THE EFFECT OF CROSSING THE CARPATINA BREED WITH THE BOER BREED FOR THE QUANTITATIVE AND QUALITATIVE IMPROVEMENT OF THE MEAT PRODUCTION IN GOATS

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Abstract

In Romania there are few studies on increasing the production of meat in goats through hybridization, these works being carried out within I.C.D.C.O.C. Palas Constanta. The present study aims to show the advantages of crossbreeding of the Carpatina breed with the Boer breed in terms of all morpho-productive indices, the aim being to create an autochthonous breed of goats specialized for meat production, well adapted to the conditions in our country. In this regard, this paper aims to study the main morpho-productive indices of the newly created population (75% Boer x 25% Carpatina) within the institute, compared to the Carpatina breed. The main breeding indices (fecundity, prolificity) were higher in the R_1 with 2.69 and 23.1 percentage points respectively compared to the Carpatina breed. Body weight of bucks and goats in the new population R_1 (75% Boer x 25% Carpathian) was higher by 44.02% and 9.72% respectively compared to the Carpatina breed. The average daily gain achieved by the kids during the fattening period was 123.56-172.75 g, higher by 39.8% at the R_1. Also, the Daily ingest of dry matter was higher by 19.91% for the R_1 compared to the Carpatina. In terms of feed conversion, the best conversion was made by the hybrids R_1 with 167g increase for 1kg of D.M. ingested, while in the group of Carpatina kids, the conversion was 144g for 1kg of D.M. ingested. In the two groups of fattened kids, the compactness index of the gigot and the muscularity index of The gigot had the value at the R_1 of 83.19% respectively 240.5% compared to only 66.44% respectively 177.21% in the group of Carpatina kids. The slaughter yield was 42.29-50.40%, being higher by 8.11 percentage points in the group of R_1 (75% Boer x 25% Carpatina breed).

Key words: *goats, meat, Boer breed, Carpatina breed*

INTRODUCTION

In the European Union countries, meat obtained from fattened young goats is appreciated by consumers, one kilogram of kids meat is worth 2-3 times more compared to 1 kg of pork or chicken.

In our country, there is a small number of works related to the increase and improvement of meat production for the goat species through hybridization, all these researches being carried out by the Research Development Institute for Sheep and Goat Breeding Palas – Constanta and the research resorts in coordination.

The present study aims to highlight the advantages of hybridization of the Carpathian breed with the Boer breed. The Boer breed is considered the most successful meat goat breed in the world. Used in crossbreeding programmes, this breed has been shown to improve the productive performance of local breeds. Many studies, including those by Lu et al. (1990), Van Niekerk et al. (1988) and Prieto et al. (2000), have presented the advantages of using Boer goats to improve meat production. Thus, research was initiated on a population of goats of the Carpatina breed that were mated with bucks of the Boer breed, following the

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morphoproductive and reproductive performance of the obtained hybrids. The results of a study carried out at R.D.I.S.G.B. Palas by Vicovan et al. in 2010 show the good growth performance of half-bred kids and superior carcass quality compared to the maternal breed. The data obtained from the research supported the idea of continuing the experiments towards creating a Romanian population of goats specialized for meat production, well adapted to the environmental conditions in our country.

MATERIAL AND METHOD

Research was carried out on the nucleus of goats R_1 (75% Boer x 25% Carpatina) belonging to R.D.I.S.G.B. Palas, Constanta and on a population of goats of the Carpatina breed, owned by a breeder from Romanu, Braila County. On these populations were performed body measurements and weighing, calculating the main indices of constitution and conformation, growth rate of fattening kids, specific consumption of feed and nutrients as well as the obtained data in the slaughter process.

Electronic scales with an accuracy of ±200 g were used to perform the weighing. In order to perform body measurements, the specific instrument was used, namely the compass for the width dimensions and the ribbon (centimeter) for the perimeters. Thus, the compactness index of the gigot and the muscularity index of the gigot were calculated, using the following formulas:
Compactness index of the gigot (Laville et al. 2002):

$$C.I.G = \frac{\text{Width of coxofemural joints}}{\text{Length of gigot}} x100$$

Muscularity index of the gigot (Vicovan et al. 2010):

$$\text{M.I.G} = \frac{\text{Perimeter of the gigot}}{\text{Lenght of gigot}} x100$$

During the growth and fattening process (100 days), the kids were fed with granulated compound feed with an energy content of 2570 Kcal M.E /kg, 16% raw protein and 8.5% raw cellulose. The administered feed was weighed daily, and the leftovers were harvested and weighed at a period of 2-3 days.

Two slaughter yields were determined:

$$Yield\ R_1 = \frac{\text{Weight of cooled carcass (kg)}}{\text{Living weight (kg per head)}} x100$$

$$Yield\ R_2 = \frac{\text{Weight of cooled carcass (kg)}}{\text{Empty living weight (kg per head)} *} x100$$

** Empty living weight – the living weight from which the gastrointestinal mass was subtracted*

All the data obtained were statistically processed and interpreted, the differences between hybrids and Carpatina breed being established by the Fisher test.

