

# THE IMPROVEMENT OF THE MILK PRODUCTION IN THE LOCAL GOAT POPULATION BY CROSSBREEDING WITH SPECIALIZED BREEDS

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## Abstract

To improve the milk production at the local populations of goats belonging to Carpathian breed, it was made the crossbreeding with Saanen breed, evaluating the performances of the hybrids comparatively to the local breed, aiming to create the first new rings of new goat populations with superior productive performances.

The researches were made on three local populations of goats, the works being coordinated by ICDCOC Palas-Constanța, with the participation of two units of research: SCDCOC Reghin-Mureș and SCDCOC Popăuți-Botoșani.

The milk productions made at the  $F_1$  half-breeds, at the first dropping were superior to the local populations as follows:

- **$F_1$  Saanen half-breeds x local population -Palas** – made a total production of  $262.20 \pm 14.51$  liters besides  $204.20 \pm 12.54$  liters at the local population -Palas;
- **$F_1$  Saanen half-breeds x local population -Reghin** – made a total production of  $291.1 \pm 7.84$  liters besides  $207.94 \pm 4.23$  liters at the local population -Reghin;
- **$F_1$  Saanen half-breeds x local population-Popăuți** – made a total production of  $265.07 \pm 6.48$  liters besides  $207.05 \pm 8.63$  liters at the local population -Popăuți.

The general conclusion which resulted from the experiment is that by using the bucks of Saanen breed, in crossbreeding with Carpathian breed from various areas it was obtained the first generation of hybrid goats which have 50% Saanen breed, respectively 3 genotypes which had significantly better performances au than the local breed regarding the production of milk.

**Key words:** improvement, half-breed goat, milk, capacity of milking

## INTRODUCTION

Applying certain modern systems of improving the goats involves completing the classical methods which are used to improve the genetic potential with methods of appreciating the hereditary base and their capacity of production, so that faster and more efficient decision can be taken in the process of selection and improvement.

For the improvement of the milk production the local goat populations, characterized at present by a great variability of the productive performances, it was made the crossbreeding with Saanen breed, evaluating the performances of the half-breeds comparatively to the Carpathian

breed, aiming to create the first genotypes with superior productive performances.

The cross breeding represent the fastest method to improve the milk production of goat, as results of researches made by various authors [3,4,5]

## MATERIAL AND METHOD

The researches began in 2006, being coordinated by the Institute of Research-Development for Sheep and Goat Breeding Palas-Constanța, at the works participating other two units of research: the Resort of Research-Development for Sheep and Goat Breeding Reghin-Mureș and the Resort of Research-Development for Sheep and Goat Breeding Popăuți-Botoșani and were concretized in:

- Evaluating the morph-productive parameters at the experimental lots;
- Control of productions (milk and body weight) at lots of half-bred goats of F<sub>1</sub> and witness lots, making the biometric measurements, weighing and gathering samples;
- Evaluating the results of dropping in order to obtain F<sub>1</sub> half-breeds (Saanen x Carpathian) and establishing the achieved reproduction indicators.

The checking of milk production and the statistical estimation of the results were made according to standard proceedings used in the research activity [1,2].

### RESULTS AND DISCUSSIONS

To establish the milk production of the goats it was considered the milk production during milking period and the quantity of milked milk after weaning the kids.

The estimation of the milk production of the goats during milking period was made indirectly, on the basis of the increasing rate of the kids during this period and of the milk quantity that was consumed to make 1 kg of weight increasing rate (8,5 liters milk/kg increasing rate in the first month of milking and 7,5 liters/kg increasing rate in the following months until weaning).

After weaning the kids there were made controls of the milk production on samples from each genotype according to the indicated methodology, calculating the quantity of milked milk.

The results obtained at ICDCOC Palas-Constanța regarding the capacity of milking of the F<sub>1</sub> half-bred goats comparatively to those of Carpathian breed are presented in Table 1.

Table 1 Capacity of milking of the F<sub>1</sub> Saanen x Carpathian goats from ICDCOC Palas-Constanța comparatively to the Carpathian breed

Specification	Capacity of milking (l/animal)							
	1 <sup>st</sup> month of lactation		2 <sup>nd</sup> month of lactation		3 <sup>rd</sup> month of lactation		Total 1 <sup>st</sup> + 2 <sup>nd</sup> + 3 <sup>rd</sup>	
	n	$\frac{X \pm s_x}{V\%}$	n	$\frac{X \pm s_x}{V\%}$	n	$\frac{X \pm s_x}{V\%}$	n	$\frac{X \pm s_x}{V\%}$
F <sub>1</sub> 50% Saanen x 50% Carpathian	22	$\frac{41.30 \pm 2.2258}{25.28}$	20	$\frac{36.91 \pm 1.9380}{23.48}$	29	$\frac{32.14 \pm 1.687}{28.26}$	29	$\frac{110.35 \pm 6.1782}{30.15}$
Carpathian breed	74	$\frac{33.89 \pm 1.768}{29.87}$	63	$\frac{32.93 \pm 1.2281}{29.59}$	64	$\frac{28.00 \pm 1.1318}{32.33}$	64	$\frac{94.82 \pm 4.0891}{34.50}$

