed on goat's milk. A significant difference was observed in the leg length of the carcasses in both groups ($p<0,01$), again in favour of the male Anglo-Nubian kids fed on cow's milk. The difference determined between the chest width of the carcasses in both groups was also significant ($p<0,05$). Subcutaneous fat thickness was significantly greater in kids fed on cow's milk ($p<0,05$). Linear parameters were also recorded in the Bulgarian White Dairy kids fed different types of milk (Table 25).

Table 25: *Linear measurements of the carcass of the Bulgarian White Dairy kids fed on different types of milk*

Linear measurement (cm)	**Goat**		**Cow**		***Sig.***
	Mean	**SD**	**Mean**	**SD**	
Carcass length	48,06	2,00	53,20	2,39	***
Leg length	48,46	1,88	49,80	0,84	NS
Chest width	19,96	1,68	18,40	4,83	NS
Subcutaneous fat thickness	8,61	2,85	15,60	5,03	*

***NS**–not significant; *** p < 0,01; * p < 0,05*

The carcasses of BWD kids fed on cow's milk are significantly longer ($p<0,001$) than those fed on goat's milk (Table 25). The measured leg length is in close values in animals fed on different types of milk. The chest width measured in animals from both groups also shows close values. The subcutaneous fat thickness measured in this study is significantly greater ($p<0,05$) in kids fed on cow's milk than kids fed on goat's milk (Table 25). The linear measurements show that male BWD kids have larger carcasses and a greater amount of accumulated fat in the sternum area than kids of the Anglo-Nubian breed. In both studied breeds, higher values of linear parameters are observed in animals fed on cow's milk.

2.2. Characteristics of the slaughtered carcass of the Anglo-Nubian and Bulgarian White Dairy kids

After determining the linear parameters of the carcass, the characteristics determining the meat productivity of the animals were examined on its left half. The results are presented in Table 26.

***Table 26**: Carcass composition in the Anglo-Nubian kids fed on different types of milk*

Slaughter parameters (Kg)	**Goat's milk**		**Cow's milk**		***Sig.***
	Mean	**SD**	**Mean**	**SD**	
Live weight 48 hours before slaughter	15,500	1,47	17,436	1,80	*NS*
Hot carcass weight	7,342	1,07	8,900	0,64	*NS*
Cooling loss	0,114	0,04	0,140	0,07	*NS*
Yield (%)	47,370	3,66	51,040	1,68	*NS*
Chilled carcass weight	7,228	1,05	8,760	0,60	*NS*
1/2 carcass weight	3,614	0,52	4,380	0,30	*NS*
Total weight of all parts	3,614	0,86	4,380	0,64	*NS*
Neck weight	0,413	0,10	0,526	0,09	*NS*
Bones	0,108	0,03	0,130	0,02	*NS*
Muscles	0,283	0,07	0,343	0,04	*NS*
Fats	0,022	0,01	0,053	0,03	*
Shoulder weight	0,896	0,28	1,099	0,23	*NS*
Bones	0,234	0,07	0,233	0,03	*NS*
Muscles	0,610	0,22	0,788	0,20	*NS*
Fats	0,052	0,02	0,078	0,02	*NS*
Loin weight	0,300	0,07	0,355	0,08	*NS*
Bones	0,114	0,01	0,129	0,03	*NS*
Muscles	0,166	0,05	0,201	0,03	*NS*
Fats	0,020	0,01	0,025	0,02	*NS*
Leg weight	1,081	0,25	1,266	0,12	*NS*
Bones	0,352	0,08	0,376	0,04	*NS*
Muscles	0,689	0,20	0,841	0,06	*NS*
Fats	0,040	0,01	0,049	0,02	*NS*
Chest	0,683	0,09	0,848	0,15	*NS*
Bones	0,271	0,04	0,334	0,05	*
Muscles	0,359	0,06	0,443	0,07	*NS*
Fats	0,053	0,01	0,071	0,04	*NS*
Abdomen	0,241	0,09	0,286	0,10	*NS*
Muscles	0,203	0,08	0,221	0,07	*NS*
Fats	0,038	0,01	0,065	0,04	*NS*

***NS**–not significant; * p < 0,05*

The live weight before slaughter (90 days) of Anglo-Nubian kids fed on goat's milk is lower than the same kids fed on cow's milk. The cooling loss is lower in animals fed goat's milk than those fed cow's milk (Table 26). The weight of the warm carcass is greater in kids fed on cow's milk (Table 26). After cooling the carcass, the result is in favour of kids fed on cow's milk. Accordingly, the yield of kids fed on cow's milk is greater than the other group of kids. After cutting the individual parts of the left half of the slaughter carcasses of AN kids, larger cuts are observed in kids fed on cow's milk. In terms of weight, all six parts of the carcass in Anglo-Nubian kids fed on cow's milk are larger than the cuts from those fed on goat's milk. The leg is the heaviest part of the carcass of kids in both groups fed on goat's milk, as it weighs 1,081 kg, whereas it is 1,266 kg in kids fed on cow's milk (Table 26). In contrast to the leg, the abdominal

part occupies the smallest weight of the carcass in Anglo-Nubian kids. In the other cuts of the carcasses, no significant differences are observed between Anglo-Nubian kids fed on different types of milk. In both Anglo-Nubian and Bulgarian White Dairy kids, the slaughter characteristics determining meat productivity were analysed, as their results are presented in Table 27.

Table 27: *Carcass composition in the Bulgarian White Dairy kids fed on different types of milk*

Slaughter parameters (Kg)	Goat's milk		Cow's milk		*Sig.*
	Mean	**SD**	**Mean**	**SD**	
Live weight 48 hours before slaughter	24,629	3,97	23,162	3,30	*NS*
Hot carcass weight	12,157	1,79	10,660	1,50	*NS*
Cooling loss	0,213	0,04	0,150	0,01	**
Yield (%)	49,36	1,53	46,02	2,70	**
Chilled carcass weight	11,944	1,75	10,510	1,50	*NS*
1/2 carcass weight	5,972	0,88	5,255	0,75	*NS*
Total weight of all parts	5,910	0,89	5,255	0,67	*NS*
Neck weight	0,717	0,10	0,646	0,09	*NS*
Bones	0,150	0,03	0,142	0,03	*NS*
Muscles	0,441	0,05	0,405	0,05	*NS*
Fats	0,126	0,03	0,099	0,02	*NS*
Shoulder weight	1,286	0,20	1,137	0,17	*NS*
Bones	0,346	0,07	0,318	0,04	*NS*
Muscles	0,800	0,13	0,717	0,10	*NS*
Fats	0,140	0,02	0,102	0,03	*
Loin weight	0,622	0,11	0,544	0,07	*NS*
Bones	0,242	0,04	0,208	0,02	*NS*
Muscles	0,304	0,05	0,280	0,04	*NS*
Fats	0,076	0,02	0,056	0,01	*NS*
Leg weight	1,541	0,27	1,386	0,15	*NS*
Bones	0,481	0,08	0,420	0,05	*NS*
Muscles	0,959	0,20	0,868	0,09	*NS*
Fats	0,101	0,02	0,098	0,02	*NS*
Chest	1,248	0,18	1,098	0,14	*NS*
Bones	0,469	0,07	0,414	0,05	*NS*
Muscles	0,634	0,09	0,600	0,07	*NS*
Fats	0,145	0,03	0,084	0,01	**
Abdomen	0,496	0,06	0,444	0,06	*NS*
Muscles	0,334	0,04	0,309	0,06	*NS*
Fats	0,162	0,02	0,135	0,01	*

NS*–not significant; ** p < 0,01; * p < 0,05*

The differences in live weight before slaughter and hot carcass weight in the Bulgarian White Dairy kids fed on goat's and cow's milk were 1,467 and 1,497 kg, respectively. However, the reported yield in both studied groups differed significantly ($p<0,01$). It was higher in goat kids fed on goat's milk than in cow's milk (Table 27).