RESULTS AND DISCUSSIONS

Reproductive indices

Data obtained on the new population of goats R_1 (75% Boer x 25% Carpatina) showed superior values for fecundity and prolificacy in R_1 goats, compared with the Carpatina breed (Table 1).

Table 1. Reproductive indices

Genotype	Fecundity	Prolificacy	Kids weaned on calved goat	The differences between R_1 and Carpathian		Genotype
				U. M.	%	
R_1 (75% Boer x 25% Carpatian)	98.99	155.10	1.3	+ 0.2	+ 18.2	P < 0,001 Very significant
Carpatian	96.30	132.0	1.1			

Within the two genotypes fecundity and prolificacy had values of 98.99% respectively 155.10% in the R_1 and of 96.30 respectively 132.0% for the Carpatina breed.

Also, the number of weaned kids was higher by 18.20% in the goats of the R_1 population compared to goats of the Carpatina breed, the differences are very significant (P<0.001).

Body weight

Body weight of bucks R_1 (75% Boer x 25% Carpatina) was an average of 76.76 kg compared to 53.30 kg / head in goats of the Carpatina breed, the differences being very significant (P<0.001) (table 2).

Table 2. Body weight in bucks of the new population of meat goats compared to goats of the Carpatina breed

Genotype	Body weight (kg / head)		The difference		Significance
	n	X ± s_x	kg	%	
R_1 (75% Boer x 25% Carpatina)	17	76.76 ± 2.17	+ 23.46	+ 44.02	P < 0.001 Very significant
Carpatina	5	53.30 ± 3.54			

Regarding the body weight of the goats from the new population, they had an average body weight of 54.29 kg, compared to the Carpatina breed in which the average body weight was 49.48 kg, the differences being distinctly significant (Table 3).

Table 3. Body weight in goats of the new population of meat goats compared to goats of the Carpatina breed

Genotype	Body weight (kg / head)		The difference		Significance
	n	X ± s_x	kg	%	
R_1 (75% Boer x 25% Carpatina)	49	54.29 ± 0.95	+ 4.8	+ 9.72	P < 0.01 Distinctly significant
Carpatina	24	49.48 ± 1.18			

Fattening of kids

The body weight of the young at the beginning of fattening was between 16.06 kg/head and 18.41 kg/head, and the final body weight was 28.87 – 35.68 kg (Table 4).

Table 4. Weight gain on kids in the control period

Genotype	Initial body weight (kg / head)	Final body weight (kg / head)	Total weight gain (kg / head)	Average daily gain (g / head)
	X ± s_x	X ± s_x	X ± s_x	X ± s_x
R_1 (75% Boer x 25% Carpatina)	18.41 ± 0.46	35.68 ± 1.10	17.28 ± 1.13	172.75 ± 11.27
Carpatina	16.06 ± 0.58	28.87 ± 1.46	12.35 ± 1.10	123.56 ± 10.89

The average daily increase achieved in the two groups was between 123.56g and 172.75g, being superior to the group from the R_1 by 39.8% compared to the group of Carpatina kids, the differences being distinctly significant (P < 0.01).

The daily ingestion of dry matter was 1036 g/head at the kids R_1 and of 864 g in the

Carpathian kids, the first consuming more dry matter/head and day with 19.91 %. If the ingested dry matter consumed relates to the living weight, the values for the two batches are close: 2.9% for the R_1 and 3.0% in the Carpatina (Table 5).

Table 5 Dry matter consumption in young males of the meat population and of the Carpatina breed

Genotype	Daily ingestion of dry matter (g/cap)	Ingestion of dry matter (% by living weight)	Efficiency of conversion of ingested feed
R_1 (75% Boer x 25 % Carpatina)	1036	2.9	167
Carpatina	864	3.0	144

Regarding the efficiency of feed conversion, it was higher by 16% at the R_1, compared to the Carpatina breed. R_1 achieved a conversion of 167 g daily gain for one kilogram of dry matter ingested while in the Carpatina goats the conversion was 144g.

In Table 6 there are presented some conformation measurements and two indices that express the dressing with musculature of the hind train, a trait that influences meat production.

Table 6. Measurements and indices on the living animal for the goat meat population and of the Carpatina breed

Specification	R_1 (75% Boer x 25% Carpatina)	Carpatina breed
	$X \pm s_x$	$X \pm s_x$
Width at coxofemoral joints (cm)	20.67 ± 0.67	18.50 ± 0.76
Perimeter of the gigot (cm)	59.67 ± 0.33	49.33 ± 1.20
Length of the gigot (cm)	24.89 ± 0.60	27.83 ± 0.54
Gigot compactness index (C. I. G.)	83.19 ± 0.87	66.44 ± 2.37
Gigot muscularity index (M. I. G.)	240.50± 4.88	177.21 ± 3.31

Both for the compactness index of the gigot and for the muscularity index of the gigot for R_1 they had the highest values in relation to the Carpathians, being 83.19% respectively 240.5% compared to only 66.44% and 177.21% respectively in the Carpathians.

