

CARCASS QUALITY RESEARCH ON CROSSBRED YOUTH IN THE NEW ECOTYPE OF KARAKUL OF BOTOSANI BREED

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Abstract

The purpose of the research was to conduct a detailed analysis of the slaughter yield, tissue structure of the half-carcass, and carcass quality over a period of three consecutive years.

The higher the proportion of muscle masses in the carcass or the dissected region, the higher the commercial value of the carcass [1].

Over the three years, experimental slaughter was carried out annually at an authorized slaughter point on crossbred males from both F₁ generations and R₁ generation.

The slaughter yield recorded values exceeding 50% throughout the analyzed period, a result that places F₁ and R₁ crossbreeds slightly above the limit imposed by specialized literature regarding the slaughter yield of mixed or specialized breeds for meat production. The carcass quality, specifically class R concerning conformation and class 3H regarding fat distribution on the carcass surface, together with the obtained slaughter yield value, are encouraging results for further research to consolidate and improve a population of sheep specialized in meat production, starting from the Karakul of Botosani reform females.

Key words: body weight, Karakul sheep, yield at slaughter

INTRODUCTION

The assessment of the fattening stage following control slaughters represents the most comprehensive and objective evaluation, as all assessments and determinations regarding meat production aptitudes are based on the direct analysis of the resulting carcasses. This method of carcass evaluation also provides details about the quality of the meat obtained after slaughter [2].

The research was conducted over a period of three years at the Research and Development Station for Sheep and Goats – "Popăuți" Botoșani, the most suitable facility for carrying out such studies. This station is the unit where the Karakul de Botoșani breed was developed.

Raising sheep for meat production is on the rise in our country, driven by the

increasing demand for meat from consumers.

The Karakul de Botoșani breed is specialized in fur production; however, due to a decreasing demand for fur over time and considering that the breed also has secondary specializations in meat and milk production, it was deemed necessary to highlight its aptitude for meat production. This is seen as an alternative to address the decline observed in fur production utilization. Consequently, there is an effort to redirect Karakul de Botoșani sheep breeders towards enhancing meat production by improving the breed improvement program with specific objectives for this purpose [3]. In anticipation of the cyclic periodicity when demand for fur production will return, meat production stands as a tangible alternative

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The manuscript was received: 18.10.2023

Accepted for publication: 10.11.2023

for the Karakul de Botoșani breed. This is the motivation behind the research conducted to determine the carcass quality for this sheep breed.

MATERIAL AND METHOD

The biological material subjected to the research consists of F_1 crossbred offspring obtained during the period 2020-2022 at the Research and Development Station for Sheep and Goats - "Popăuți" Botoșani. The crossbreeding involved using rams from the Palas Meat Breed with reform females from the Karakul de Botoșani breed. Additionally, R_1 offspring were obtained by crossing F_1 females with rams of the Karakul de Botoșani breed. Since the reform females from the Karakul de Botoșani breed are no longer part of the specific activities of the fur production improvement program, they are directed towards this study.

Throughout the studied period, the crossbred youth received the same feeding and maintenance conditions as the youth of the Karakul de Botoșani breed.

The assessment of body weight and various component parts of the carcass was carried out using an electronic scale.

The slaughter yield was evaluated by comparing the carcass weight, obtained from experimental slaughter, to the live weight of the crossbred youth.

The tissue structure for carcass quality analysis was centralized by presenting the average values obtained regarding the content of meat, bones, the bone-to-meat ratio, and the percentage participation of each anatomical region in the carcass at the age of 7 months. This analysis was conducted for both males from the F_1 generation in the years 2020, 2021, and 2022, as well as for R_1 crossbred males from the year 2022.

The collected data were processed using the spreadsheet application Microsoft Excel 2007.

RESULTS

According to the data presented in Table 1, we can observe that over the course of the three analyzed years, the slaughter yield shows improved values for F_1 offspring, with the highest value recorded in the year 2022. The R_1 offspring also record a slaughter yield close to that of F_1 offspring in the year 2021.