The cooling loss was significantly higher in kids fed on goat's milk ($p<0,01$), but this did not affect the high difference in the weight of a cold carcass (Table 27).

From the established higher values of the parameters, such as live weight before slaughter, hot carcass weight, yield and cold carcass weight, it logically follows that all parts of the carcass in BWD kids fed on goat's milk have a higher weight than kids fed on cow's milk. The largest difference in the weight of the individual cuts is observed in the leg and the smallest in the abdomen.

The live weight before slaughter in all studied groups varies from 15,500 kg in AN kids fed on goat's milk to 24,629 kg in BWD kids also fed on goat's milk.

The values for hot carcass weight are from 7,342 to 12,157 kg, as the values for BWD breed animals are higher.

Cold carcass weight ranged from 7,228 to 11,94 kg, with the results being higher for BWD breed kids for both types of feeding.

The cooling loss determined for kids of both breeds, fed on different types of milk, ranged from 0,114 to 0,213 kg. The values obtained for BWD kids were higher for both types of feeding.

The yield ranged from 46,02 to 51,04%, with higher values observed for the Anglo-Nubian kids, which may be due to the breed characteristics.

The leg is the heaviest cut of the carcasses in all groups of kids. Its weight varies from 1,081 to 1,541 kg, and it logically follows that the weight of the leg is greater in the Bulgarian White Dairy kids.

The weight of the neck varies from 0,413 kg in AN kids fed on goat's milk to 0,717 kg in Bulgarian White Dairy animals fed on cow's milk. The weight of this part of the carcass of BWD animals fed on both types of milk is higher than that of Anglo-Nubian kids.

The abdominal part has the lowest weight of all cuts of the carcass. Its weight varies from 0,241 to 0,496 kg.

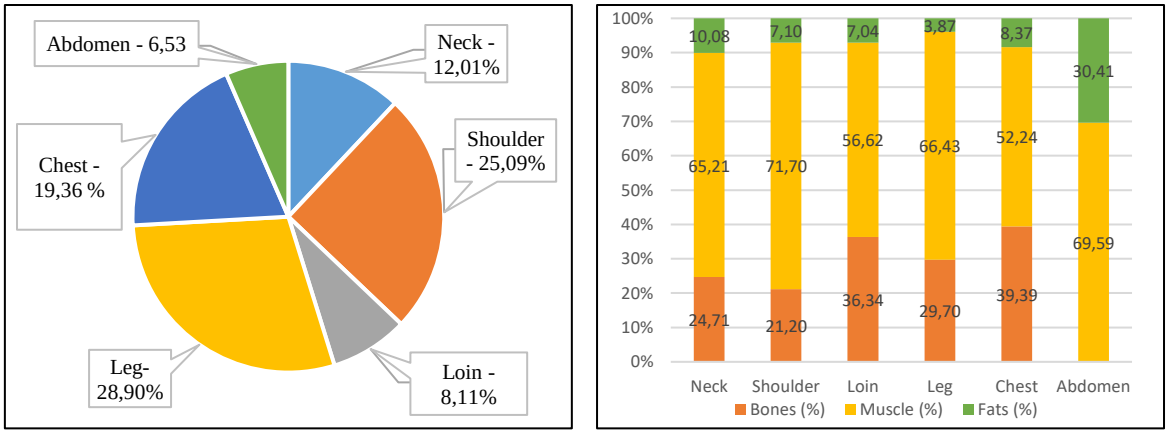
The weight of the loin is very similar in kids fed on both types of milk and in both studied breeds. The values obtained for this cut are significantly higher in the Bulgarian White Dairy kids. The results obtained for this cut are from 0,300 to 0,622 kg.

The weight of the chest differs significantly, and again, this cut is heavier in the Bulgarian White Dairy Breed. The values are from 0,683 to 1,248 kg.

The analysis of the slaughter characteristics of Anglo-Nubian and Bulgarian White Local breed kids fed on goat's and cow's milk shows that they have high yield and meat productivity and that feeding on milk other than maternal does not worsen the values of the slaughter parameters. Higher live weight at slaughter leads to a heavier carcass, higher yield and, accordingly, larger slaughter cuts.

2.3. Ratio of carcass parts and their constituent tissues in Anglo-Nubian and Bulgarian White Dairy kids

The carcass parts of the Anglo-Nubian kids fed on cow's milk are presented in percentage ratio in Figure 6a and Figure 6b.



a **b**

Figure 6a: *Carcass ratio of male Anglo-Nubian kids fed on cow's milk*
Figure 6b: *Ratio of tissues in carcass parts of the Anglo-Nubian kids fed on cow's milk*

Expressed in percentages, the highest and lowest values are again occupied by the leg and the abdominal part, 28,90 and 6,53%, respectively. The percentage ratio of the leg and the shoulder are in close values, with the thoracic limbs being 3,81% less than the pelvis.

Despite the weight superiority of the kids fed on cow's milk, in the kids fed on goat's milk, a percentage ratio among the parts of the carcass is observed in very close limits. The distribution of all cuts is in close values to those of the Anglo-Nubian kids fed on goat's milk (Figure 2a and Figure 6a). For example, the loin in the kids fed on goat's milk is 8,30%, and in those fed on cow's milk, it is 8,11%. Differences of less than 1% are also observed between the chest and the neck in AN kids fed on both types of milk.

The indicated cuts of the carcass were deboned, and after a complete dissection, the three main types of tissues were separated, as presented in percentages in Figure 6b.

The largest share of the distribution of the three main tissues in the carcasses of AN kids is occupied by muscle tissue; it varies from 25,24% in the chest to 71,70% in the shoulder.

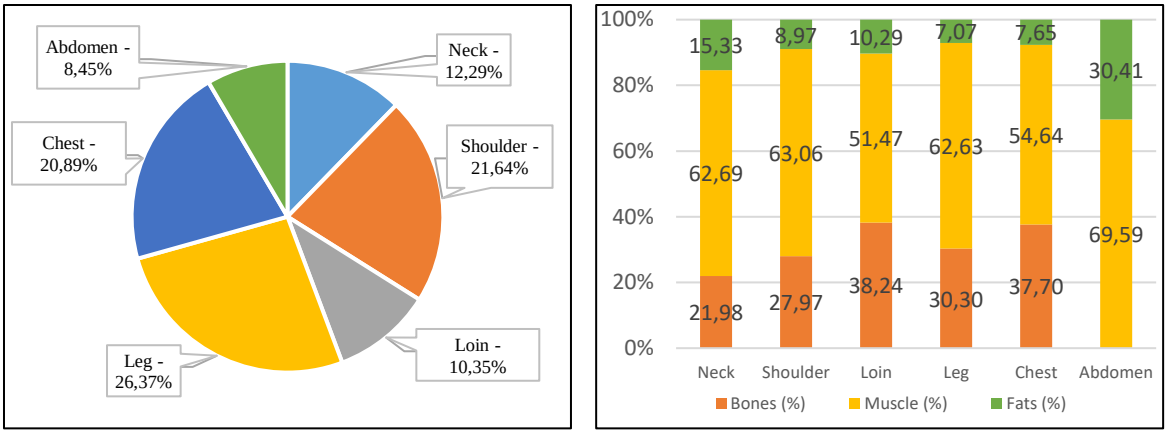
After deboning the cuts in AN kids fed on cow's milk, we found that the shoulder has the highest percentage of muscle mass, followed by the abdominal part and the leg.

