

CROSS-BREEDING BETWEEN THREE FAT-TAILED IRANIAN BREEDS OF SHEEP

Cruzamiento entre tres razas ovinas iraníes de cola grasa

Croissement entre trois races ovines iraniennes de queue grasse

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INTRODUCTION

Sheep in Iran belong mainly to fat-tailed carpetwool breeds, well adapted to the poor range conditions.

Although mutton is the most important source of meat in Iran nevertheless due to relatively low productivity and improper feeding, its production is not efficient.

Cross-breeding is one of the effective methods for improving the efficiency of lamb production and desirable combinations for the future development of more productive strains should be sought.

Many workers have reported (DE BACA *et al.*, 1956; BAILEY *et al.*, 1961; SINDWELL *et al.*, 1964; MCGUIRK, 1967; FAHMY *et al.*, 1969; SIDWELL and MILLER, 1971, and ABOUL-NAGA, 1972) on the positive effect of cross-breeding on number of lambs weaned and weaning weight.

The main objective of this study was to evaluate the three fat-tailed Iranian breeds of sheep (Karakul, Mehraban and Naeini), especially in relation to the effect of cross-breeding on birth weight, daily gain from birth to weaning and weaning weight.

MATERIALS AND METHODS

The lambs used in this study were from three fat-tailed carpet-wool Iranian breeds of sheep: Karakul (K), Mehraban (M) and Naeini (N). Mehraban is raised in farms of the western part of the country but K and N are mainly range sheep.

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TABLE 1

LEAST-SQUARES CONSTANTS BY BREED OF SIRE, BREED OF DAM, AGE OF DAM AND SEX OF LAMB AND TEST OF SIGNIFICANCE FOR DIFFERENCES BETWEEN CONSTANTS

Classification	No. of lambs	Birth weight		No. of lambs	Weaning weight		Daily gain from birth to weaning	
		Kg	± S. E.		Kg	± S. E.	g	± S. E.
Overall mean	341	4.06	0.05	335	20.06	0.27	211.5	3.5
Breed of dam:								
<i>K</i>	108	0.45	0.05 <i>a</i>	106	0.55	0.24 <i>c</i>	— 0.2	3.1 <i>a</i>
<i>M</i>	129	— 0.04	0.04 <i>b</i>	126	1.59	0.21 <i>b</i>	21.7	2.8 <i>b</i>
<i>N</i>	104	— 0.41	0.05 <i>c</i>	103	— 2.14	0.27 <i>c</i>	— 21.5	3.5 <i>c</i>
Breed of sire:								
<i>K</i>	110	0.11	0.04 <i>a</i>	106	0.23	0.21 <i>a</i>	2.2	2.7 <i>a</i>
<i>M</i>	120	— 0.06	0.04 <i>b</i>	120	0.02	0.21 <i>a</i>	0.9	2.7 <i>a</i>
<i>N</i>	111	— 0.05	0.04 <i>b</i>	109	— 0.25	0.21 <i>a</i>	— 3.1	2.7 <i>a</i>
Age of dam:								
2 years	149	— 0.27	0.06 <i>a</i>	143	— 0.51	0.31 <i>a</i>	— 2.9	4.0 <i>a</i>
3 »	98	0.10	0.06 <i>b</i>	98	0.14	0.34 <i>a</i>	1.2	4.4 <i>a</i>
4 »	87	0.05	0.07 <i>b</i>	87	0.00	0.33 <i>a</i>	— 2.2	4.9 <i>a</i>
5 »	7	0.12	0.14 <i>ab</i>	7	0.37	0.75 <i>a</i>	3.9	9.6 <i>a</i>
Sex of lamb:								
<i>F</i>	158	— 0.11	0.03 <i>a</i>	155	— 0.87	0.14 <i>a</i>	— 9.9	1.8 <i>a</i>
<i>M</i>	183	0.11	0.03 <i>b</i>	180	0.87	0.14 <i>b</i>	9.9	1.8 <i>b</i>

All means within a particular sub-class differ significantly ($P < 0.05$) except those followed by the same letter.

Naeini has a white fleece and relatively small size, adapted to the poor central ranges of Iran. Karakul is famous for raising lambs with high quality fur, but is also raised for meat production in the southern and eastern parts of the country. No classical selection for meat, milk and wool has been performed on these breeds.