On the basis of the weight increasing rates of the kids that were established in the first 3 months of milking it was established that the milk production of the F<sub>1</sub> half-breed goats was of 41.30±2.2258 liters in the first month of lactation. 36.91±1.9380 liters in the second month of lactation and 32.14±1.687 liters in the third month of lactation. The milk production of the half-breed goats during milking period was of 110.35±6.1782 liters.

The milk production of the goats of Carpathian breed (witness lot) was of

33.89±1.768 liters in the first month of lactation, 32.93±1.2281 liters in the second month and 28.00±1.1318 liters in the third month of lactation. The milk production of the Carpathian goats during milking period was of 94.82±4.0891 liters.

The comparative analysis of the results regarding the capacity of milking for the F<sub>1</sub> half-breed goats and of those of Carpathian breed is presented in Table 2.

Table 2 Differences regarding the capacity of milking of the F<sub>1</sub> goats (Saanen x Carpathian) comparatively to the Carpathian breed

Differences between F <sub>1</sub> half-breed goats and Carpathian breed	Capacity of milking (l/animal)			
	1 <sup>st</sup> month of lactation	2 <sup>nd</sup> month of lactation	3 <sup>rd</sup> month of lactation	Total of lactation period
± liters	+ 7.41	+ 3.39	+ 4.14	+ 15.53
± %	+ 21.9	+ 12.1	+ 14.78	+ 16.37
Significance of differences	p < 0.001 Very significant	p > 0.05 Insignificant	p < 0.05 Significant	p < 0.05 Significant

The obtained data regarding the capacity of milking of the F<sub>1</sub> hybrid goats show the fact that the milk production of goats in this period was significantly bigger ( $p < 0,05$ )

besides the milk production of the goats of Carpathian breed.

The comparative results regarding the production of milked milk at the two lots are presented in Table 3.

Table 3 The production of milked milk at the F<sub>1</sub> Saanen x Carpathian half-bred goats, comparatively to Carpathian breed (1<sup>st</sup> lactation)

No.	Genotype	Milked milk (l/ animal)		
		Period of milking (days)	Total	Per milking day
			X ± sx	X ± sx
1.	F <sub>1</sub> Saanen x Carpathian	134	151.80±7.7463	1.13±0.0578
2.	Carpathian breed	134	109.32±4.9670	0.82±0.0376

As a result of processing the data obtained during 4 monthly controls it was established the fact that at the F<sub>1</sub> hybrid goats it was obtained a milked quantity of milk at the first lactation of 151.80±7.7463 liters. and

at the goats of Carpathian breed of 109.32± 4.9670 liters.

The comparative situation of the total production of milked milk and the daily quantity of milk at the two genotypes is presented in Table 4.

Table 4 The differentiation of the production of milked milk at the F<sub>1</sub> hybrid goats comparatively to the Carpathian breed

Genotype	Difference between F <sub>1</sub> and Carpathian					
	Total production of milked milk (l)			The daily production of milked milk (l)		
	± liters/animal	± %	Signification	± liters/animal	± %	Signification
F <sub>1</sub> (50% Saanen x 50% Carpathian)	+ 42.48	+ 38.9	p < 0.001 Very significant	+ 0.31	+ 37.8	p < 0.001 Very significant

The result obtained at the first generation by the F<sub>1</sub> half-bred females regarding the quantity of milked milk reveals the fact that the total production of milk was bigger with 42.48 liters. respectively with 38.9% besides the mother breed which was subject to the improvement by crossbreeding with Saanen he-goats. The obtained results between the

half-bred goats and Carpathian breed were very significant.

To establish the total milk production of the two genotypes, the milk quantity produced during milking period and the total quantity of milked milk were considered, the data being presented in Table 5.

Table 5 The total milk production at the first lactation at the F<sub>1</sub> Saanen x Carpathian goats comparatively to the Carpathian breed

No.	Genotype	Total milk production (liters/animal)		
		Total quantity of milk	Days of lactation	Milk produced per lactation day
		X ± sx	X ± sx	X ± sx
1.	F <sub>1</sub> Saanen x Carpathian	262.10±14.5176	216.0±1.6733	1.217±0.0711
2.	Carpathian breed	204.20±12.5412	223.13±0.9200	0.915±0.0557

So, on the basis of the obtained results it was established the fact that the total milk production of the F<sub>1</sub> half-bred goats at the first lactation was of 262.10 ± 14.51 liters in a period of lactation of 216.0 ± 1.67 days.