Regarding the bones in the carcass cuts, the highest values are observed in the chest and loin and the lowest in the shoulder and neck.

The highest accumulated fat is registered in the abdominal part – 30,41%, whereas the lowest in the leg – 3,87% (Figure 6b). Similar results were obtained in Anglo-Nubian kids fed on goat's milk. The highest reported fat was found in the abdominal part at 15,77%, and the lowest in the leg at 3,70% (Figure 2b).

The pelvic and thoracic limbs have the best ratio of the three types of tissues. Muscle takes the largest share, followed by bone, as the accumulated fat occupies the smallest share of the entire cut. Similar results for the thoracic and pelvic limbs were observed in goats fed with mother's milk (Figure 2b).

The percentage distribution of cuts from the carcass of a kid Bulgarian White Dairy breed is presented in Figure 7a.



a ***b***

Figure 7a*: Ratio of carcass parts of male Bulgarian White Dairy kids fed on cow's milk*
Figure 7б*: Ratio of tissues in carcass parts of the Bulgarian White Dairy kids fed on cow's milk*

The largest and smallest parts of the carcass are the leg and the abdomen, respectively, in BWD kids fed on cow's milk, as in all other groups compared. The loin, neck and abdomen are the three cuts with the smallest percentage share from the percentage ratio of the carcass parts. The highest percentage values are found for the neck 12,29%, followed by the loin 10,35% and the abdomen – 8,45%. The chest and shoulder are in close values, occupying 22,96 and 20,93%, respectively (Figure 7a). After cutting the individual parts of the carcass, it is seen that despite the close values of the share occupied by the cut, the ratio of the individual tissues in it differs, for example, the bones in the chest are 37,70%, and in the shoulder, 27,97% in BWD kids fed on cow's milk (Figure 7b) Differences in the percentage ratio are also observed in the amount of muscle tissue. In the chest, 54,64% were recorded, and in the shoulder, 63,06%. Only the fats in these two parts of the carcass were close to 7,65% in the chest and 8,97% in the shoulder. Data show that the largest amount of bones is found in the shoulder and the least in the neck – 38,24 and 21,98%, respectively (Figure 7b). As in all studied groups, in BWD kids fed on cow's milk, the least fat was found in the leg – 7,07% and the greatest in the abdominal part – 30,41% (Figure 7b).

In all studied groups, the leg occupies the largest share of the carcass. The values are from 26,07 to 29,91%, with higher values being recorded in the Anglo-Nubian kids in both types of feeding (Figure 2a and Figure 6a).

Of the three main tissues constituting the carcasses, fat is the least in this cut and ranges from 3,70 to 7,07%. The results show that the fat content in the leg is lower in Anglo-Nubian goat kids. Moreover, the fat content in the legs of animals fed goat's milk is lower than those fed cow's milk (Figure 2b and Figure 6b). Bones constitute 29,70 to 32,56% of the leg, with the lowest amount found in AN kids fed on cow's milk and the highest in the same goat kids fed on goat's milk (Figure 2b and Figure 6b). The largest amount of muscle tissue is in the leg, as the values vary from 62,23 to 66,43%. In the experimental animals of the AN breed, a higher percentage of muscle tissue was found than in BWD kids (Figure 2b, 4b, 6b and 7b).

The results for the shoulder are from 21,76% in the Bulgarian White Dairy kids fed on goat's milk to 26,64% in the kids of the same breed fed on cow's milk (Figure 4a and Figure 7a). Higher values for this cut were recorded in both breeds of kids fed on cow's milk. The muscle tissue content in the shoulder varies from 62,21 to 71,70%, as a greater amount of muscle tissue is observed in the Anglo-Nubian breed. The bones constitute about 21,20 – 27,97% of the shoulder. The highest content is registered in the BWD kids fed on cow's milk (Figure 7b), and the lowest is in the AN kids fed with the same (Figure 6b). The amount of fat was low, similar to the leg and ranged between 5,80 – 10,89%.

The neck is from 11,43 to 12,29% of the carcass of the experimental animals. The muscle tissue content in this cut is high, occupying between 61,51-68,52%. The bones are in the range of 20,92 and 26,15%. The fat is in higher values than those in the leg and shoulder, varying between 5,33-17,57%. The fat content in this cut is lower in animals of the Anglo-Nubian breed. The abdominal part has the lowest values of all cuts in the carcasses. It occupies from 6,53 to 8,45%, as lower values were reported for it in the Anglo-Nubian kids.
A high fat content is observed in the abdominal part, which varies between 15,77% in the AN kids fed on goat's milk (Figure 2b) and 32,66% in BWD kids fed on mother's milk (Figure 4b). The chests occupy a large share of the carcass of the slaughtered animals (18,90 – 21,12%), similar to the leg and shoulder. However, the ratio of their constituent tissues is different since the bones in this cut are in a larger quantity, they are contained in the shoulder in 37,58 – 39,39%. The muscle tissue content in the chest part is from 50,80 to 54,64%, as the fat varies between 7,67 and 11,62%. A higher bone tissue content is found in the chest part of the carcasses of AN kids than those of the BWD breed.
The loin is a cut that occupies a small percentage of the carcass, in which there is a large number of bones and not such a large amount of muscles than the leg and shoulder. The fat in it is not in a large amount and varies between 6,67 and 12,22%.

2.4. Internal organs and non-slaughter characteristics of Anglo-Nubian and Bulgarian White Dairy kids

Internal organs are a factor determining the slaughter yield. The weights of the internal organs of the Anglo-Nubian kids fed on goat's and cow's milk were compared as part of the carcass characteristics. Our results are presented in Table 28.

