Evaluation of Romanov-Karakul crosses for pelt production and fertility

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Karakul × Romanov crosses with varying genetic contributions from each breed were evaluated for their pelt production and fertility. The genetic contribution of each breed varied from 12,5 – 87,5%.

Pelt quality improved as the genetic contribution of the Karakul increased. However, none of the crosses were suitable for pelt production owing to inferior pelt quality. The fertility of crosses with a 50 and 75% Romanov contribution was high. However, in terms of profitability, the results were not superior to those of the purebred Karakul when the Romanov contribution to the cross was 25%. It may, therefore, be concluded that crossing the Karakul with the Romanov to increase fertility is unfeasible in a pelt production enterprise owing to inferior pelt quality.

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Karakoel × Romanovkruisings met variërende genetiese bydraes van beide rasse is geëvalueer ten opsigte van pelsproduksie en vrugbaarheid. Die genetiese bydrae van elke ras het gevarieer vanaf 12,5 – 87,5%.

Pelsgehalte het verbeter met 'n toenemende bydrae deur die Karakoel. Geeneen van die kruisings was egter geskik vir pelsproduksie nie weens minderwaardige pelsgehalte. Vrugbaarheid is geëvalueer in die 75 × 25; 50 × 50 en 25 × 75 Romanov × Karakoelkruisings. Die vrugbaarheid in die 75 × 25 en 50 × 50 Romanov × Karakoelkruisings was hoog, maar het 'n skerp daling in die geval van die 25 × 75 Romanov × Karakoelkruising getoon. Vrugbaarheid het in so 'n mate in hierdie kruis verminder dat dit tesame met die meegaande swak pelseienskappe nie ekonomies beter was as die suiwer Karakoel nie. Die kruising van die Karakoel met die Romanov om vrugbaarheid te verhoog en die nageslag te gebruik vir pelsproduksie blyk dus nie lewensvatbaar te wees nie weens minderwaardige pelsgehalte.

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Introduction

The lambing percentage of purebred Karakul ewes is approximately 100%, of which 2 – 5% might be twins (Zaaiman, 1966). The Romanov breed is known for its high fertility. Arsenév (1974) found the average litter size of the Romanov to be 2,23. Singles, twins, triplets, quadruplets and quintuplets accounted for 17,0; 51,2; 27,7; 3,9 and 0,2% of the births, respectively. An average lambing percentage of 420% was recorded in one flock. The high fertility of the Romanov might be used to increase pelt production by crossbreeding with the Karakul. It is well known that traits associated with reproductive ability and the survival of offspring, are considerably affected by heterosis (Falconer, 1964). However, there is a danger that crossbreeding with the Karakul might have a deleterious effect on pelt quality. The object of the present study was therefore to determine whether crossing the Karakul with the Romanov would increase fertility and to establish what effect it would have on pelt quality.

Procedure

From 1968 to 1979 various crosses were made between the Romanov and Karakul breeds which resulted in crossbreds with the following percentages of Romanov genetic contribution: 87,5; 75,0; 62,5; 50,0; 37,5; 25,0 and 12,5%. All these crosses were evaluated for pelt production but only the 75 × 25, 50 × 50 and 25 × 75 (Romanov × Karakul) crosses were evaluated with regard to fertility.

The crossbred pelts were subjectively evaluated on the live lambs and the subjective measure of each of the various pelt characteristics was converted to a categorical score, ranging from 1 – 10. For example, a score of ten denotes a curly and excellent pelt while a score of one denotes a smooth and very poor pelt in terms of curl development, pattern and hair quality. A score of eight denotes a pelt consisting of very long and thick hair fibres while a score of two is on the other end of the scale in this regard. As the score increases, so the quality of all other pelt characteristics increases except for metallic and brittle hair. A score of five indicates normal hair stiffness, while higher scores indicate stiffer hair.

Fertility was determined by the percentage of singles, twins, triplets or quadruplets born to ewes that lambed.

Results and Discussion

Pelt characteristics

The average of certain pelt characteristics pertaining to the different Romanov × Karakul crosses are presented in Table 1. It is evident from Table 1 that pelt quality improved as the percentage of Karakul inheritance increased. The pelt characteristics of the crosses having the highest (87,5%) and lowest (12,5%) Karakul inheritance are compared in Table 2. The differences are expressed as percentages of the mean of the 12,5% Karakul cross. The results in Table 2 show clearly that curl type and pattern improved dramatically with an increase in Karakul genetic contribution from 12,5 to 87,5%. Both the length and thickness of the hair decreased as the Karakul genetic contribution increased, with the result that hair stiffness and brittleness increased. Metallic hair improved by a vast 44,15% with the higher percentage of Karakul genetic contribution, while lustre, extremities (hair quality of the chest, tail and hind legs) and general hair quality improved by 16,14; 13,02 and 12,13% respectively.