Data from 341 lambs born and 335 lambs weaned were used in this study. The lambs were born single from November, 1972, through March 1973, in the Animal Research Station of the University. Only four twin lambs were born and were not included in this study. The lambs were creep-fed during the suckling period and were weaned at 75 ± 10 days in age on three dates. The creep ration consisted of 50 % barley, 10 % sunflower seed meal, 20 % wheat bran, 18 % dried sugar-beet pulp with molasses, 1 % bone meal and 1 % salt. The creep ration was ground, mixed and fed *ad libitum*. Alfalfa was fed free choice, and lambs had access to the ewe only for about 12 hours at nights.

The data were analyzed by the least squares method as outlined by HARVEY (1960). Constants were fitted for breed of dam, breed of sire interactions. The regression of weaning weight and daily gain from birth to weaning on weaning age were also included. Tests of significance for differences between individual means were performed using the DUNCAN's Multiple Range Test as modified by KRAMER.

RESULTS AND DISCUSSION

The least squares constants for birth weight, weaning weight and daily gain from birth to weaning are shown in Table 1. Breed of dam had a significant effect on all traits. Karakul ewes produced significantly heavier lambs at birth followed by M and N, but M ewes weaned significantly the heaviest and fastest growing lambs from birth to weaning, followed by K and N ewes. The superiority of M lambs at weaning can be attributed to the higher milk production of this breed.

Breed of sire had no significant effects, except on birth weight. K rams produced heavier lambs at birth as compared with M and N, which were similar.

Birth weight was the only trait significantly influenced by age of dam. The lightest lambs were born from 2 years old ewes. Significant effects of age of dam on these traits were reported by BLACKWELL and HENDERSON (1955), SIDWELL *et al.* (1964), BROWN (1968), FAHMY (1969), LAX and PARKER (1971), SIDWELL and MILLER (1971) and ABOUL-NAGA *et al.* (1972). The lack of uniform age distribution and consequently very small number of five years old ewes compared with the other age groups has made the comparison between 4 and 5 year groups unrealistic.

Ram lambs were significantly heavier than ewe lambs both at birth and at weaning and had significantly higher daily gain from birth to weaning. This is in agreement with the results of several other investigators.

The interaction between breed of sire and breed of dam was highly significant for weaning weight and daily gain from birth to weaning, but not for birth weight.

Regressions of weaning weight and daily gain from birth to weaning on weaning age were 230 g and 0.33 g, respectively.

TABLE 2

ACTUAL DIFFERENCES AND PERCENT DIFFERENCES BETWEEN CROSSBREDS AND AVERAGE OF COMPARABLE PURE BREEDS FOR BIRTH WEIGHT, WEANING WEIGHT AND DAILY GAIN FROM BIRTH TO WEANING

Breed crosses		Birth weight (Kg)		Weaning weight (Kg)		Daily gain from birth to weaning (g)	
Rams	Ewes	Actual difference	Percent difference	Actual difference	Percent difference	Actual difference	Percent difference
<i>K</i>	<i>M</i>	-0.368	- 8.4	0.922	4.4	10.35	4.7
<i>K</i>	<i>N</i>	-0.437	-10.5	0.213	1.1	17.49	9.3
<i>M</i>	<i>K</i>	-0.024	- 0.5	-0.311	- 1.5	- 6.24	- 2.8
<i>M</i>	<i>N</i>	-0.192	- 5.0	-0.760	- 3.9	- 5.59	- 2.8
<i>N</i>	<i>K</i>	0.240	5.7	2.384	12.8	26.71	14.2
<i>N</i>	<i>M</i>	0.112	2.9	2.707	14.2	34.38	17.2

The effect of heterosis, defined as the difference between the weights of the crossbred lamb and the average of the two comparable pure breeds, is shown in Table 2. For birth weight, only two out of six crosses showed some degree of positive heterosis, but for weaning weight and daily gain from birth to weaning four out of six crosses showed positive heterosis. All crosses sired by N showed highly positive heterosis for all traits, among them the largest positive difference, 2.707 Kg (% 14.2) for weaning weight and 34.38 g (% 17.2) for daily gain were obtained with N rams and M ewes. The result of mating M rams with the other two breeds showed negative heterosis for all traits.

SUMMARY

Birth weights, daily gains from birth to weaning and weaning weights of 335 lambs obtained from purebreds and two-way crosses of three fat-tailed Iranian sheep breeds were analyzed by the least squares method.

Karakul (K) produced significantly heavier lambs at birth, followed by Mehraban (M) and Naeini (N). Mehraban ewes weaned the heaviest lambs followed by K and N. Karakul rams produced heavier lambs at birth than either M or N.