***Table 28**:Weight of internal organs in Anglo-Nubian kids fed on different types of milk*

Parameter *(Kg)*	Feeding				Sig.
	Goat	SD	Cow	SD	
Heart	0,056	0,01	0,081	0,01	***
Lungs	0,243	0,04	0,273	0,03	NS
Liver	0,301	0,04	0,414	0,07	**
Spleen	0,037	0,01	0,048	0,01	*
Kidney	0,029	0,01	0,050	0,01	***
Abdomen	0,441	0,11	0,571	0,09	NS
Small intestines	0,527	0,09	0,550	0,09	NS
Large intestine	0,470	0,10	0,642	0,07	*
TestisTestisTestisTestisTestis	0,080	0,02	0,056	0,01	*
Head	0,769	0,04	0,946	0,10	**
Perirenal fat	0,027	0,01	0,091	0,07	*
Skin	0,860	0,04	1,176	0,13	***
Feet	0,707	0,05	0,691	0,06	NS

***NS**–not significant; *** p < 0,001; ** p < 0,01; * p < 0,05*

The perirenal fat was significantly higher in male Anglo-Nubian kids fed on cow's milk than those fed on goat's milk (p<0,05) (Table 28). The results showed significantly higher values of heart (p<0,001), liver (p<0,01), spleen (p<0,05), kidney (p<0,001), large intestine (p<0,05), testis (p<0,05), head (p<0,01) and skin (p<0,001) in animals fed on cow's milk (Table 28). The internal organs of the Bulgarian White Dairy kids were weighed. The results obtained are presented in Table 29.

Table 29: *Weight of internal organs in the Bulgarian White Dairy kids fed on different types of milk*

Parameter (Kg)	Feeding				Sig.
	Goat	SD	Cow	SD	
Heart	0,097	0,01	0,090	0,01	NS
Lungs	0,442	0,15	0,399	0,08	NS
Liver	0,501	0,46	0,535	0,06	NS
Spleen	0,068	0,01	0,044	0,01	**
Kidney	0,050	0,01	0,059	0,01	NS
Abdomen	0,449	0,08	0,652	0,09	**
Small intestines	0,534	0,09	0,653	0,04	*
Large intestine	0,832	0,10	0,795	0,13	NS
Testis	0,185	0,02	0,068	0,01	***
Head	1,320	0,23	1,234	0,30	NS
Perirenal fat	0,191	0,23	0,129	0,04	NS
Skin	1,414	0,16	1,361	0,29	NS
Feet	1,023	0,23	0,718	0,14	*

NS*–not significant; *** p < 0,001; ** p < 0,01; * p < 0,05*

The analysis of the weight of internal organs shows that the abdomen's small and large intestines have the greatest weight, followed by the liver and lungs. The weight of the head varies from 0,769 to 1,320 kg, as lower values are recorded in the experimental animals of the Anglo-Nubian breed (Table 28 and Table 29).

The skin of the animals of both studied breeds weighs from 0,860 to 1,414 kg, as the values recorded in the Bulgarian White Dairy kids are higher (Table 28 and Table 29).

The feet weigh from 0,691 to 1,023 kg, with lower values being recorded in the Anglo-Nubian kids (Table 28 and Table 29).

The lungs in goat kids of both breeds weighed less in the AN kids than the BWD ones (Table 28 and Table 29).

The weight of the liver varied between 0,301 kg in the Anglo-Nubian kids fed on goat's milk to 0,535 kg in the Bulgarian White Dairy kids fed on cow's milk (Table 28 and Table 29).

The kidney and spleen were the organs with the smallest weight. They weighed between 0,029 and 0,068 kg and were larger in the Bulgarian White Dairy breed animals. The heart was slightly larger than theirs, its weight varying between 0,056 and 0,097 kg (Table 28 and Table 29).

The perirenal fat differed significantly between both breeds, as AN kids were significantly smaller. Their weight varies from 0,027 kg in the AN kids fed on goat's milk to 0,191 kg in BWD kids fed on cow's milk (Table 28 and Table 29).

3. Technological qualities

3.1. Technological parameters of meat of Anglo-Nubian kids

The values for the technological parameters, such as pH, colour and water-holding capacity of meat of the Anglo-Nubian kids fed on different types of milk, are presented in Table 30.

Table 30: *pH, colour and water-holding capacity of meat of the Anglo-Nubian kids fed on different types of milk*

Parameter	Feeding		Muscle		RMSE	Sig.		
	Goat	Cow	m. *LTL*	m.*SM*		Feeding	Muscle	Feeding x Muscles
pH 45	6,57	6,49	6,47	6,59	0,18	NS	NS	NS
pH 24	6,14	6,04	6,05	6,12	0,25	NS	NS	NS
L*	49,73	40,43	44,99	45,17	3,85	***	NS	NS
a*	16,88	8,99	12,33	13,55	1,09	***	*	NS
b*	9,05	9,45	8,15	10,35	1,16	NS	***	NS
c	18,96	19,88	18,91	19,93	1,04	0,06	*	NS
h	28,07	26,75	26,80	28,02	2,08	NS	NS	NS
WHC (%)	35,17	35,24	34,11	36,30	2,26	NS	*	NS

NS*–not significant; *** p < 0,01; * p < 0,05*

The pH in the studied groups is in values characteristic of the animal species. A decrease in its values of twenty-four hours *post mortem* was noted in both muscles, as well as both types of feeding.

The meat colour is characterised by the three main coordinates, as well as by the saturation and the hue angle. In the present study, a significant difference in the meat brightness of Anglo-Nubian kids was observed, as it was in higher values in the kids (p<0,001) fed on goat's milk than those fed on cow's milk.

The values characterising the red colour in meat differ significantly between both types of feeding (p<0,001), as well as in both analysed muscles (p<0,05). The data of the meat colour for b* are in close values as regards both types of feeding. However, they are in a significant difference between both studied muscles (p<0,001). The same conclusion can be drawn from the results obtained for the meat colour saturation. In both studied muscles, values of 18,91 are observed in m. *Longissimus thoracis et lumborum* and 19,93 in m. *Semimembranosus* (Table 30), which differ significantly (p<0,05). The values of the hue angle are close values for all studied groups, no significant differences are observed in them. The water-holding capacity of the meat of AN kids is approximately equal values when fed different types of milk. In contrast, the water-holding capacity determined in both studied muscles differs (p<0,05). The lower values obtained for the WHC of the meat determine its high quality.

3.2. Technological parameters of meat of the Bulgarian White Dairy kids

The same technological properties were analysed for the meat of the Bulgarian White Dairy kids are presented in Table 31

Table 31: *pH, colour and water holding capacity of meat of the Bulgarian White Dairy kids fed on different types of milk*

Parameter	Feeding		Muscle		RMSE	Sig.		
	Goat	Cow	m. *LTL*	m.*SM*		Feeding	Muscle	Feeding x Muscles
pH 45 min	6,20	6,38	6,45	6,53	0,19	*	NS	NS
pH 24 h	6,04	5,89	6,06	5,86	0,37	NS	NS	NS
L*	42,57	37,33	39,02	40,88	3,97	**	NS	NS
a*	17,27	6,87	11,45	12,70	2,46	***	NS	NS
b*	8,09	8,11	7,63	8,57	1,66	NS	NS	NS
c	19,25	19,81	18,22	20,84	1,61	NS	***	NS
h	24,86	28,12	25,47	27,51	1,66	***	**	NS
WHC (%)	30,25	36,03	31,41	34,87	3,03	***	*	*

NS*–not significant; *** p < 0,001; ** p < 0,01; * p < 0,05*

After two measurements of the pH of the meat of the Bulgarian White Dairy kids, an expected decrease in values was observed for a 24-hour storage period. In goat kids fed on goat's milk, this decrease was less than in those fed on cow's milk. For pH, recorded at 45min *post mortem*, significantly different values ($p<0,05$) were observed due to the type of milk used for animal feed. For the same parameter, determined on both analysed muscles, no significant differences were observed. The final pH was in close values for the groups of goat kids fed on different types of milk, also in both examined muscles. The meat brightness showed significantly higher values in goat kids fed on goat's milk than those fed on cow's milk ($p<0,01$). The presence of red colour in the meat, expressed as a*, was in significantly higher values in goat kids fed on goat's milk ($p<0,001$). This parameter is not significantly affected by the different muscles.

