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Growth Performance of Crossbred Lambs and Productivity of Kurdi Ewes as Affected by the Sire Breed under Extensive Production System

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ABSTRACT

Crossbreeding of four Iranian fat-tailed sheep breeds, namely Kurdi (K), Chaal (C), Afshari (A) and Sanjabi (S) was carried out to determine the ram breed effects on productivity of Kurdi fat-tailed ewes (K) under extensive production system. A total of 475 Kurdi ewes were mated to 24 rams from the above four breeds resulting in 454 lambs. Ram breed had a significant influence on early growth traits of the lambs. Lambs sired by C rams were heavier than the other lambs (P< 0.05) at birth and weaning. Body weight at 160 days of age (W160) in crossbred lambs was significantly higher than that of the purebred lambs while crossbred lambs for W160 were similar (P> 0.05).Greasy fleece weight of lambs at first shearing (GFW) and fat-tail measurements were significantly affected by ram breed. Number of lambs born and number of lambs weaned per ewe lambed or per ewe joined were similar among the four groups, whereas there was significant effect on productivity. In general, ewes mated to Chaal ram had higher productivity than those mated to other ram breeds.

Keywords: Crossbreeding, Early growth traits, Fat-tail measurements, Productivity of ewe.

INTRODUCTION

Mutton is one of the most important sources of red meat in the Middle East where the fat-tailed sheep are dominant. However, mutton production fails to cater the increasing demand of the growing population. Sheep production systems have to be dynamic to meet the changing demands of consumers (Van Wyk *et al.*, 2003). Appropriate breeding strategies are necessary to improve the productivity of the local breeds in the region. Profitability of sheep production systems may be evaluated by optimizing reproduction, as well as growth and survival of lambs that result in increased productivity levels (Boujenane *et al.*, 1998).

Sheep is one of the species that has relatively high biodiversity in the Middle East. For example, sheep population in Iran comprises 26 breed populations (Kiyanzad, 2002). Such genetic diversity provides favourable opportunities for enhancing production efficiency by means of crossbreeding strategies that exploit breed diversities, heterosis, and breed complementary (Freking *et al.*, 2000; Freking and Leymaster, 2004). In certain cases, crossbreeding that is considered as an efficient, thrifty, and cost-effective procedure for genetic improvement, utilizes genetic variation across breeds to promote

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the efficiency of commercial livestock production. Benefit of crossbreeding on growth and reproductive traits of various breeds of sheep are documented by numerous studies (Doloksaribu *et al.*, 2000; Freking and Leymaster, 2004; Hassen *et al.*, 2004; Ekiz and Altine, 2006).

Kurdi sheep is a medium-frame (mid-size) fat-tailed breed and a multi-purpose breed for milk, carpet wool, and meat production. It originated and is dominant in western Iran. All Iranian native sheep breeds, except the Zel breed, are fat-tailed. The fat-tail that is regarded as an adaptive response of animals to harsh environmental conditions, serves as an energy source during migration and winter season when grazing is limited due to low pasture quality and quantity (Zamiri and Izadifard, 1997). There have been a number of studies on crossbreeding fat-tailed sheep in research establishments (Farid *et al.*, 1977; Farid and Makarechian, 1978; Kiyanzad, 2002; Kashan *et al.*, 2005). However, "on farm" evaluation has been sparse. Studies on the effects of crossbreeding on growth, reproductive and fat-tail characteristics of fat-tailed sheep under pastoral conditions are not common. The main objective of the present study was to investigate the effect of ram breed on productivity of fat-tailed ewes under pastoral based grazing system.

MATERIALS AND METHODS

The present research was conducted in Ilam Province, a mountainous area located in the west of Iran at latitude of 33° 38´ north and longitude of 46º 26´ east, about 1,319 m above the mean sea level. Annual rainfall varies between 200 and 750 mm. Although the region is surrounded by mountains, deserts in the west and the south have also influenced the climate of the region that presents a highly variable annual weather profile. Heavy showers or heavy snow in the winter and dusty, hot, dry weather in the summer are normal for this region.

