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# The Effect of Bilateral Crossbreeding between Arkhamerino and Ghezel Sheep on the Quality of Wool of Their $F_1$ Crosses

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## ABSTRACT

In order to study the effect of bilateral crossbreeding between Arkhamerino (Ar) and Ghezel (G) sheep on the quality of wool produced by their $F_1$ crosses, 16 Arkhamerino×Ghezel (ArG) $F_1$ sheep and 53 Ghezel×Arkhamerino (GAr) $F_1$ sheep were sampled. Fiber Diameter (FD), Coefficient of variation of fiber diameter (CVf) and Staple Length (SL) were traits measured on wool samples. The variations between obtained data were analyzed for genotype, sex and birth type. The results showed that the FD was not affected by any of the factors in model. Genotype, had significant effect on CVf and SL ($p<0.01$) and the effect of sex on the SL was significant ($p<0.01$). Also twin $F_1$s produced longer staples than single crosses ($p<0.01$). Bilateral crossbreeding between Ar and Gh sheep did not make considerable changes in FD of wool produced by their F1 crossbreds but CVf and SL of wool have been influenced.

**Key words:** Crossbreeding, sheep, wool, fiber diameter, coefficient of fiber diameter, staple length

## INTRODUCTION

In developing countries, raising sheep and goat due to their good adaptation to the poor feeding conditions, has increased. This is why the sheep and goat raising is an important branch of domestic industry (Odabasogluo *et al*., 2009). As a result, the necessity of raising animals those have the potential for higher production to be felt. Crossbreeding programs are designed with the aim to increase livestock production capability through the use of genetic potential of breeds and heterosis effects from their crossbreds on important economic traits (Lupton *et al*., 2004). In sheep and goat, many crossbreeding experiments have been conducted that typically but not always are mainly focused on improving meat and lamb production. Since milk and wool production are known as a product of interest in sheep and goat, it is recommended that in crossbreeding programs factors such as wool production and quality, should be considered (Lupton *et al*., 2004). In the most of crossbreeding programs, having the highest hybrid vigor in $F_1$ crosses is very important. Also some traits may influenced by the breed of mother or sire of crosses (Pitchford, 1992). It seems that doing bilateral crossbreeding between parents may makes different hybrid vaguer in offspring.

In this study, the objective was to see if bilateral crossbreeding between parents affected the quality of wool of $F_1$ crosses and whether relocation parents, was able to create changes in wool traits.

## MATERIALS AND METHODS

**General experimental design:** This study was conducted in Agriculture Research Institute of Khalat Poushan (University of Tabriz, Iran) in 2002. Sheep raised under semi-intensive breeding system with the same management conditions. During the spring, summer and autumn sheep grazed in local pastures. During winter they were fed Barley grain as extra food. Tow flock of Arkhamerino and Ghezel sheep crossed.

Arkhamerino (Ar) is a fine wool breed that synthesized in Kurminitsky Research Institute of Kazakistan by crossing between Arkhar rames and Merino ewes. The fleece of this breed is a suitable material in textile industry.

Ghezel (G) is a native sheep from East Azebijan province of Iran that produces coarse and colorful wool but it is well adapted to the mountainous condition of this state.

**Wool measurements:** Wool samples collected from mid- side of 16 ArG $F_1$ sheep (Ar as maternal and G as paternal) and 53 GAr $F_1$ sheep (G as maternal and Ar as paternal) at 15 month age (Tabbaa *et al*., 2001). Samples sent to the Wool and Skin Research Laboratory (University of Tabriz) and 3 staples removed from random positions in each sample and measured using a standard method (ASTM, 1996). Mean values of SL calculated.

Subsequently samples washed. Clean samples were minicored to produce short pieces of fiber, approximately 2 mm in length by using wool microtum and measured for mean fiber diameter and SD (Lupton, 1995) using a Projection Microscope (BK2 4014, with power zoom of 300X) and a standard method (ASTM, 1989). For each sample CVf calculated (McGregor and Butler, 2009).