The yellow colour b* of meat is in close values in both studied groups and is not affected by both factors considered - feeding and muscle. The values for colour saturation remain close in the kids fed on both types of milk but differ significantly between the muscles ($p<0,001$), as they are higher in m. *Semimembranosus*. The hue angle differs in the different types of feeding ($p<0,001$), as well as in both studied muscles ($p<0,01$). The lowest values were recorded in the goat kids fed on goat's milk - 24.86 and the highest in the meat of kids fed on cow's milk – 28,12 (Table 31). A significant difference is observed between the data obtained for both muscles, but smaller than that in both types of feeding. An interaction between the factors of feeding and muscle ($p<0,05$) was observed in the results obtained for the water holding capacity of meat of the Bulgarian White Dairy kids. Animals fed on goat's milk had a better WHC (20,23%) than those fed on cow's milk (36,03%). The water holding capacity was also better in m. *Longissimus thoracis et lumborum* - 1,04% and m. *Semimembranosus* – 34,83% (Table 31).

In the initial measurement of pH 45 min, the values were from 6,20 to 6,57, and in the second measurement of pH 24h, an expected decrease in these values from 5,89 to 6,14 was observed.

The meat colour can significantly influence the choice of meat by consumers. The values for meat brightness differ significantly between both types of feeding for both breeds. Higher results are observed in the meat of Anglo-Nubian kids. No significant differences are observed between both studied muscles, as the values obtained in m. *Semimembranosus* are slightly higher than those in m. *Longissimus thoracis et lumborum*.

The values for the red colour in meat ranged from 6,87 to 17,24. The values for the yellow colour are from 8,09 to 9,45, as lower values for this parameter are recorded in the Bulgarian White Dairy kids. The results obtained for b* are lower in m. *Longissimus thoracis et lumborum* than those in m. *Semimembranosus*.

The results for the colour saturation of meat vary from 18,96 to 19,88. The hue angle for the meat of the experimental animals is from 24,86 to 30,25. The lowest values are recorded in the Bulgarian White Dairy kids fed on cow's milk and the highest in the same kids fed on goat's milk. In both muscles, higher values are observed in the animals fed on goat's milk.

The data obtained for the water-holding capacity of meat are in similar values for both studied breeds, the results for this parameter vary between 30,25 and 36,03%. In the kids of both breeds fed on cow's milk, lower values of WHC are observed. The WHC of m. *Semimembranosus* is higher than m. *Longissimus thoracis et lumborum*.

3. Chemical composition

3.1. Chemical parameters of meat of Anglo-Nubian kids

The parameters of the chemical composition of meat, protein, fat, moisture and minerals were examined. These parameters are a significant factor in determining meat quality. Their content and the ratio among them determine the taste and some organoleptic meat qualities.

Analysis on m. *Longissimus thoracis et lumborum* and m. *Semimembranosus* were conducted on both breeds. The data on the parameters determining the chemical composition of meat of the Anglo-Nubian kids fed on different types of milk are presented in Table 32.

Table 32: *Chemical composition of meat of Anglo-Nubian kids fed on different types of milk*

Parameter	Feeding		Muscle		RMSE	Sig.		
	Goat	Cow	LTL	m.*SM*		Feeding	Muscle	Feeding x Muscle
Protein	19,08	18,71	18,60	19,19	1,18	NS	NS	NS
Fats	1,96	0,86	1,39	1,43	0,62	***	NS	NS
Moisture	75,93	77,27	76,93	76,27	1,18	*	NS	NS
Ash	1,07	1,16	1,09	1,14	1,10	**	NS	NS

***NS**–not significant; *** p < 0,001; ** p < 0,01; * p < 0,05*

Table 32 shows that feeding affects the chemical composition of the meat of the Anglo-Nubian kids. There is a significant difference among the values of the physicochemical parameters, such as fat, moisture and minerals, in kids fed on goat's and cow's milk. Protein is the only parameter that is not affected by either the type of feeding or the muscle studied. The values determined for the protein content in the meat of AN kids fed goat's milk are 19,08%, and in those fed cow's milk are 18,71% (Table 32). The difference in the protein content in both muscles is also not significant. The largest difference in the values of the chemical parameters is observed in the fat in the meat of animals fed on different types of milk (p<0,001). The fat content in the meat of kids fed on goat's milk is 1,96%, and in those fed on cow's milk is 0,86%. In contrast, no significant difference is observed in the fat content in m. *Longissimus thoracis et lumborum* and m. *Semimembranosus* (Table 32). The same trend is observed in the moisture content in meat, without a significant difference to the muscle studied. Significantly higher moisture content was recorded in the meat of the Anglo-Nubian kids fed on cow's milk – 77,27%, compared to 75,93% in kids fed on goat's milk (p<0,05) (Table 32). Ash ranged from 1,07% in kids fed goat's milk to 1,16% in those fed cow's milk.

The differences were significant (p<0,01) and corresponded to the values characteristic of the animal species.

3.2. Chemical parameters of meat of the Bulgarian White Dairy kids

The chemical composition of meat was also determined in the Bulgarian White Dairy kids fed different types of milk. The results obtained are shown in Table 33.

Table 33*: Chemical composition of meat of the Bulgarian White Dairy kids fed different types of milk*

Parameter	Feeding		Muscle		RMSE	Sig.		
	Goat	Cow	m. *LTL*	m.*SM*		Feeding	Muscle	Feeding x Muscle
Protein	19,55	19,47	19,45	19,58	0,93	NS	NS	NS
Fats	2,27	0,93	1,52	1,69	0,48	***	NS	NS
Moisture	75,11	76,40	75,92	75,60	1,03	*	NS	NS
Ash	1,10	1,20	1,14	1,16	0,05	***	NS	NS

***NS**–not significant; *** p < 0,01; * p < 0,05*

A significant difference was observed in the groups of the Bulgarian White Dairy kids, similar to those of Anglo-Nubian, fed on different types of milk, and insignificant differences in the results of both muscles. No interaction was observed between both analysed factors that could have an impact on the composition of the chemical parameters of meat. The protein content is again the only parameter that is not influenced by both studied factors. Its content is in very close values in the studied groups, ranging between 19,45 and 19,58% (Table 33). The

largest difference (p<0,001) is observed in the amount of fat, as in kids fed on goat's milk, it is 2,27%, and in those fed on cow's milk – 0,93%. This difference is not observed when comparing both muscles. Therefore, the difference is insignificant: 1,52% - m. *Longissimus thoracis et lumborum* - 1,69% and m. *Semimembranosus* (Table 33). The amount of moisture differs significantly between the groups, depending on the diet (p<0,05), and its values are higher in animals fed on cow's milk. Similarly, significantly higher values in the group fed cow's milk are established for the ash (p<0,001). In a comparative analysis of the chemical parameters studied in both breeds of kids, it is seen that the values of protein, fat and minerals are higher in the BWD breed. The moisture content in meat of both breeds of kids is close, as the lowest recorded is 75,11% in BWD kids fed on goat's milk, and the highest in Anglo-Nubian kids fed on cow's milk (Table 32 and Table 33). The protein content in the samples is from 18,71 to 19,55%, as slightly lower values are observed in the meat of Anglo-Nubian kids.