Animals and Management

Crossbreeding of four fat-tailed Iranian sheep breeds namely Kurdi (K), Afshari (A), Chaal (C) and Sanjabi (S) was initiated in three Kurdi flocks. Flocks structure and ram breeds used in the study are presented in Table 1. At the beginning of the project, all ewes and rams were ear tagged and the approximate age of the animals was determined by teeth counting. All flocks were kept on local rangelands from late March to early June grazing on natural pastures, based mainly on annual legumes, annual grasses, and some perennial grasses. From early June to late December, the animals were allowed to graze on wheat and barely stubbles and other agricultural crop residues. In winter (late December to late March), the animals were penned at night and provided with wheat straw and barley grain as supplement (approx. 0.3 kg barley grain and 1kg wheat straw per ewe) and grazed during the day on poor quality pastures.

A well recognized annual health program was carried out for all flocks. Animals were treated with anti parasite drugs to control internal and external parasites. Blood samples of the ewes and rams were collected

Table 1. Number and age structure of rams and ewes within each flock by breed and breed cross at the beginning of the experiment.

Flock Number	No. of ewes	Average age of ewes (yr)	No. of rams				Average age of rams (yr)	Mating ratio
			Kurdi	Afshari	Chaal	Sanjabi		
1	154	4.0	2	2	2	2	3.3	1:19
2	157	3.7	2	2	2	2	3.5	1:20
3	164	4.2	2	2	2	2	3.7	1:21
Total	475	3.8	6	6	6	6	3.5	1:20

and tested against Brucellosis, those positive were culled from the flocks. The animals were then vaccinated against Foot and Mouth disease and Enterotoxaemia. Ewes, lambs and rams of all the flocks were shorn once each year in mid spring.

In each flock, ewes were managed as a single group within each season, except during the 60 days mating period commencing in June, in which the ewes from each of the three flocks were divided to four equal subgroups to produce the four crossbred groups of K×K, A×K, C×K and S×K (Table 2). All of the meat type, fat-tailed, and large size rams of Afshari, Chaal and Sanjabi breeds were collected from pastoral flocks in Zanjan, Kermanshah, and Ghazvin Provinces of Iran, respectively. The Kurdi breed, a medium size animal, was chosen as the ewe breed because it is the most common breed in the studied region.

Lambs were born from early November through January. At birth or shortly thereafter, lambs were identified with ear tags and weighed (±0.1 kg). Sex, date of birth, type of birth, dam and ram group were recorded. The lambs were also weighed monthly (±0.5 kg). Ewes that lambed were separated, and provided 1kg of wheat straw and 0.5 kg of barely grain per day. Ewes and their lambs were then kept together under the same management condition. Lambs were weaned at approximately 100±10 days of age and kept under range conditions for two months and were daily provided with 0.2 kg of straw and 0.2 kg of barley grain per lamb.

Table 2. Number of lambs by gender and breed and breed cross.

Gender	Breed and breed crosses			
	K×K[a]	A×K[b]	C×K[c]	S×K[d]
Male	61	55	53	51
Female	55	58	62	59
Total	116	113	115	110

[a] Sire= Kurdi, Dam= Kurdi; [b] Sire= Afshari, Dam=Kurdi; [c] Sire= Chaal, Dam= Kurdi, [d] Sire= Sanjabi, Dam= Kurdi.

Traits Definition

The traits investigated were classified as lamb and ewe traits. Early growth traits consisted of birth weight (BW); weaning weight (WW) (100±10 days of age), post weaning weights at 160 (W160) and 180 days (W180) and wool traits of lambs included greasy fleece weight at first shearing (GFW) and greasy fleece weight at first shearing per kg of live weight (GFW/LW). After shearing at approximately 6 month age and before marketing, live animal allometric measurements such as fat-tail length (distance from the base to the tip of the tail on the inner side of the tail, FTL), fat-tail width (measured at the base of the tail, FTW), fat-tail thickness (measured at the base of the tail using calliper, FTT), and circumference of the tail at the base (FTC) were recorded on the lambs.