**Statistical analysis:** Data collected on $F_1$ crosses were analyzed using the fix model of variance procedure in SAS version 6.12 (SAS, 1989; Soltani, 1996). Statistical model used was:

$$Y_{ijkl} = \mu + A_i + S_j + T_k + e_{ijkl}$$

In this model $A_i$: effect of Genotype, $S_j$: effect of sex and $T_k$: effect of birth type.

## RESULTS AND DISCUSSION

In Table 1, the least square mean values of wool traits separated by factors in model are shown. ArG and GAr had same FD but GAr crosses produced longer staples with higher CVf. $F_1$'s had no significant difference in FD and CVf in both sexes but $F_1$ ewes had higher SL. Also single and twine crosses produced fibers with similar diameter despite singles produced longer fibers.

Table 1: Least square mean values of wool traits separated by the factors in model

| Factors | FD (Mm) | CVf (%) | SL (cm) |
|---|---|---|---|
| **Genotype** | | | |
| ArG | 26.85±1.09 | 28.04±2.45** | 7.91±1.16** |
| GAr | 26.42±0.55 | 37.02±1.09 | 12.22±0.49 |
| **Sex** | | | |
| Male | 25.77±0.83 | 30.92±1.88 | 9.36±1.02** |
| Female | 27.50±0.84 | 34.15±1.67 | 12.77±0.59 |
| **Type of birth** | | | |
| Single | 26.48±0.66 | 32.32±1.25 | 11.67±0.48** |
| Twine | 26.79±1.04 | 32.75±2.37 | 8.47±1.22 |

**Significant probability at 0.01

**Genotype:** Genotype had no effect on FD of fibers produced by two crossbred groups. Taherpour *et al.* (2000) in comparison of wool of Iranian and Saffulk $F_1$ crossbreds and Brash *et al.* (1994) in their evaluation of direct and maternal genetic effects on wool quality, reported that genotype had no effect on FD. Sidwel *et al.* (1971) showed that FD did not influenced by genotype but Lupton *et al.* (2004) compared wool of Dorset, Finnsheep, Romanov, Texel and Montadal crossbreds and indicated the effect of genotype on FD. Chougulae *et al.* (1988) reported that genotype significantly affected FD in Deccani, Merino and Dorset crossbreds. Also they indicated Merino×Deccani crossbreds had finner wool than Deccani×Dorset sheep. Ganai and Pandey (1993) in their experiment, crossbreeding between Rambouillet and Australian Merino with Indian breeds, showed that FD influenced by genotype and Merino crossbreds had lower FD. Odabasogluo *et al.* (2009) suggested that genotype had effect on FD of Angora goat×Colored Mohair goat $F_1$ kids.

Cvf influenced by genotype ($p<0.01$) and ArG crossbreds produced fibers with lower CVf. Sidwel *et al.* (1971) crossed some pure English breeds and showed that genotype significantly affected CVf in F1 crosses.

Sl differed between tow $F_1$ groups ($p<0.01$) and ArG sheep had longer SL. Chougulae *et al.* (1988) indicated that Deccani× Merino F1 crosses had longer SL than Deccani×Dorset. Ganai and Pandey (1993) and Lupton *et al.* (2004) reported that genotype had effect on SL.

**Sex:** Sex had significant effect on SL ($p<0.01$) and $F_1$ ewes had longer staples.

Kahyayi (2001) in his estimation of genetic and phenotypic parameters of Moghani sheep and Tabbaa *et al.* (2001) in evaluation of fleece characteristics of Awassi sheep, reported same results but Odabasogluo *et al.* (2009) and Taherpour and Salehi (2000) indicated no effect of sex on SL.

**Birth type:** Birth type affected SL ($p<0.01$) and single $F_1$ crosses had longer staples. Aimone *et al.* (1999) measured shorter SL in Merino×Rambouillet single $F_1$ crosses. Sidwel *et al.* (1971) and Ganai and Pandey (1993) showed that birth type had no effect on FD.

## CONCLUSION

As a general conclusion, it seems that bilateral crossbreeding between Arkhamerino and Ghezel sheep did not make considerable changes in FD of wool produced by their F1 crossbreds, but CVf and SL of tow crossbred groups influenced.

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