Table 1 The assessment of the slaughter yield for F_1 crossbred male offspring from the years 2020, 2021, and 2022, as well as for R_1 crossbred males from the year 2022

Category	Gender	Yield at slaughter	Standard deviation
F_1 year 2020	M	50,20 %	0,302
F_1 year 2021	M	50,38 %	
F_1 year 2022	M	50,46 %	
R_1 year 2022	M	50,31 %	

By analyzing the data obtained (Table 2), we can observe that the average total weight of the half-carcass for F_1 crossbred male youth at the age of 7 months recorded

the lowest value in the year 2020, specifically 9.58 kg. In the years 2021-2022, the values were relatively close without statistically significant differences.

Table 2 The average tissue structure of the half-car casses for F_1 crossbred males from the years 2020, 2021, and 2022, as well as for R_1 crossbred males from the year 2022

Specification	M.U.	Average values for crossbred males, generation				Standard deviation
		F_1			R_1	
		Year 2020	Year 2021	Year 2022	Year 2022	
Half-car cass weight	kg	9,58	11,24	11,07	10,91	0,967
Meat content of the half-car cass	kg	7,00	7,76	7,82	7,18	0,8318
Bones in the half-car cass	kg	1,60	2,31	2,09	2,08	0,3725
Fat in the half-car cass	kg	0,98	1,17	1,15	1,65	0,2819
Bone-to-meat ratio	-	1:4,38	1:3,36	1:3,74	1:3,45	-
Neck and back	kg	2,20	2,85	2,79	2,75	0,3708
Meat	kg	1,72	2,13	2,10	2,04	0,1696
Bones	kg	0,48	0,72	0,69	0,70	0,1118
Bone-to-meat ratio	-	1:3,58	1:2,96	1:3,04	1:2,93	-
Participation in the carcass	%	25,58	28,30	28,15	29,70	1,404
Breast with brisket	kg	2,23	2,22	2,22	2,25	0,0134
Meat	kg	1,81	1,89	1,87	1,83	0,0313
Bones	kg	0,42	0,33	0,35	0,42	0,0424
Bone-to-meat ratio	-	1:4,31	1:5,73	1:5,34	1:4,36	-
Participation in the carcass	%	25,93	22,04	22,40	24,30	1,573
Loin	kg	1,62	1,67	1,64	1,63	0,0194
Meat	kg	1,29	1,10	1,24	1,21	0,0835
Bones	kg	0,33	0,57	0,40	0,42	0,1032
Bone-to-meat ratio	-	1:3,91	1:1,92	1:3,10	1:2,88	-
Participation in the carcass	%	18,83	16,58	16,55	17,60	0,959
Leg	kg	2,55	3,33	3,26	2,63	0,395
Meat	kg	2,18	2,64	2,61	2,09	0,251
Bones	kg	0,37	0,69	0,65	0,54	0,124
Bone-to-meat ratio	-	1:5,89	1:3,83	1:4,02	1:3,87	-
Participation in the carcass	%	29,65	33,07	32,89	28,40	1,912

From the total weight of the half-car cass, the highest amount of meat was recorded in F_1 crossbred males in the year 2022, specifically 7.82 kg. R_1 crossbred males from the year 2022 recorded a value of 7.18 kg, a value close to that recorded by F_1 males in the year 2020.

As observed in Fig. 1, regarding carcass conformation and fat distribution on the carcass surface, they are classified as follows:

- For crossbred male offspring, F_1 generation, year 2022

- Class R in terms of conformation;
- Class 3H in terms of fat distribution on the carcass surface.

- For crossbred male offspring, R_1 generation, year 2022

- Class R in terms of conformation;
- Class 4L in terms of fat distribution on the carcass surface.

As the values obtained for the amount of meat in the half-car cass are not very dispersed from the mean obtained over the three analyzed years, we can state that the new ecotype obtained in the Karakul de Botoşani breed can be stabilized and improved for meat production.