Reproductive traits of Kurdi ewes included the number of lambs born per ewe lambing or prolificacy (NLBL), lambs born per ewe joined (NLBJ), lambs weaned per ewe lambed or fecundity (NLWL) and the number of lambs weaned per ewe joined (NLWJ). The composite traits were total litter weight at birth per ewe lambed (the sum of birth weights of all lambs born for each ewe lambing or ewe productivity at birth (LWBEL), total litter weight at birth per ewe joined (the sum of birth weights of all lambs born for each ewe joined multiplied by conception rate (LWBEE), total litter weight at weaning per ewe lambing ewe or productivity at weaning (LWWEL), the sum of the weights of all the lambs weaned per ewe lambing) and the total litter weight at weaning per ewe joined (LWWEE), the sum of the weights of all the lambs weaned for each ewe lambing multiplied by conception rate).

Statistical Analysis

The mathematical model for the analysis of live weights, fleece weight and fat-tail measurements included fixed effects of

Table 3. Least-squares mean (±S.E.) for early growth traits and fleece weight by breed cross.

	Early growth traits (kg)			Fleece weight (gr)	
	BW[a]	WW[b]	W160[c]	GFW[d]	GFW/LW[e]
Breed crosses[f]	**	**	*	*	*
K×K	4.2 ± 0.13^{b}	21.5 ± 0.47^{b}	26.8 ± 0.72^{b}	618.0 ± 51.85^{a}	22.5 ± 1.54^{a}
A×K	4.3 ± 0.12^{b}	22.8 ± 0.65^{b}	29.1 ± 0.83^{a}	494.3 ± 54.43^{b}	17.4 ± 1.62^{b}
C×K	4.6 ± 0.10^{a}	24.8 ± 0.56^{a}	28.3 ± 0.79^{a}	619.7 ± 55.49^{a}	21.5 ± 1.65^{a}
S×K	4.2 ± 0.08^{b}	22.6 ± 0.72^{b}	29.8 ± 0.81^{a}	620.8 ± 53.19^{a}	21.5 ± 1.58^{a}
Overall	4.3 ± 0.05	23.2 ± 0.31	28.5 ± 0.44	558.9 ± 26.42	20.7 ± 0.79

[a] Birth weight; [b] Weaning weight; [c] Weight at 160 days of age; [d] Greasy fleece weight of lambs at first shearing, [e] Greasy fleece weight of lambs at first shearing per kg of live weight.
[f] See Table 2.
* and **; Breed effect is significant at $P< 0.05$ and $P< 0.01$, respectively.
Means with different superscripts in each column differ ($P< 0.05$).

ram breed, gender of the lamb (male and female), birth type (twin and single), flock management (three levels), ewe age (2, 3, 4 and 5 years old) and age of lamb as a linear covariate, and random residual error. The first-order interactions between all the fixed effects were fitted in the model but were not significant, therefore, they were disregarded. The model was fitted using the general linear model (GLM) procedure of the SAS software package (SAS Institute, 1999). The mean comparisons between the sub-classes of the fixed effects were carried out using the t-test of LSMEANS procedure of SAS.

RESULTS

Early Growth Traits

Least-squares means (±S.E.) for early growth traits of lambs by breed crosses are presented in Table 3. According to the traits considered, some variations were observed (Figure 1). The breed of ram had significant influence on body weight at birth, weaning, and post-weaning. BW and WW of C×K lambs were significantly higher than the other three genotypes (Table 3). There were no significant differences among weights of

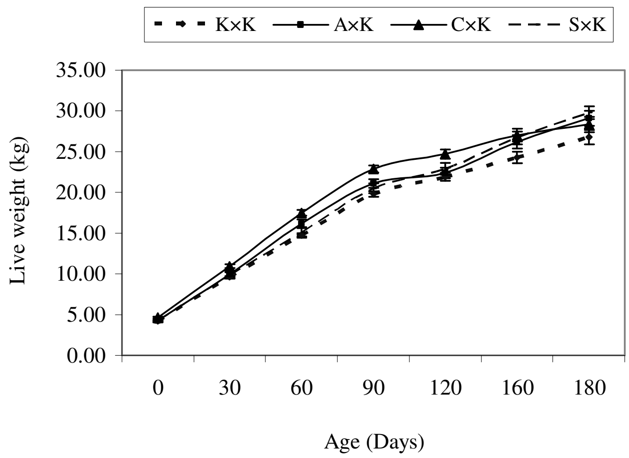

Figure 1. Early growth pattern of four lamb genotypes under grazing extensive system**.** (K×K, A×K, C×K, S×K: See Table 2).

