A study of pelt and growth traits in Zandi sheep

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ABSTRACT

To determine the genetic and phenotypic correlations between pelt and growth traits, 3632 records of growth traits and 1123 records of pelt traits, from Zandi sheep at the breeding centre of Khojir were studied. Growth traits included birth and weaning weight, 6 months weight and average daily gain for 0-3 and 3-6 months of age. Pelt traits included curl type, pattern and lustre. Data were analysed using an animal model through the DFREML package. Direct heritability estimates of birth weight, weaning weight, 6 months weight and average daily gain for 0-3 and 3-6 months of age were 0.35 (0.05), 0.15 (0.05), 0.17 (0.05), 0.14 (0.05) and 0.15 (0.05) respectively. Direct heritability estimates of curl type, pattern and lustre of pelt were 0.18 (0.08), 0.07 (0.04) and 0.36 (0.07) respectively. Genetic correlation between different growth traits were high and positive. Genetic correlation between curl type and growth traits was positive, while genetic correlation between lustre and pattern with growth traits were negative. As a result and with care of negative genetic correlation between pelt and growth traits, it is proposed that two selection lines should be established to have lambs with suitable weights and marketable pelts. In one line growth traits, and in another line, pelt traits must be set as a selection goals.

Key words: Zandi sheep; Pelt traits; Growth traits; Genetic parameters.

INTRODUCTION

Zandi sheep are a dual purpose breed (meat and pelt) that are kept in the central region of Iran. The origin of Zandi sheep can be traced to the Karakul sheep breeds of Shiraz. Karakul and Zandi sheep are similar in many ways, but the main resemblance between them is a beautiful pelt in the new born lambs. Since the price of meat relative to pelt value increased in recent years in Iran, breeders have tended to select for meat and improved growth traits. In contrast, pelt traits have declined in importance in Iran. Many studies have reported that the genetic correlation between pelt and growth traits is negative and maybe the genetic potential for pelt traits are lost because of recurrent selection for growth traits (Koshevoy, 1992; Trauer, 1993; Ashirov, 1994). Greef and Faure (1991) had reported a genetic correlation between curl type and lustre (-0.23) and curl type and pattern (-0.39) respectively. Schoeman and Albertin (1993) also reported the genetic correlation between curl type with lustre and pattern as -0.11 and -0.1.

Estimation of genetic and phenotypic correlations between pelt traits and growth traits are important and essential to plan breeding programs.

MATERIAL AND METHODS

In this study, 3632 records from 979 ewes and 94 rams for growth traits and 1123 records from 425 ewes and 37 rams for pelt traits, collected from the Zandi sheep breeding centre of Khojir were studied. Growth traits included birth weight, weaning weight, 6 months weight and average daily gain for 0-3 and 3-6 months of age. Pelt traits included curl type, pattern and lustre of pelt. Variance components were estimated by the restricted maximum likelihood (REML) procedure using derivative-free algorithm (DFREML) fitting two different, univariate and bivariate, animal model (Meyer, 1995). Convergence was considered to have been reached when the variance of function values in the Simplex and Powel were less than 10^{-8}.

RESULTS

Estimates of heritability and genetic and phenotypic correlations between pelt and growth traits are shown in Tables 1 and 2. Genetic correlations between different growth traits were high and positive in this study. Genetic correlation between curl type and growth traits was positive, while genetic correlation between lustre and pattern with growth traits were negative.

TABLE 1: Heritability estimates of pelt and growth traits.

Trait	Heritability
Birth weight	0.36 (0.05)
Weaning weight	0.15 (0.06)
6 months weight	0.17 (0.05)
ADG 0-3 months	0.14 (0.05)
ADG 3-6 months	0.15 (0.05)
Curl type	0.17 (0.08)
Lustr3	0.36 (0.07)
Pattern	0.07 (0.04)

ADG: average daily gain

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TABLE 2: Genetic and phenotypic correlations between pelt and growth traits .