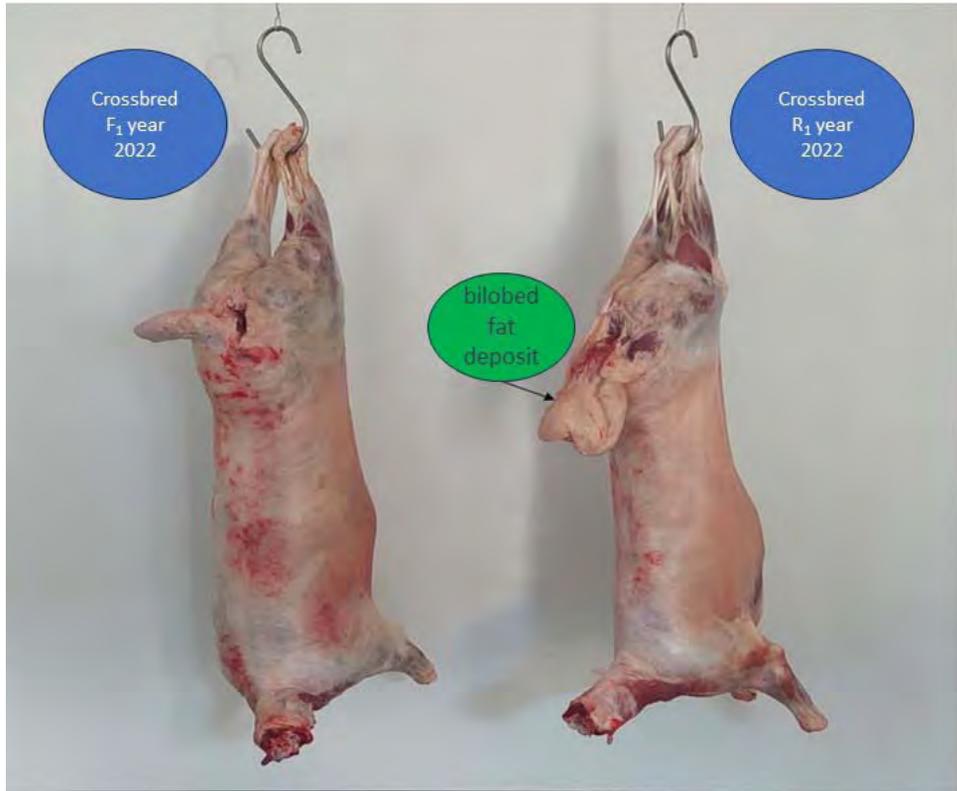


Fig. 1 The carcass appearance of crossbred male youth in the year 2022

DISCUSSIONS

Regarding the slaughter yield, the results obtained in the years 2020, 2021, and 2022 for F_1 and R_1 crossbred offspring were evaluated. Within the study, F_1 crossbred males from the years 2020, 2021, and 2022, and R_1 crossbred males from the year 2022 were slaughtered, and the results obtained regarding the slaughter yield were centralized in Table 1.

The tissue structure for carcass quality analysis was centralized in Table 2 by presenting the average values obtained regarding the content of meat, bones, the bone-to-meat ratio, and the percentage participation of each anatomical region in the carcass at the age of 7 months. This analysis was conducted for both males from the F_1 generation in the years 2020, 2021, and 2022, as well as for R_1 crossbred males.

The higher the proportion of muscle masses in the carcass or the dissected region, the higher the commercial value of the carcass.

Deboning is the process by which meat is removed from the bones [4]. Meat trimming is the operation of separating tissues with low nutritional value, called trimmings (tendons, aponeuroses, covering fascia, vascular and nervous cords), and sorting the meat based on qualities [5].

Analyzing the half-carcass in terms of the ratio between the average weight of bones and meat, the lowest ratio was recorded in 2021, while the best ratio was recorded in 2020, namely 1:4.38. Concerning the contribution of the neck and back to the carcass, the lowest value was recorded in 2020 at 25.58%, while in 2021 and 2022, the values were very close without statistically significant differences.