K×K, A×K and S×K lambs at birth and weaning. W160 of the crossbred lambs was higher than purebred lambs (P< 0.05) whereas crossbred lambs were similar (P> 0.05). All the body weight traits were significantly affected by gender of the lambs. Age of the dam had a significant effect on birth weight. Flock management significantly influenced body weight at weaning and post-weaning.

Wool Traits

Results of least-squares analysis of variance revealed that ram breed had a significant influence on GFW and GFW/LW (Table 3). The lambs sired by Afshari rams produced significantly lower GFW and GFW/LW than the other breed groups, whereas K×K, C×K and S×K had similar wool traits.

Fat-tail Measurements

Least squares means for fat-tail measurements of four lamb breed crosses are presented in Table 4. The ram breed had significant effects on FTC, FTL, FTW and FTT, while A×K and S×K were similar in terms of FTC and FTT (P> 0.05). FTL of S×K lambs was the highest and that of A×K and C×K lambs was the lowest. However, the values of A×K and C×K lambs were similar. The S×K and K×K lambs had the maximum and C×K and A×K lambs had the minimum FTW (Table 4).

Reproductive Traits

The ram breed effect was not significant for NLBL, NLBE, LWEL and LWEE, expect fecundity and LWBEE (P< 0.01) (Table 5). Ewes mated to Chaal rams had higher fecundity (P< 0.05) and LWBEE (P< 0.01) than the others. Across all the mating types, Kurdi ewes mated to Chaal rams produced the significantly highest ewe productivity at weaning (25.71 kg).

DISCUSSION

C×K lambs exceeded other crossbred and purebred lambs in early growth rate (up to weaning) under pastoral extensive grazing system. After weaning, the other breeds also were superior to purebred animals (KK) and were similar. The superiority can be attributed to larger body size and body weight of Chaal breed relative to Kurdi breed. According to Boujenane *et al.* (1998), the superiority of crossbred lambs may be related partly to positive heterosis for pre-weaning growth. Our results regarding the ram breed effects on early growth traits are consistent with previous studies (Doloksaribu *et al.*, 2000; El Fadili *et al.*, 2000; Freking and Leymaster, 2004; Ekiz and Altine, 2006) despite differences in the breeds involved. Contrary to our findings, Farid *et al.* (1977) reported that the breed of sire was not significant for birth weight and weaning weight of three fat-tailed breeds. However, breeds studied by Farid *et al.*

Table 4. Least-squares mean (SE) for live animal fat-tail measurements by breed and breed cross.

	Fat-tail measurements (cm)			
	FTC[a]	FTT[b]	FTL[c]	FTW[d]
Breed cross	**	*	**	**
K×K	23.0 ± 0.6^{a}	1.81 ± 0.05^{a}	30.1 ± 0.89^{b}	17.4 ± 0.67^{ab}
A×K	22.0 ± 0.7^{ab}	1.77 ± 0.07^{ab}	28.1 ± 0.98^{c}	16.0 ± 0.82^{bc}
C×K	21.0 ± 0.6^{b}	1.70 ± 0.05^{b}	27.0 ± 0.92^{c}	16.0 ± 0.74^{c}
S×K	23.0 ± 0.7^{ab}	$1.79 \pm 0.0)^{ab}$	34.5 ± 0.95^{a}	18.1 ± 0.79^{a}
Overall	22.7 ± 0.3	1.78 ± 0.04	30.0 ± 0.53	16.8 ± 0.41

[a] Fat-tail circumference; [b] Fat-tail thickness; [c] Fat-tail length, [d] Fat-tail width.
* and **; Breed effect is significant at *P*< 0.05 and *P*< 0.01, respectively.
Means with different superscripts in each column differ (P< 0.05).