The fat content in the goat kids of both studied breeds is from 0,86 to 2,24%. The amount of fat is significantly higher in the goats fed on goat's milk than those fed on cow's milk. The amount of fat in both muscles is higher in m. *Semimembranosus*, than m. *Longissimus thoracis et lumborum*. The moisture content in the meat is from 75,11 to 77,27%, as higher values are reported in the meat of goat kids fed on cow's milk. The ash content in the meat of the goat kids is in close limits (1,07 – 1,20%). The results show that higher values of this parameter were found in the samples of animals fed on cow's milk.

4.3. Meat fatty acid composition of the Anglo-Nubian kids

The fatty acid composition of the meat of kids fed on different types of milk is presented in Table 34.

Table 34: *Fatty acid composition of meat of the Anglo-Nubian kids fed on different types of milk*

Fatty acids (%)	Feeding		Muscle		RMSE	Sig.		
	Goat	Cow	m. *LTL*	m. *SM*		Feeding	Muscle	F x M
C14:0	3,47	2,23	2,95	2,76	0,54	***	NS	NS
C15:0	0,46	0,35	0,39	0,39	0,05	***	NS	NS
C16:0	22,02	20,17	21,25	20,96	1,63	*	NS	NS
C16:1	2,33	2,94	2,46	2,80	0,53	*	NS	NS
C17:0	0,86	0,62	0,79	0,69	0,14	**	NS	NS
C18:0	13,21	12,83	13,17	12,87	1,12	NS	NS	NS
C18:1n-9	37,46	36,29	38,28	35,46	4,66	NS	NS	NS
C18:2n-6	10,16	11,16	9,80	11,52	2,59	NS	NS	NS
C18:3n-3	0,41	0,48	0,42	0,47	0,07	NS	NS	NS
CLA	0,39	0,34	0,33	0,40	0,10	NS	NS	NS
C20:2n-6	0,55	1,34	0,96	0,93	0,30	***	NS	NS
C20:3n-6	0,49	0,80	0,64	0,66	0,23	**	NS	NS
C20:4n-6	6,67	8,38	6,84	8,22	1,99	0,06	NS	NS
C20:5n-3	0,29	0,50	0,37	0,41	0,13	**	NS	NS
C22:5n-3	1,04	1,30	1,14	1,21	0,28	*	NS	NS
C22:6n-3	0,19	0,27	0,21	0,25	0,10	NS	NS	NS

NS*–not significant; *** p < 0,001; ** p < 0,01; * p < 0,05*

The fatty acid profile in the muscle lipids of the Anglo-Nubian kids fed on different types of milk shows that the way of feeding significantly affects the content of individual fatty acids.

The percentage of fatty acids in total lipids did not differ significantly in both muscles, and no interaction was observed between the studied factors that could change the content of the lipid profile of the meat.

A higher content has been found in saturated acids, such as C14:0 ($p<0,001$), C15:0 ($p<0,001$), C16:0 ($p<0,05$), C17:0 ($p<0,01$), which is significantly higher in the meat of kids fed on goat's milk than kids fed on cow's milk. The greatest difference is observed in palmitic acid. Its content in the meat of AN kids fed goat's milk is 22,02%, and in those fed cow's milk is 20,17% (Table 34).

The same trend is observed in stearic acid, but the difference between the values obtained for its content in the lipid profile of the meat of AN kids is not significant.

There are two monounsaturated fatty acids in the present study – palmitoleic (C16:1) and oleic (C18:1n-9). The content of oleic acid is the highest in the entire fatty acid profile of the meat of AN kids fed on goat's and cow's milk – 37,46 and 36,29%, respectively. Palmitoleic acid is in a significantly smaller amount. It occupies 2,33% of the lipids in the meat of kids fed on goat's milk and 2,94% in those fed on cow's milk (Table 34). The difference in the content of C16:1 is significant between both studied groups of kids ($p<0,05$), unlike the content of C18:1n-9. Significant differences are observed in C20:2n-6 ($p<0,001$), C20:3n-6 ($p<0,01$), C20:5n-3 ($p<0,01$), and C22:5n-3 ($p<0,05$). The greatest difference was observed in eicosadienoic fatty acid; its content was higher in kids fed cow's milk than those fed goat's milk – 1,34 and 0,55%, respectively.

The total content of SFAs, MUFAs and PUFAs was examined, as well as some ratios, such as n-6/n-3 P/S, which are of the utmost significance for human health. The results are shown in Table 35.

Table 35: *Total amounts of fatty acids and lipid indices in meat of the Anglo-Nubian kids fed on different types of milk*

Parameter (%)	Feeding		Muscle		RMSE	Sig.		
	Goat	Cow	m. *LTL*	m.*SM*		Feeding	Muscle	F x M
SFAs	40,02	36,20	38,55	37,67	2,35	**	NS	NS
MUFAs	39,79	39,23	40,74	38,26	4,50	NS	NS	NS
PUFAs	20,19	24,57	20,71	24,07	5,19	0,09	NS	NS
n-6/n-3	9,26	8,50	8,52	9,11	0,96	NS	NS	NS
P/S	0,50	0,68	0,54	0,64	0,15	*	NS	NS
AI	0,59	0,46	0,54	0,51	0,08	***	NS	NS
TI	0,47	0,37	0,04	0,39	0,13	***	NS	NS

***NS**–not significant; *** p < 0,001; ** p < 0,01; * p < 0,05*

The highest total content of unsaturated fatty acids was found in AN kids fed goat's milk – 40,02% and the lowest in kids fed cow's milk – 36,20% (Table 35).

Monounsaturated fatty acids are in very close ranges from 38,26% in m. *Semimembranosus* to 40,74% in m. *Longissimus thoracis et lumborum*.

In polyunsaturated fatty acids, values with small differences are also observed from 20,19% in kids fed goat's milk to 24,57% in animals fed cow's milk. The values show a tendency to increase in the group fed on cow's milk ($p=0,09$).

The ratio of n-6/n-3 fatty acids is in close values, with higher values in kids fed goat's milk and lower values in those fed cow's milk, without significant differences.

The values of AI and TI differ significantly among the groups, depending on the diet (p<0,05), and its values are higher in animals fed on cow's milk.

4.4. Fatty acid composition of meat of the Bulgarian White Dairy kids

The fatty acid content in the meat of the Bulgarian White Dairy kids fed on different types of milk is determined and presented in Table 36.