The interaction between breed of sire and breed of dam was highly significant for gain and weaning weight but not for birth weight. Regressions of weaning weight and daily gain from birth to weaning on age at weaning were 230 g and 0.33 g respectively.

RESUMEN

El peso al nacer, la ganancia diaria desde el nacimiento al destete de 335 corderos obtenidos de razas puras y de dos sistemas de cruzamiento de tres razas iraníes de cola grasa se analizaron por el método de los mínimos cuadrados. La Karakul (K) produjo corderos significativamente de más peso al nacer, seguida por las razas Mehraban (M) y Naeini (N). Las ovejas M destetaron los corderos de mayor peso, seguidas por las K y N. Los carneros K produjeron corderos de más peso al nacer que los carneros M y N. La interacción entre las razas del padre y de la madre fue significativamente alta para la ganancia en peso y para el peso al destete, pero no para el peso al nacer. La regresión del peso al destete y de la ganancia diaria desde el nacimiento al destete o la edad al destete fueron de 230 g y de 0,33 g, respectivamente.

RESUME

Le poids à la naissance, le gain journalier dès la naissance au sevrage de 335 agneaux obtenus de trois races pures et de deux systèmes de croisement chez 3 races iraniennes de queue grasse ont été analysés par la méthode des minimum carrés. La race Karakul (K) a produit des agneaux significativement plus pesants à la naissance que les races Mehraban (M) et Naeini (N). Les brebis M ont sevré les agneaux plus pesants, suivies par les K et N. Les béliers K ont produit des agneaux plus pesants à la naissance que ceux M et N. L'interaction entre les races

paternelle et maternelle a été significativement haute pour le gain du poids et pour le poids au sevrage, mais non pour le poids à la naissance. La regression du poids au sevrage et du gain journalier du poids dès la naissance au sevrage ou l'âge au sevrage furent de 230 g et de 0,33 g, respectivement.

LITERATURE CITED

- ABOUL-NAGA, A.; ELTAWIL, E. E.; SALAH, E.; GALAL, E.; LABBAN, F., and KHISHIN, S. S. (1972): The effects of crossing Merino with Ossimi and Barki sheep on some productive traits. *J. Agric. Sci., Camb.*, 78:275.
- BAILEY, C. M.; CHAPMAN, A. B., and POPE, A. L. (1961): Relative value of crosses in market lamb production. *Wis. Agr. Exp. Sta. Res. Bul.* No. 226.
- BLACKWELL, R. L., and HENDERSON, C. R. (1955): Variation in fleece weight, weaning weight and birth weight of sheep under farm conditions. *J. Anim. Sci.*, 14:831.
- DEBACA, R. C.; BOGART, Ralph; CALVIN, Lyle D., and NELSON, O. M. (1956): Factors affecting weaning weights of cross. *J. Anim. Sci.*, 15:667.
- DUNCAN, D. B. (1955): Multiple range and multiple F tests. *Biometrics*, 11:1.F.
- FAHMY, M. H.; SALAH, E.; GALAL, E.; GHANON, Y. S., and KHISHIN, S. S. (1969): Cross-breeding of sheep under semiarid conditions. *Anim. Prod.*, 11:351.
- HARVEY, W. R. (1960): Least-squares analysis of data with unequal subclass numbers. *A.R.S.*, 20-8. U.S.D.A.
- KRAMER, C. V. (1957): Extension of multiple range tests group correlated adjusted means. *Biometrics*, 13:13.
- PARKER, C. F. (1971): Cross bred (F_1) rams for improving rate and percentage of lambing in Columbia and Targhee rams. *J. Anim. Sci.*, 33:203.
- SIDWELL, G. M.; EVERSON, D. O., and TERRILL, C. E. (1964): Lamb weights in some pure breeds and crosses. *J. Anim. Sci.*, 23:105.
- SIDWELL, G. M., and MILLER, L. R. (1971): Production in some pure breeds of sheep and their crosses. II. Birth weights and weaning weights of lambs. *J. Anim. Sci.*, 32:1090.
- LAX, J., and BROWN, G. H. (1968): The influence of maternal handicap, inbreeding and ewe's body weight at 15-16 months of age on reproduction rate in Australian Merinos. *Aust. J. Agric. Res.*
- MCGUIRK, B. J. (1967): *Wool technology and sheep-breeding*, 14(2):73.