The total production of milk at the goats of Carpathian breed was of 204.20 ± 12.54 liters in a period of lactation of 223.13 ± 0.93 days. The daily average production of milk was of

1.127 ± 0.071 liters at the half-bred goats and of 0.915 ± 0.055 liters at the witness lot.

The comparative analysis between the two genotypes regarding the total production

of milk and the average daily production on the whole period is presented in Table 6.

Table 6 The differentiation of the total milk production and of the average daily production between the F<sub>1</sub> half-bred goats (Saanen x Carpathian) and Carpathian breed from ICDCOC Palas-Constanța

Genotype	Difference between F <sub>1</sub> and Carpathian					
	Total production of milk			Average daily production		
	± liters/animal	± %	Signification	± liters/animal	± %	Signification
F <sub>1</sub> Saanen x Carpathian	+ 57.9	+ 28.4	p < 0.001 Very significant	+ 0.302	+ 33.0	p < 0.001 Very significant

There are noted distinctly significant differences regarding the total production of milk, at the two lots in the favor F<sub>1</sub> half-breeds (Saanen x Carpathian).

The obtained results regarding the capacity of milking of the F<sub>1</sub> goats from SCDCOC Reghin-Mureș is presented in Table 7.

Table 7 The capacity of milking of the goats with F<sub>1</sub> genotype (Saanen x Carpathian) from SCDCOC Reghin-Mureș

Genotype	Capacity of milking (l/animal)							
	The first month of lactation		The second month of lactation		The third month of lactation		Total per lactation	
	X±sx	V%	X±sx	V%	X±sx	V%	X±sx	V%
F <sub>1</sub> Saanen x Carpathian	46.67 ± 1.8425	17.20	26.05 ± 1.3020	21.79	26.67 ± 0.8242	13.46	99.39 ± 2.9178	13.32
Carpathian	36.70 ± 1.5015	21.65	23.19 ± 1.150	26.24	23.497 ± 0.6754	15.21	83.38 ± 2.6125	16.12

So, the F<sub>1</sub> half-bred goats (Saanen x Carpathian) had a capacity of milking of 99.39 ± 2.9178 liters, and the goats of Carpathian breed (witness lot) had a capacity of milking of 83.38 ± 2.6125 liters.

The comparative analysis of the obtained results, given in Table 8, reveals the

superiority of the F<sub>1</sub> half-bred goats which at the first lactation had a capacity of milking bigger with 19.2% besides the goats of Carpathian breed, the registered differences being distinctly significant.

Table 8 The differentiation of the total capacity of milking of the Half-bred goats besides the Carpathian breed

Genotype	Differences between F <sub>1</sub> and Carpathian		
	Quantity of milk		Significance of differences
	± liters	± %	
F <sub>1</sub> Saanen x Carpathian	16.01	19.20	p < 0.01 Distinctly significant

On the basis of the obtained results at the four monthly controls it was established the total production of milked milk given in Table 9.

From the obtained data it results that the total production of milked milk at the F<sub>1</sub> half-

bred goats was of 191.813 ± 4.8657 liters. and at the witness lot was of 124.562 ± 2.4861 liters. The daily average quantity of milked milk was of 1.400 liters at the half-bred goats and of 0.909 liters at the witness lot.

Table 9 The total production of milked milk (137 days) at the half-bred goats from SCDCOC Reghin-Mureș

Genotype	n	Total productions		Milk/animal/day
		X ± sx	V%	
F <sub>1</sub> Saanen x Carpathian	18	191.813±4.8657	10.76	1.400
Carpathian	84	124.562±2.4861	18.29	0.909

Table 10 The difference between the total productions of milked milk of the half-bred goats comparatively to the Carpathian breed

Genotype	Difference between F <sub>1</sub> and Carpathian		
	The total production of milked milk		Significance
	± liters	± %	
F <sub>1</sub> Saanen x Merinos	+ 67.25	+ 53.98	p < 0.001 Very significant

The comparative analysis between the productions of milked milk of the 2 genotypes indicates the fact that Saanen breed had an obvious improving effect upon the Carpathian breed from Mureș, the quantity of milked milk at the first lactation at the half-bred goats being bigger with

53.98% besides the Carpathian breed, the differences statistically established being very significant. On the basis of the results that were obtained during breastfeeding and milking periods it was determined the total production milk of the goats from the experiments.