Table 36: *Fatty acid composition of meat of the Bulgarian White Dairy kids fed on different types of milk*

Fatty acids	Feeding		Muscle		RMSE	Sig.		
	Goat	Cow	m. *LTL*	m. *SM*		Feeding	Muscle	F x M
C14:0	2,74	2,27	2,35	2,64	0,59	0,06	NS	NS
C15:0	0,36	0,35	0,34	0,37	0,05	NS	NS	NS
C16:0	20,87	20,11	20,40	20,59	1,44	NS	NS	NS
C16:1	1,96	2,93	2,22	2,67	0,60	***	0,08	NS
C17:0	0,77	0,71	0,74	0,72	0,12	NS	NS	NS
C18:0	12,62	12,55	13,02	12,16	0,75	NS	*	NS
C18:1n-9	41,41	38,68	41,34	38,76	5,14	NS	NS	NS
C18:2n-6	10,18	11,49	10,18	11,49	2,59	NS	NS	NS
C18:3n-3	0,39	0,49	0,43	0,45	0,07	**	NS	NS
CLA	0,38	0,33	0,34	0,36	0,10	NS	NS	NS
C20:2n-6	0,52	1,18	0,84	0,87	0,23	***	NS	NS
C20:3n-6	0,41	0,61	0,44	0,58	0,18	**	0,07	NS
C20:4n-6	6,14	6,55	5,91	6,78	5,90	NS	NS	NS
C20:5n-3	0,27	0,40	0,33	0,35	0,11	**	NS	NS
C22:5n-3	0,86	1,15	0,95	1,05	0,40	0,09	NS	NS
C22:6n-3	0,13	0,20	0,17	0,16	0,10	NS	NS	NS

***NS**–not significant; *** p < 0,001; ** p < 0,01; * p < 0,05*

The results obtained show that the content of individual saturated fatty acids is in close values in the Bulgarian White Dairy kids fed on different types of milk and does not differ significantly, but a trend towards a lower content of C14:0 is observed in the group with cow's milk (p=0,06).

A significant difference in the results is observed in the content of palmitoleic acid, with higher values recorded in animals fed cow's milk (p<0,001). The highest values in the fatty acid profile of the meat of BWD goats, in both types of feeding, are occupied by oleic acid (C18:1n-9), and the results obtained are in close limits. In animals fed on different types of milk, a significant difference in the content of linolenic acid (C18:3n-3) is observed, with higher values being found in the meat of BWD goats fed on cow's milk (p<0,01). Eicosadienoic fatty acid (C20:2n-6) is significantly higher in the meat of goats fed on cow's milk (p<0,001). The same is observed for C20:3n-6 and C20:5n-3 fatty acids (p<0,01).

No significant differences were found between the muscles. The stearic acid content was significantly higher in m. *Longissimus thoracis et lumborum* than in m. *Semimembranosus* (p<0,05).

Table 37: *Total amounts of fatty acids and lipid indices in meat of the Bulgarian White Dairy fed on different types of milk*

Parameter	Feeding		Muscle		RMSE	Sig.		
	Goat	Cow	m. *LTL*	m.*SM*		Feeding	muscle	F x M
SFAs	37,36	35,99	36,85	36,48	1,99	NS	NS	NS
MUFAs	43,36	41,61	43,56	41,43	5,46	NS	NS	NS
PUFAs	19,28	22,40	19,59	22,09	6,01	NS	NS	NS
n-6/n-3	10,45	8,85	9,24	9,81	1,79	*	NS	NS
P/S	0,52	0,62	0,53	0,61	0,18	NS	NS	NS
AI	0,51	0,46	0,47	0,49	0,07	NS	NS	NS
TI	0,44	0,39	0,43	0,39	0,10	*	NS	NS

NS*–not significant; *** p < 0,001; ** p < 0,01; * p < 0,05*

Saturated fatty acids (SFAs) occupied higher values in the meat of the Bulgarian White Dairy kids fed on goat's milk. However, no significant differences were observed in both muscles.

The content of MUFAs is in close values, both in the meat of kids fed cow's and goat's milk and in both muscles. In PUFAs, no significant differences were observed caused by the two factors studied: feeding and muscle type.

The ratio of n-6/n-3 fatty acids in the meat of BWD breed kids fed on different types of milk significantly differs ($p<0,05$), as higher values were found in the experimental animals fed on goat's milk.

The values for the ratio of P/S fatty acids were similar in feeding on different types of milk and in both studied muscles and did not differ significantly.

The results obtained for the atherogenic index were within narrow limits. They did not differ significantly between the studied meat of kids fed on goat's and cow's milk, nor in the values of both muscles. In contrast, TI is significantly higher in kids fed on goat's milk ($p<0,05$). This parameter is similar in both muscles.

The ratio between cholesterol-lowering and cholesterol-raising fatty acids varies within narrow limits; no significant differences are observed for this parameter in the meat of goats from the different experimental groups.

The myristic acid in the meat of AN and BWD goats varied from 2,23 to 3,48%. Lower values were observed in goats of both breeds fed cow's milk. The content of C 14:0 in both muscles was higher in the AN kids.

The pentadecanoic acid was in close values of 0,35-0,45%, and these results overlap in both studied goat breeds, both feeding methods, and both studied muscles.

Of all the saturated fatty acids differentiated in the present study, the highest values were established for palmitic acid. Its content varied from 20,11 to 22,17%. Higher values were recorded in the meat of Anglo-Nubian kids.

The amount of margaric acid in the meat of BWD and AN breed kids ranges from 0,62 to 0,86%.

The stearic acid content varies from 12,55 to 13,21%. The highest values are observed in the meat of AN kids fed on goat's milk and the lowest in BWD kids fed on cow's milk. Higher results for C18:0 were established in *Longissimus thoracis et lumborum* than in m. *Semimembranosus*.

The oleic acid has the highest content in the fatty acid profile of meat. It occupies values from 36,29 to 41,41%. The highest results were found in Bulgarian White Dairy kids fed goat's milk and the lowest in Anglo-Nubian kids fed cow's milk. Higher values for C18:1 n-9 were found in the lipid profile of *Semimembranosus*, than m. *Longissimus thoracis et lumborum* (Table 34 and Table 36).

Palmitoleic acid occupies from 2,33 to 2,94% of the fatty acid profile in the meat of AN and BWD kids. The results for C16:1 differed significantly between the groups of kids fed on different types of milk.

Linoleic acid occupied from 10,16 to 11,49% of the fatty acid profile in the meat of AN and BWD goats. The above data clearly show that the meat of animals fed on cow's milk contained more C18:2 n-6. The content of this fatty acid was higher in m. *Semimembranosus*, than m. *Longissimus thoracis et lumborum*.

The values for linolenic acid are from 0,38 to 0,49%. They do not differ significantly in both studied breeds, as well as in both analysed muscles.

The content of conjugated linoleic acid varies in very low ranges from 0,33 to 0,38%. Its amount did not differ significantly in both muscles and the experimental animals of both breeds.

The eicosadienoic acid content in the meat of both breeds varies from 0,52 to 1,34%, with significantly higher values found in kids fed on cow's milk. No significant differences influenced by feeding were observed between both muscles.

The results we found for the content of dihomo-γ-linolenic acid were in the range of 0,41-0,80%. Its content is higher in the meat of AN kids than the BWD breed. Higher values for C20:3n-6 were obtained in animals of both breeds fed on cow's milk.

Arachidonic acid constitutes between 6,14 and 8,38% of the lipid profile of the meat. The highest value is observed in the meat of AN kids fed cow's milk and the lowest in BWD kids fed goat's milk. Higher values for the content of C20:4n-6 were recorded in both muscles in animals fed on cow's milk.