From Table 7 it follows that the hybrids R_1 they had the compactness index of the gigot higher by 16.75 percentage points compared to the Carpatina breed. Also, the muscularity index of the gigot was higher by 63.29 percentage points at the R_1 compared to the Carpatina, the differences are very significant ($P < 0.001$).

Table 7. Differentiation of the indices of compactness and muscularity of the gigot in males of the meat population and of the Carpatina breed

Specification	Compactness index		Muscularity index	
	percentage points	Significance	percentage points	Significance
Differentiation between R1 and Carpatina	+ 16.75	P < 0.001 Very significant	+ 63.29	P < 0.001 Very significant

The slaughter yield 1 in the two groups was between 42.29% and 50.40%, being higher in the group of R_1 by 8.11 percentage points compared to the Carpathian group (table 8).

Table 8. Slaughter yield in R_1 compared with contemporaries of the Carpatina breed

Genotype	Live weight before slaughter (kg / head)	Empty live weight (kg / head)	Cooled carcass weight (kg / head)	Slaughter yield %	
				Yield 1	Yield 2
R_1 (75% Boer x 25 % Carpatina)	35.20 ± 1.24	31.55 ± 1.24	17.73 ± 0.54	50.40 ± 0.01	56.24 ± 0.03
Carpatina	33.30 ± 2.46	28.27± 2.26	14.12 ± 1.47	42.29 ± 2.39	49.77 ± 1.22

It follows from the table that at living body weights, approximately equal to the lots, both yield 1 and Yield 2 show different values. Thus, at the hybrids R_1 yield values R_1 and yield R_2 the values were 50.40 % and 56.24 % respectively, and in the Carpatina breed the values were 42.29% and 49.77% respectively. Compared to the Carpatina breed, both slaughter yields (R_1 and R_2) were higher in the group of hybrids R_1 by 8.11 percentage points and 6.47 percentage points respectively, the differences being significant ($P < 0.05$).

Table 9. The tissue structure of the carcass in the R_1 compared with contemporaries of the Carpatina breed

Genotype	Carcass weight of which (%)				Differences between genotypes (percentage points)		
	Total	muscle	bones	fat	muscle	bones	fat
R_1 (75% Boer x 25% Carpatina)	100	62.80	24.23	12.97	+ 2.75 P < 0.05 significant	- 3.11 P < 0.05 significant	+ 0.37 P>0.05 insignificant
Carpatina	100	60.05	27.34	12.60			

R_1 Boer x Carpatina have by 2.75 percentage points more muscles in the carcass and by 3.11 percentage points fewer bones compared to the kids of the Carpatina breed, the differences being significant ($P<0.05$).

CONCLUSIONS

As a result of the research carried out on the effect of crossing the Carpathian breed with the Boer breed in order to improve the quantitative and qualitative meat production in goats, the following conclusions are drawn:

- The reproductive indices (fecundity, prolificacy) were between 96.30-98.99 (fecundity) and 132.0-155.10% (prolificacy) respectively, the values being higher in the population of goats R_1 (75% Boer x 25% Carpathian). Also, the number of weaned kids was higher in the R_1 population with 18.20% compared to the Carpathian breed.
- The body weight of the bucks from the Boer x Carpathian population was 76.76 kg, being higher by 44.02% compared to the Carpathian breed, the differences being very significant ($P<0.001$). The goats had an average body weight of 49.48-54.29 kg, being higher by 9.72% in the R_1 population the differences are distinctly significant ($P<0.01$).
- The average daily gain achieved by kids during the fattening period was 123.56-172.75 g, which had superior values to the Boer x Carpathian group by 39.8%.
- The daily ingestion of dry matter / head/Day was 864-1036 g, being higher by 19.91% in the group of the R_1 population. The consumption of dry matter relative to live weight showed close values in the two groups, this being 2.9-3.0%.

The R_1 achieved a conversion of 167 g per kilogram of dry matter ingested, being higher by 16 % compared to the Carpatina hybrids, in

which the conversion was of 144 g/kg dry matter ingested.

- The compactness index of the gigot and the muscularity index of the gigot had the highest values at the R_1 this is 83.19% respectively 240.5% compared to only 66.44% and 177.21% respectively for the Carpatina kids.
- Slaughter yield R_1 was 50.40% in the group of the R_1, and in the group of Carpatina kids it was 42.29%, being higher in the population R_1 by 8.11 percentage points, the differences being significant ($P<0.05$).
- The obtained data reveal the superiority of the population of goats R_1 (75% Boer x 25% Carpatina), compared to the Carpatina breed at all morphoproductive characteristics, reproductive indices and carcass quality indices, resulting in the need to continue research until the fifth generation (including) of reproductive isolation, when the new population could be homologated as a new breed of meat goats, unique in Romania.

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