Table 5. Least-squares mean (S.E.) for reproductive traits of Kurdi ewes exposed to four ram breeds.

Trait	Overall	Ram breed				F-test[#]
		Kurdi	Afshari	Chaal	Sanjabi	
Prolificacy	1.0 ± 0.12	1.1 ± 0.21	1.0 ± 0.23	1.0 ± 0.20	1.0 ± 0.20	N.S.
NLBJ[a]	1.0 ± 0.19	1.0 ± 0.35	1.0 ± 0.32	1.0 ± 0.33	1.0 ± 0.34	N.S.
LWBEL[b]	4.5 ± 0.15	4.4 ± 0.17[b]	4.4 ± 0.20[b]	4.8 ± 0.18[a]	4.3 ± 0.21[b]	*
LWBEE[c]	4.2 ± 0.17	4.1 ± 0.20[b]	4.0 ± 0.21[b]	4.6 ± 0.20[a]	3.9 ± 0.23[b]	**
LWEL[d]	1.0 ± 0.21	1.0 ± 0.29	1.0 ± 0.32	1.0 ± 0.31	1.0 ± 0.30	N.S.
Fecundity	1.0 ± 0.29	0.9 ± 0.39	0.9 ± 0.41	0.9 ± 0.37	0.9 ± 0.40	N.S.
LWWEL[e]	23.3 ± 0.98	22.0 ± 1.11[b]	23.4 ± 1.14[b]	25.70 ± 1.12[a]	23.1 ± 1.18[b]	**
LWWEE[f]	20.8 ± 1.04	19.4 ±1.21[b]	20.8 ± 1.23[ab]	22.7 ± 1.20[a]	20.1 ± 1.27[b]	*

[a] Number of lambs born per ewe joined; [b] Ewe productivity per ewe lambed; [c] Ewe productivity per ewe exposed; [d] Litter size at weaning per ewe lambing; [e] Total litter weight at weaning per ewe lambing; [f] Total litter weight at weaning per ewe exposed.
N. S. $P > 0.05$; * $P < 0.05$ and ** $P < 0.01$, respectively.
Means with different superscripts in each row differ (P< 0.05).

(1977) were not included in the present study, reflecting the fact that the influence of crossbreeding may depend on the breed involved and the environmental conditions.

Post weaning weights of all crossbred lambs were similar and significantly higher than that of the purebred Kurdi lambs. Farid *et al.* (1977) also reported that market weight (weight at 175 day) of pure- and crossbred fat-tailed lambs was not affected by breed of the sire.

Lambs sired by Afshari rams had a significantly lower GFW than those of Kurdi, Chaal, and Sanjabi sired lambs, which were similar. The same trend was observed for GFW/LW among breed and breed crosses which is in agreement with Farid and Makarechian (1978).

Prolificacy and fecundity were not significantly affected by the breed of ram, indicating that the mentioned traits are the characteristics of the ewe. Boujenane *et al.* (1998) and Kiyanzad (2002) revealed that the breed of ram had no significant influence on litter size at birth, which is in agreement with our results. In contrast, El Fadili *et al.* (2000) and Freking *et al.* (2000) reported that the ram breed significantly influenced the litter size at birth and litter size at weaning.

Productivity traits of ewe, such as litter weight at weaning, are biologically and economically important characteristics of ewe (Freking *et al.*, 2000). However, the genotype of the lambs affects its weight. Therefore, the influence of ram breed was a significant source of variation for ewe productivity at birth and weaning or at lambing and mating. Kurdi ewes that mated with Chaal rams were more productive at birth. The results of the present study are in general agreement with those of Kiyanzad (2002). Consistent with the present findings, Freking *et al.* (2000) reported litter weaning weight per ewe lambed was significantly influenced by the ram breed, although the effect of ram breed on litter weaning weight per ewe joined was not significant. Also, Boujenane *et al.* (1998) reported that litters sired by meat type ram were heavier at weaning than litters sired by local breeds, suggesting the advantageous effect of crossbreeding on litter weaning weight. Significant effect of ram breeds on weaning weight of lambs sired by different ram breeds was also reported by El Fadili *et al.* (2000).