Docosapentaenoic acid in the meat varied from 0,86 to 2,85%. Its content is higher in the meat of AN kids than the BWD kids. A significant difference was observed between the content of C22:5n-3 in the meat of animals fed on goat's and cow's milk.

The content of docosahexaenoic acid is low. No significant interactions were observed either by the type of feeding or by the muscle studied.

The saturated fatty acids vary from 36,20 to 40,02%; they are higher in the kids fed goat's milk than those fed cow's milk. Regarding both studied muscles, no significant effect of feeding with a different type of milk is observed.

The monounsaturated fatty acids are from 39,23 to 43,36%. The lowest values of this parameter were recorded in the meat of BWD breed kids fed on cow's milk and the highest in AN breed kids fed on goat's milk. Higher values were recorded in both muscles of animals fed on cow's milk.

Polyunsaturated fatty acids vary from 20,19 to 24,57%. The lowest values reported for this parameter are in AN kids fed goat's milk, and the highest in BWD kids fed cow's milk.

The ratio of n-6/n-3 fatty acids is from 8,50 to 10,45%. No significant impact was found on the results of feeding and the examined muscle.

The ratio between polyunsaturated and saturated fatty acids (P/S) varied in low values from 0,50 to 0,68%. (Table 35 and Table 37).

The values for the thrombogenic and atherogenic indices were close, as they differ significantly in the meat of animals fed different types of milk. No differences were observed for these parameters for both examined muscles.

5. C O N C L U S I O N S AND R E C O M M E N D A T I O N S

CONCLUSIONS:

The results obtained and their analysis allow us to draw the following conclusions:

1. 1. The average daily growth of the kids was established, and in both studied breeds, it was higher until the 90th day.

2. The live weight before slaughter in the 90-day-old kids of the Anglo-Nubian breed in the present study was, on average, 15,500 kg; significantly higher values were found in the Anglo-Nubian kids at 120 days 19,486 kg. The kids of the Bulgarian White Dairy breed at 90 days weigh on average - 24,629 kg, and those at 120 days - 25,300 kg.

3. With increasing slaughter age, the carcass weight after cooling increased significantly. It was 7,288 kg in the 90-day-old Anglo-Nubian kids. It was 9,340 kg in 120-day-old kids. The chilled carcasses of the Bulgarian White Dairy breed at 90 days were 11,944 kg, and at 120 days of age - 11,641 kg.

4. It was found that the yield of 90-day-old Bulgarian White Dairy kids (49,36%) was significantly higher than that of 120-day-old kids (46,73%).

5. Male kids of the AN breed showed better slaughter characteristics and a higher proportion of muscle tissue than BWD kids. Therefore, the former are more suitable for meat production.

6. The leg was the largest cut of the carcasses of the experimental animals, both in weight and percentage. It had the lowest fat content of all cuts.

7. Meat of animals fed on goat's milk showed better results of losses during thermal processing and meat tenderness.

8. The slaughter age had an impact on the water-holding capacity and protein content of meat in both studied breeds, as at 120 days, they were higher compared to 90 days.

9. The content of SFAs in meat from Anglo-Nubian and Bulgarian White Dairy kids was higher in kids slaughtered at 90 days than those at 120 days.

10. The ratios between n-6/n-3 fatty acids increased with increasing slaughter age,

11. The fat content, L* and a* of meat increase significantly when fed on goat's milk than cow's milk.

12. Feeding kids with cow's milk led to an increase in the content of PUFAs in the meat and a decrease in MUFAs and SFAs. The ratio between PUFAs/SFAs was higher than the meat of kids fed on goat's milk. The values of the n-6/n-3 ratio were higher in the meat of kids fed on goat's milk.

13. Feeding and age affected the values of AI and TI, as the values established for them were higher in 90-day-old kids of both breeds fed on goat's milk.

RECOMMENDATIONS

1. A comprehensive analysis of the meat quality of male kids from the dairy sector could serve as a basis for creating new standards for the utilisation of the production of these animals.

2. To achieve higher meat quality, earlier slaughter of animals is recommended, taking into account the physiological characteristics of different breeds. Young animals show better structural meat qualities, which is important for the goat kid meat market.

3. The established high slaughter yield adds value to male animals and reveals the potential of dairy goat breeds for meat production. This would help goat farmers in dealing with the surplus of male animals.

4. Based on the results of the present study, farmers can benefit from marketing strategies that emphasise the quality of goat-kid meat raised in specific conditions. Certification of goat kid meat, depending on the nutrition and age of the animals, would increase the competitiveness of farmers' production in the market.

5. It is highly significant to promote a sustainable goat industry, producing high-quality products while ensuring an adequate supply of animal proteins for a balanced, healthy diet for people.

6. C O N T R I B U T I O N S

Scientific contributions:

1. The study offers new evidence on the influence of goat's and cow's milk feeding on the meat quality of goat kids, which can be the basis for subsequent research in this area.

2. The study provides new data on the meat quality of male kids of the AN and BWD breeds, enriching the available scientific information.

3. It was found that the age of animals at slaughter significantly affects the slaughter and physicochemical parameters, which helps optimise the slaughter age.

4. The study provides new scientific data on the impact of goat's and cow's milk on the chemical composition and organoleptic characteristics of the meat of goat kids. This contributes to a better understanding of the effects of different feeds on the quality of meat and its chemical parameters.

Scientific contributions:

1. The influence of slaughter age - 90 and 120 days on the meat qualities of male BWD and AN kids was studied. The average daily gain for 90 and 120 days was determined, the carcass was characterised, and the yield, cooling loss, weight of individual parts and their percentage ratio were determined.

2. The influence of the slaughter age and alternative feeding on cow's milk on the technological qualities and chemical composition of the meat of male BWD and AN kids was studied.

3. In connection with the current requirements for healthy nutrition, the influence of the slaughter age and alternative feeding on cow's milk on the fatty acid profile of the meat of male kids of the BBM and AN breeds was determined. The total amounts of fatty acids and lipid indices were determined.

Practical contributions:

1. The results can be used to promote goat kid meat as a product with high nutritional value and health benefits.

2. Data on the influence of nutrition and breed assist farmers in choosing a strategy for raising goat kids to produce quality meat.

3. It has been established that goat kid meat is an economically and environmentally sustainable product.

4. Baseline values for key meat quality parameters have been proposed, which can be used to develop production standards.

5. The results of the influence of nutrition and breed on the colour and tenderness of meat can be used to develop techniques for improving taste qualities.

6. A model of an interdisciplinary approach to meat quality assessment has been created, including slaughter characteristics, technological qualities, chemical composition and fatty acid profile.

7. The slaughter analysis of kids from the dairy sector can be useful to farmers in assessing the economic efficiency of the herd.

7. SCIENTIFIC PUBLICATIONS ON THE TOPIC OF THE DISSERTATION:

1. Mondeshka, L. (2022). Potentialities to Increase Meat Productivity in Goats. Journal of Mountain Agriculture on the Balkans, 25 (6), 154-169.

2. Mondeshka, L., T. Popova, and S. Stoycheva, (2024). Technological Qualities of Goat Meat. Journal of Mountain Agriculture on the Balkans, 27 (4), 72-95.

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