The various pelt characteristics of the Romanov × Karakul crosses were compared with those of a control Karakul flock. The percentage deviation of the respective means of the crosses from those of the Karakul control flock, run at the same Research Station, are presented in Table 3. The averages of the pelt characteristics of the control flock are presented in Table 4. The general trend discernable from the results in Table 3 indicates that pelt quality improved with an increase in Karakul genetic contribution but is as a whole still inferior to those of the control flock. It is necessary to point out the following:

(i) The 50 Romanov × 50 Karakul cross was the first such cross to be made and the data is therefore representative of observations in an unselected population. This fact is also applicable to the pelt data of this cross presented in Table 1.

(ii) Over the past 15 years there has been no selection in the Karakul control flock used in this study.

Table 2 Percentage deviation from the mean of pelt characteristics of the 87,5% Karakul cross expressed as a percentage of the 12,5% Karakul cross

Character	Deviation (%)	Character	Deviation (%)
Curl type	+ 198,04	Metallic hair	− 44,15
Pattern	+ 131,00	Hair stiffness	+ 18,94
Hair length	− 32,76	Brittle hair	+ 18,87
Hair thickness	− 19,53	Extremities[a]	+ 13,02
Lustre	+ 16,14	Hair quality (general)	+ 12,13

[a] = Hair quality of the chest, tail and hind legs
\+ = Increase
− = Decrease

Fertility

The lambing results (expressed as the number of lambs born to the ewes that lambed) of the 75 × 25, 50 × 50 and 25 × 75 Romanov × Karakul crosses are presented in Table 5. It is quite clear from these results that the fertilities of the 75 × 25 and 50 × 50 Romanov × Karakul crosses are practically the same but considerably higher than that of the 25 Romanov × 75 Karakul cross. In the latter cross the percentage of twins and triplets decreased by 42,0 and

Table 1 Averages of certain pelt characteristics of importance in the various Romanov × Karakul crosses

	Percentage Romanov × Karakul						
Character	12,5 × 87,5 n = 113	25 × 75 n = 587	37,5 × 62,5 n = 58	50 × 50 n = 113	62,5 × 37,5 n = 50	75 × 25 n = 49	87,5 × 12,5 n = 55
Curl type	3,04	4,55	3,76	4,30	2,12	1,94	1,02
	± 1,51	± 2,60	± 2,80	± 2,21	± 1,75	± 1,67	± 0,15
Pattern	2,31	2,07	1,61	1,22	1,08	1,04	1,00
	± 1,11	± 0,83	± 0,83	± 0,39	± 0,29	± 0,18	± 0,00
Hair length	5,48	5,71	6,33	7,06	6,92	8,39	8,15
	± 1,52	± 1,06	± 1,17	± 0,89	± 1,05	± 1,40	± 1,26
Hair thickness	5,85	5,53	5,83	6,15	6,22	6,58	7,27
	± 1,23	± 1,13	± 1,36	± 1,19	± 1,22	± 1,32	± 1,33
Lustre	4,75	4,28	3,73	3,61	3,96	3,78	4,09
	± 1,35	± 1,02	± 1,07	± 0,75	± 0,57	± 0,75	± 0,99
Metallic hair	3,44	4,22	5,81	6,67	5,84	6,47	6,16
	± 2,15	± 2,45	± 1,85	± 2,23	± 2,13	± 1,90	± 1,74
Hair stiffness	4,90	4,75	4,52	4,26	4,30	4,21	4,12
	± 0,84	± 0,68	± 0,99	± 0,67	± 0,77	± 0,76	± 0,43
Brittle hair	1,26	1,13	1,02	1,00	1,00	1,00	1,06
	± 1,00	± 0,75	± 0,15	± 0,00	± 0,00	± 0,00	± 0,39
Extremities[a]	4,69	4,50	4,30	4,15	4,16	4,29	4,15
	± 0,83	± 0,75	± 0,80	± 0,58	± 0,38	± 0,46	± 0,59
Hair quality (general)	4,53	4,18	3,83	3,59	3,82	3,98	4,04
	± 1,15	± 0,91	± 0,94	± 0,79	± 0,56	± 0,60	± 0,39

n = Number
[a] = Hair quality of the chest, tail and hind legs
± = Standard deviation

Table 3 Differences in pelt characteristics of Romanov-Karakul crosses and a Karakul control flock expressed as the percentage deviation from the Karakul control flock