Table 11 The total production of milk at the first lactation at the F<sub>1</sub> Saanen x Carpathian goats comparatively to the Carpathian breed

Genotype	The total production of milk (liters/cap)		
	Quantity of milk (liters)	Days of lactation	Milk/day lactation(liters)
	X ± sx		
F <sub>1</sub> Saanen x Carpathian	291.1±7.8422	227	1.282
Carpathian breed	207.94±4.2311	227	0.916

Table 12 The difference between the total productions of milk at the F<sub>1</sub> half-breeds and those of Carpathian breed

Genotype	The differences between F <sub>1</sub> and Carpathian		
	Quantity of milk		Significance
	± liters	± %	
F <sub>1</sub> Saanen x Carpathian	+ 83.26	+ 40.0	p < 0.001 Very significant

The F<sub>1</sub> half-bred goats (Saanen x Carpathian) made a total quantity of milk of 291.2 liters, a production bigger with 83.26 liters, respectively 40%, besides the Carpathian breed (very significant differences). The daily quantity of milk calculated on the whole period of lactation, of 227 days, was of 1.282 liters at the half-

bred goats and 0.916 liters at the goats of Carpathian.

On the basis of the increasing rates made by the kids during breastfeeding and the controls during milking period it was established the milk production of the half-bred goats, comparatively to the Carpathian breed during the whole period of lactation, of 214 days (Table 13).

Table 13 The production of milk of the half-bred goats from SCDCOC Popăuți-Botoșani comparatively to the Carpathian breed

Month of lactation	Period	F <sub>1</sub> goats (n = 28)			Local goats (n = 29)		
		X ± sx	V%	Daily average production	X ± sx	V%	Daily average production
April	Breastfeeding	37.84 ± 2.32	26.78	1.26	30.16 ± 3.21	28.54	1.04
May	Breastfeeding	43.16 ± 3.18	29.88	1.39	34.20 ± 2.92	28.16	1.10
June	Breastfeeding	44.23 ± 2.90	27.14	1.47	36.12 ± 2.38	33.86	1.20
July	Milking	40.36 ± 3.38	33.72	1.30	31.85 ± 2.58	40.12	1.03
August	Milking	38.69 ± 2.66	28.64	1.25	28.60 ± 3.06	36.82	0.92
September	Milking	33.61 ± 4.03	39.22	1.12	26.58 ± 3.22	38.36	0.89
October	Milking	27.18 ± 3.34	33.19	0.88	19.54 ± 2.46	39.48	0.63
<b>Total of breastfeeding period (90 days)</b>		<b>125,33</b>	-	<b>1.38</b>	<b>100.48</b>	-	<b>1.10</b>
<b>Total of milking period (124 days)</b>		<b>139,84</b>	-	<b>1.13</b>	<b>106.54</b>	-	<b>0.87</b>
<b>Total (breastfeeding + milking)</b>		<b>265,07</b>	-	<b>1.23</b>	<b>207.05</b>	-	<b>0.97</b>

From the obtained data it was noted that the production of milk of the F<sub>1</sub> half-bred goats (Saanen x Carpathian) during breastfeeding period was of 125.33 liters, a production bigger with 24.73% besides the production of the Carpathian breed of 100.48 liters (significant differences  $p < 0.05$ ). The production of milk of the half-bred goats during milking period was of 139.84, bigger with 31.26% besides the 2 genotypes, being very significant.

The calculus of the total production of milk of the half-bred goats during the whole lactation period of 214 days revealed the fact that they made a total production of milk of 265.07 liters, bigger with 27.7% besides the production of the Carpathian breed (significant differences  $p < 0.01$ ).

## CONCLUSIONS

1. The total milk production of the F<sub>1</sub> half-bred goats from ICDCOC Palas-Constanța at the first lactation was of 262±14.5176 liters during a lactation period of 216±1.6733 days (significantly bigger  $p < 0.01$ ), besides the production of the goats of Carpathian breed which was of 204.20±12.5441 liters, during a period of lactation of 223±0.92 days.

2. The total milk production at the first lactation of the F<sub>1</sub> half-bred goats from SCDCOC Reghin-Mureș was of 291.2 liters,

a production bigger with 40% besides the milk production of the Carpathian breed.

3. The calculus of the total production of milk of the half-bred goats from SCDCOC Popăuți-Botoșani revealed a production of 265.07 liters, a production bigger with 27.7% besides the Carpathian breed from North Moldavia.

The general conclusion which resulted from the experiment is that by using the improving bucks from Saanen breed, in crossbreeding with Carpathian breed from various areas it was obtained the first generation of hybrid goats which have 50% Saanen blood, respectively 3 genotypes which had significantly better performances au than the local breed regarding the production of milk.

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