Trait	Birth weight	Weaning weight	6 months weight	ADG 0-3 months	ADG 3-6 months	Curl type	Lustre	Pattern
Birth weight	1	0.74	0.78	0.53	0.43	0.34	-0.80	-0.57
Weaning weight	0.98	1	0.92	0.97	0.63	0.59	-0.80	-0.80
6 month weight	0.92	0.94	1	-	0.44	0.18	-0.12	-0.90
ADG 0-3 months	0.69	0.85	-	1	-	-	-	-
ADG 3-6 months	0.30	0.89	0.78	-	1	-	-	-
Curl type	-0.26	-0.41	0.17	-	-	1	-0.53	-0.49
Lustre	0.14	0.49	-0.13	-	-	0.03	1	0.64
Pattern	0.40	-0.27	-0.90	-	-	0.09	0.91	1

The values above the diagonal are genetic correlations and the values under the diagonal are phenotypic correlations.
ADG: average daily gain.

DISCUSSION

Heritability estimates of curl type, pattern and lustre were 0.177, 0.07 and 0.36 respectively. Heritability estimates for these traits in Karakul were 0.43, 0.34 and 0.45 Lourens and Erasmus (1998). In other research on Zandi sheep, Safdarian et al. (1995) reported heritability estimates for curl type and pattern as 0.19 and 0.35. The differences between heritability estimates might be due to different categorizations of pelt traits in these studies. For example, lustre and pattern were allocated to one of 3 scores while in the study on the Karakul these traits were allocated in 5 scores. The use of 5 scores instead of 3 for pattern and lustre, yield more accurate records for estimation of genetic trends (Trauer, 1993).

Direct heritability estimates of birth weight, weaning weight, 6 months weight and average daily gain for 0-3 and 3-6 months of age were 0.36 (0.05), 0.15 (0.05), 0.17 (0.05), 0.14 (0.05) and 0.15 (0.05) respectively. Heritability estimates of birth weight, weaning weight, 6 months weight and average daily gain for 0-3 months of age were 0.15, 0.18, 0.39 and 0.14 by Vanzyl et al. (1998). Kalantar & Khojastekey (2005) also reported these estimates in Zandi sheep for birth weight, weaning weight and 6 months weight 0.18, 0.31 and 0.18 respectively. Results indicate that growth traits had a high positive genetic correlation to each other, thus through the selection for one of the growth traits, others will be improved subsequently. The results of this study agree with reports of Kalantar & Khojastekey (2005) and Safdarian et al. (1995) in Zandi sheep. Genetic correlations between birth weight with weaning and 12 month weight were estimated as 0.77 and 0.22 by Vanzyl et al. (1998). Genetic correlations between curl type with lustre and pattern were -0.53 and -0.49 while between pattern and lustre were 0.64. Greef and Faure (1991) had reported genetic correlations between curl type with lustre and pattern as being -0.23 and -0.39 and between lustre and pattern 0.32 respectively. Thus, it is expected that, through increasing the mean of curl type in the population the mean of pattern and lustre will be decreased. As shown in Table 2, genetic correlation between all growth traits with curl type are positive, whereas the genetic correlation between growth traits with lustre and pattern are negative. For example, the genetic correlations between birth weight with curl type, pattern and lustre were 0.34, -0.57 and -0.8 respectively. Greef and Faure (1991) had estimated genetic correlations between birth weight with curl type, pattern and lustre as being 0.36, -0.72 and -0.18 respectively. Given these negative genetic correlations, it is expected that through the selection for growth traits, the mean of curl type will be increased and in contrast the mean of pattern and lustre will be decreased in the population. As a mentioned above, the preservation of genetic potential in Zandi sheep for growth and pelt traits is very important and both pelt and growth traits, must be included in the breeding goal. Due to the negative genetic correlation between pelt and growth traits, it is proposed that two selection lines should be established to have lambs with suitable weights and marketable pelts. In one line growth traits, and in the other line, pelt traits must be set as the selection goal. Also, it is proposed that, to develop more accurate estimates for genetic and phenotypic parameters the degree of scoring for lustre and pattern should use a five point scale.

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