	Percentage Romanov × Karakul						
Character	12,5 × 87,5	25 × 75	37,5 × 62,5	50 × 50	62,5 × 37,5	75 × 25	87,5 × 12,5
Curl type	− 42,85	− 14,47	− 29,32	− 19,17	− 60,15	− 63,53	− 80,82
	P(0,001)	*P*(0,001)					
Pattern	− 20,61	− 28,86	− 44,67	− 57,07	− 62,88	− 64,26	− 65,63
	P(0,001)	*P*0,001)					
Hair length	+ 0,55	+ 4,77	+ 16,15	+ 29,55	+ 26,98	+ 53,95	+ 49,55
	−	*P*(0,001)					
Hair thickness	+ 4,10	− 1,60	+ 3,74	+ 9,43	+ 10,68	+ 17,09	+ 29,36
	P(0,050)	*P*(0,100)					
Lustre	+ 3,04	− 7,15	− 19,18	− 21,69	− 14,10	− 18,00	− 11,28
	P(0,400)	*P*(0,001)					
Metallic hair	+ 20,71	+ 48,07	+ 103,86	+ 134,04	+ 104,92	+ 127,02	+ 116,14
	P(0,001)	*P*(0,001)					
Hair stiffness	− 10,74	− 15,48	− 17,66	− 22,40	− 21,67	− 23,31	− 24,95
	P(0,001)	*P*(0,001)					
Brittle hair	− 30,77	− 37,91	− 43,95	− 45,05	− 45,05	− 45,05	− 41,75
	P(0,001)	*P*(0,001)					
Extremities[a]	+ 8,82	+ 4,41	− 0,23	− 3,71	− 3,48	− 0,46	− 3,71
	P(0,001)	*P*(0,001)					
Hair quality (general)	+ 2,26	− 5,64	− 13,54	− 18,96	− 13,77	− 10,15	− 8,80
	P(0,400)	*P*(0,001)					

[a] = Hair quality of the chest, tail and hind legs
P(0) = Significance level

Table 4 Averages of pelt characteristics in a Karakul control flock

Character	Mean out of 10 n = 1357	Character	Mean out of 10 n = 1357
Curl type	5,32	[a] Metallic hair	2,85
	± 1,715		± 2,050
Pattern	2,91	Hair stiffness	5,49
	± 0,949		± 0,996
Hair length	5,45	[a] Brittle hair	1,82
	± 1,148		± 1,610
Hair thickness	5,62	Extremities	4,31
	± 1,039		± 0,978
[a]Lustre	4,61	Hair quality	4,43
	± 1,11	(general)	± 1,146

n = Number
Extremities = Hair quality of the chest, tail and hind legs
± = Standard deviation
[a]n = 462

Table 5 Lambing results of the 75 × 25, 50 × 50 and 25 × 75 (Romanov × Karakul) crosses

	Romanov × Karakul					
	75 × 25		50 × 50		25 × 75	
Fertility expressed as	Number	%	Number	%	Number	%
Ewes lambed	113	–	424	–	185	–
Twins	63	55,75	244	57,55	27	14,59
Triplets	9	7,96	31	7,31	2	1,08
Quadruplets	1	0,88	2	0,47	–	–
Number of lambs born to the number of ewes lambed	197	174,34	736	173,58	216	116,76

6,5% units, respectively, and there were no quadruplets. There was an overall tendency to an increase in fertility with an increase in Romanov genetic contribution. Unfortunately no lambing data on the 12,5 Romanov × 87,5 Karakul cross are available. However, experience with the upgrading of the Blackhead Persian to the Karakul at this Research Station has shown that a further loss in fertility could be expected in such a cross. According to results obtained by Boshoff, Burger & Cronje (1975), it might be expected that the fertility of a 12,5 Romanov × 87,5 Karakul cross would not differ appreciably from that of the purebred Karakul.

Comparing the lambing results of the 25 Romanov × 75 Karakul cross with those of the Karakul control flock and those of a Karakul flock in the 10th and 11th years of selection for twins, they were found to differ significantly ($P \leq 0,05$) from those of the control flock but not from those of the twin flock.

It is therefore evident that the fertility of a 25 Romanov × 75 Karakul cross will be higher than that in a purebred Karakul flock. However, Boshoff *et al.* (1975) also found that in comparison with the Karakul there was an unfavourable deeper seasonal anoestrus present to a certain degree in the Romanov × Karakul crosses.

Conclusion

Irrespective of fertility, it may be concluded that crossing the Romanov with the Karakul would be unfeasible, mainly because of the poor pelt quality resulting from such crossbreeding.

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