It has been shown that fat-tail weight is highly correlated with external measurements of the tail (Zamiri and Izadifard, 1997; Ermias and Rege, 2003) and many live animal tail measurements are moderately heritable (Vatankhah and Talebi, 2008) and genetically are correlated with weight of tail and rump fat (Ermias and Rege, 2003). The ability to build up energy reserves as body fat for use during the times of stress is perhaps the most important adaptation associated with overall productivity of the ewes and selection in favour of fat deposition may be considered a breeding objective aimed at reducing animal losses during 'unfavorable' periods (Ermias and Rege, 2003). Zamiri and Izadifard (1997) pointed out that large fat-tail may interfere with mating, especially in young rams, and may decrease fertility. The crossbred lambs sired by Chaal breed had lower fat-tail dimensions, hence lower fat-tail weight when compared with the other genetic groups. Thus, Chaal breed as terminal sire breed would improve productivity of Kurdi ewes and optimize lamb fat-tail weight without negative impact on wool production of the lambs under pastoral extensive grazing system.

CONCLUSIONS

Performance of crossbred lambs, specially those sired by Chaal rams, exceeded that of the Kurdi lambs. It is concluded that Chaal breed could be an appropriate breed for terminal sire crossbreeding to improve both Kurdi ewe productivity and early lamb growth under pastoral extensive grazing system. Further investigation of fattening performance and carcass quality of crossbred lambs sired by Chaal breed is necessary.

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REFERENCES

1. Boujenane, I., Berrada, D., Mihi, S.and Jamai, M. 1998. Reproductive Performance of Ewes and Preweaning Growth of Lambs from Three Native Moroccan Breeds Mated to Rams from Moroccan and Improved Breeds. *Small Rumin. Res.*, **27**: 203-208.
2. Doloksaribu, M., Gatenby, R. M., Subandriyo, and Bradford, G. E. 2000. Comparison of Sumatra Sheep and Hair Sheep Crossbreds. III. Reproductive Performance of F_2 Ewes and Weights of Lambs. *Small Rumin. Res.,* **38**: 115-121.
3. Ekiz, B. and Altine, A. 2006. The Growth and Survival Characteristics of Lambs Produced by Commercial Crossbreeding Kivircik Ewes with F_2 Rams with the German Black-headed Mutton Genotypes. *Turk. J. Vet. Anim. Sci.*, **30**: 507-512.
4. El Fadili, M., Michaux, C., Detilleux, J. and Leroy, P. L. 2000. Comparison of Five Crossbreeding Types Involving Timahdit, d' Man and Improved Terminal Sire Breeds of Sheep: Ewe Reproduction, Lamb Survival and Growth Performance. *Anim. Sci.*, **71**: 435-441.
5. Ermias, E. and Rege, J. E. O. 2003. Characteristics of Live Animal Allometric Measurements Associated with Body Fat in Fat-tailed Sheep. *Livest. Prod. Sci.*, **81**: 271–281.
6. Farid, A. and Makarechian, M. 1978. Crossbreeding of Iranian Fat-tailed Sheep. IV. Wool Production of Karakul, Mehraban, Naeini and Their Reciprocal Crosses at Six and Fifteen Months of Age. *Iran. J. Agric. Res.*, **6**: 49-59.
7. Farid, A., Makarechian, M. and Sefidbakht, N. 1977. Crossbreeding of Iranian Fat-tailed Sheep: Lamb Performance of Karakul, Mehraban and Naeini Breeds. *J. Anim. Sci.,* **44**: 542-548.
8. Freking, B. A. and Leymaster, K. A. 2004. Evaluation of Dorset, Finnsheep, Romanov, Texel, and Montadale Breeds of Sheep. IV. Survival, Growth, and Carcass Traits of F1 Lambs. *J. Anim. Sci.,* **82**: 3144-3153.
9. Freking, B. A., Leymaster, K. A. and Young, L. D. 2000. Evaluation of Dorset, Finnsheep, Romanov, Texel, and Montadale