Regarding the participation of the breast with brisket in the carcass, it recorded the lowest value in 2021 and 2022, namely 22.04% and 22.40% for F₁ crossbred males. As for the loin's contribution to the carcass, it recorded the lowest value in 2021 and 2022, namely 16.58% and 16.55% for F₁ crossbred males. The leg (jigou) showed varied values in terms of participation in the carcass, with the lowest value of 28.40% in 2022 for R₁ crossbred males, and the highest value of 33.07% in 2021 for F₁ crossbred males. The lower participation of the leg in the carcass of R₁ crossbred males can be attributed to the descent transmission of phenotypic characteristics present in the Karakul de Botoșani breed. These animals result from mating F₁ crossbred females with purebred Karakul de Botoșani males, inheriting the bilobed fat deposit from the base of the tail. This fat deposit, relative to the total weight of the animal, plays a significant role in differentiating carcasses based on the percentage of meat, explaining why the leg has a lower value in terms of participation in the carcass.

CONCLUSIONS

Following the researches carried out for carcass quality at new meat crossbred ecotype of Karakul breed, we can conclude:

1. The average total weight of the half-carcass for F₁ crossbred male youth at the age of 7 months recorded the lowest value in the year 2020, specifically 9.58 kg. In the years 2021-2022, the values were relatively close without statistically significant differences.

2. From the total weight of the half-carcass, the highest amount of meat was recorded in F₁ crossbred males in the year 2022. R₁ crossbred males from the year 2022 recorded a value of 7.18 kg, a value close to that recorded by F₁ males in the year 2020.

3. From the analysis of the half-carcass regarding the bone-to-meat ratio, the best ratio is recorded in the year 2020, specifically 1:4.38.

4. The leg (jigou) shows the most varied values regarding participation in the

carcass, recording the lowest value of 28.40% in the year 2022 for R₁ crossbred males, while the highest value is recorded in F₁ crossbred males in the year 2021, specifically 33.07%. The fact that the leg does not register a high percentage of participation in the carcass for R₁ crossbred males is largely due to the descent transmission of phenotypic characteristics present in the Karakul de Botoșani breed.

5. The slaughter yield recorded values above 50% throughout the analyzed period, a result that places F₁ and R₁ crossbred males slightly above the limit imposed by specialized literature regarding the slaughter yield of mixed or specialized breeds for meat production. The carcass quality, specifically Class R in terms of conformation and Class 3H in terms of fat distribution on the carcass surface, together with the value obtained in the slaughter yield, are encouraging results for further research to strengthen and improve a population of sheep specialized in meat production, starting from reform Karakul de Botoșani females.

6. The result of the study state that the new ecotype obtained in the Karakul de Botoșani breed can be stabilized and improved for meat production

7. The genetic transmission of breed characteristics within the Karakul de Botoșani sheep can be observed in the R₁ generation through the high percentage of fat in the half-carcass. While this is undesirable for individuals specialized in meat production, it is appreciated by consumers of Karakul de Botoșani sheep meat, as it provides a unique taste. This aspect should also be capitalized on in the new ecotype of this breed.

CONFIRMATION

The research was carried out within the project "*Genetic stabilization of a new ovine ecotype specialized for pelts and meat production in the Karakul breed*".

REFERENCES

1. Pascal, C., Nechifor, I. (2014). The effect of crossing romanian sheep breeds with rams of meat breeds over the specific indicators of meat production. *Lucrări Științifice, Seria Zootehnie*, ISSN L 1454-7368, vol 61, p 25-31
2. Pascal C., 2015: *Tratat de creșterea ovinelor și caprinelor*, Editura Ion Ionescu de la Brad, Iași.
3. Crișmaru A., Nechifor I., Florea A.M., Pascal C. 2022: Reseach on the influnce of color variety on body weight of the Karakul of Botosani lamns *Lucrări Științifice, Seria Zootehnie*, ISSN L 1454-7368, vol 61, p 25-31
4. Mărgărint Iolanda, Boișteanu, P.C., Chelaru, A., 2002: *Fiziologia animalelor*, Edit. Ion Ionescu de la Brad, Iași, ISBN 973-8014-84-0.
5. Lambe, N., Navajas, E., Bünger, L., Fisher, A., Roche, R., Simm, G. (2009). Prediction of lamb carcass composition and meat quality using combinations of post-mortem measurements. *Meat Science* 81:711-71.