Breeds of Sheep. I. Effects of Ram Breed on Productivity of Ewes of Two Crossbred Populations. *J. Anim. Sci.*, **78**: 1422-1429.
10. Hassen, Y., Solkner, J. and Fuerst-Waltl, B. 2004. Body Weight of Awassi and Indigenous Ethiopian Sheep and Their Crosses. *Small Rumin. Res.*, **55**: 51-56.
11. Kashan, N. E. J., Manafi Azar, G. H., Afzalzadeh, A. and Salehi, A. 2005. Growth Performance and Carcass Quality of Fattening Lambs From Fat-tailed and Tailed Sheep Breeds. *Small Rumin. Res.,* **60**: 267–271.
12. Kiyanzad, M. R. 2002. Crossbreeding of Three Iranian Sheep Breeds with Respect to Reproductive, Growth and Carcass Characteristics. Ph.D. Thesis, University of Putra, Malaysia.
13. SAS Institute, I. 1999. *Sas Procedure Guide*. Version 8.0, Cary, NC, USA.
14. Van Wyk, J. B., Fair, M. D. and Cloete, S. W. P. 2003. Revised Models and Genetic Parameter Estimates for Production and Reproduction Traits in Elsenburg Dormer Sheep Stud. *S. Afr. J. Anim. Sci.*, **33**: 213-222.
15. Vatankhah, M. and Talebi, M. A. 2008. Genetic Parameters of Body Weight and Fat-tail Measurements in Lambs. *Small Rumin. Res.,* **75** 1–6.
16. Zamiri, M. J. and Izadifard, J. 1997. Relationships of Fat-tail Weight with Fat-tail Measurements and Carcass Characteristics of Mehraban and Ghezel Rams. *Small Rumin. Res.*, **26**: 261-266.

اثرات نژاد قوچ بر عملکرد رشد بره های آمیخته از میش های نژاد کردی در شرایط پرورش سنتی

ع. ک. اسماعیلی زاده، س. ر. میرائی آشتیانی، م. س. مختاری و م. اسدی فوزی

چکیده

یک آزمایش آمیخته گری با استفاده از چهار نژاد گوسفند بومی ایران شامل نژادهای کردی، شال، افشاری و سنجابی با هدف تعیین اثر نژاد قوچ بر بازدهی میش های خالص نژاد کردی تحت شرایط پرورش سنتی انجام شد. تعداد ۴۷۵ راس میش نژاد کردی با ۲۴ راس قوچ از چهار نژاد فوق آمیزش داده شدند و تعداد ۴۵۴ راس بره تولید شد. نژاد قوچ اثر معنی داری بر صفات رشد اولیه بره ها داشت. وزن تولد و وزن شیرگیری بره های حاصل از قوچ های نژاد شال بطور معنی داری بیشتر از سایر گروهها بود. وزن در سن ۱۶۰ روزگی هر سه گروه بره های آمیخته بیشتر از گروه خالص کردی بود ($P < ۰/۰۵$) اما بین گروه های آمیخته از لحاظ وزن در سن ۱۶۰ روزگی تفاوتی مشاهده نشد. وزن پشم تولیدی بره ها در اولین پشم چینی و وزن پشم تولیدی به ازاء هر کیلوگرم وزن بدن تحت تاثیر نژاد قوچ بود ($P < ۰/۰۵$). نژاد قوچ بطور معنی داری محیط دنبه، طول دنبه، عرض دنبه و ضخامت دنبه را تحت تاثیر قرار داد. تعداد بره های متولد شده و تعداد بره های شیرگیری شده به ازاء هر میش زایمان کرده یا میش جفتگیری کرده تحت تاثیر نژاد قوچ نبود، اما اثر نژاد قوچ بر وزن کل بره های متولد شده و شیرگیری شده به ازاء هر میش زایمان کرده یا هر میش جفتگیری کرده معنی دار بود ($P < ۰/۰۵$). میش های آمیزش کرده با نژاد شال نسبت به میش های آمیزش کرده با سایر نژادهای قوچ عملکرد بهتری داشتند.