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THE EFFECTS OF NORTH AMERICAN AND SOUTH AFRICAN GENOTYPES ON TURKISH ANGORA GOATS

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Summary: Angora goats have developed their characteristics around Ankara which was used to be known as "Angora". Angora goats are being bred for the production of mohair. Although its origin is Anatolia (Ankara) the production characteristics of Angora goats in other countries, particularly in North American (Texan) and South African are higher than Turkish Angora goats. Studies are being carried out since 1982 in Anadolu (Cifteler) State Farm to improve the production characteristics of Turkish Angora goats. The aim of the study here is to investigate the effects of firstly North American and then South African genotypes separately on Turkish Angora goats. In the statistical analyses of data general linear models (GLM) procedure was used.

The use of North American genotype provided an evident improvement in the production and quality of mohair but not in the body improvement and live-weight of the animals in this population. Similarly, South African genotype had an improvement effect on mohair production but not on live-weight in the crossbred generation.

As a result, it was determined that to improve the production characteristics of Turkish Angora goats, besides using the advantages of North American and South African genotypes, more emphasis should be given on the selection and culling procedures, two shearings per year should be applied and husbandry and feeding practices should be improved.

Keywords: Angora goat, crossbreeding, mohair.

Introduction

Angora goats have developed their characteristics around Ankara which was used to be known as "Angora" (8). Angora goats are being bred for the production of mohair. Although its origin is Anatolia (Ankara) the production characteristics of Angora goats in other countries, particularly in North American (Texan) and South African are higher than Turkish Angora goats (1, 10, 11, 12). Studies are being carried out since 1982 in Anadolu (Cifteler) State Farm to improve the production characteristics of Turkish Angora goats (3, 4, 6, 13). This study was carried out to investigate the effects of crossbreeding the North American and South African genotypes for improving the important yielding characteristics levels of Turkish Angora goat population.

Material and Method

The study was conducted at the Anadolu (Cifteler-Eskisehir) State Farm. While the pure breeding is continued in the herd, bucks imported from United States (Texas) and crossbreds born from inseminations using South African semen were used. Synthetically groups achieved by crossing those crossbreds among themselves were also established (3, 4, 6).

Primarily the North American and secondly the South African genotypes' effects were separately investigated. Body development of kids, mohair yield and characteristics, the body weight of does before insemination (autumn), body weights, some reproductive characteristics levels and effects of some environmental factors on these characteristics were investigated.

The following linear models were used in the statistical analysis of the investigated characteristics.

For kids : $Y_{ijklmno} = \mu + G_i + S_j + T_k + A_l + W_m + J_n + e_{ijklmno}$
For does : $Y_{ilno=} \mu + G_i + A_l + J_n + e_{ilno}$

The symbols in this model are;

$Y_{ijklmmno}$: Observed trait yield value of a random individual
μ : Expected mean
G_i : Effect of genotype (i=TT, TB_1, AmF_1, AmF_2, AmB_1, AfF_1)
S_j : Effect of sex (j: Male and female)
T_k : Effect of birth type (k: Single and twin)
A_l : Effect of age (l: 1, 2, 3, ... and 7)
W_m : Effect of birth week (m: April 1, ..., May 1)
J_n : Effect of year (n: 1984, ..., 1998)
$e_{ijklmno}$: Random error.

It was assumed that there was not any important interaction among the investigated factors, and the effect proportions of these factors were determined by "*least squares means*" method (5, 9). The statistical significance control of the differences among the mean values was done by "*Duncan-test*" (2). GLM procedure of SAS program was used for statistical analysis (7).

Results

The results determined for the characteristics investigated in the study are presented below in tables.

Table 1. The reproductive traits of Turkish and North American genotype Angora goats does and survival rates of kids.

Genotype	Does number at mating	Kidding		Twinning		Survival rates of kids (105. days)	
		n	*%*	*n*	*%*	*n*	*%*
TT	5086	4493	88.34[a]	371	8.26[a]	2394	98.6[b]
TB_1	63	53	84.12[b]	1	1.89[b]	645	98.4[b]
AmF_1	716	584	81.56[b]	19	3.25[b]	1235	98.6[b]
AmF_2	8	4	50.00[b]	-	-	133	100.0[a]
AmB_1	12	11	91.66[ab]	-	-	130	97.7[ab]
Total	5885	5145	87.43	391	7.60	4537	98.6
American							
-%25	8115	7159	88.22[a]	887	12.39[b]	6120	98.8[a]
%25-50	455	400	87.91[a]	49	12.25[b]	1408	98.9[a]
%50	1736	1486	85.60[a]	227	15.28[b]	1980	98.9[a]
%50-75	90	80	88.89[a]	11	13.75[b]	262	98.5[a]
+%75	105	90	85.71[a]	20	22.22[a]	165	98.2[a]
Total	10501	9215	87.75	1194	12.95	9935	98.8

[a,b] : Differences between genotype groups with different superscripts are statistically significant (P<0.05).

Table 2. Body weight of Turkish and North American genotype Angora goat kids and does (kg)*.

Genotype	Birth			Weaning (105. days)			12 months			Does at mating		
	n	*Mean*	*S.E.*	*n*	*Mean*	*S.E.*	*n*	*Mean*	*S.E.*	*n*	*Mean*	*S.E.*
TT	2394	2.55^{b}	0.012	2357	15.32^{b}	0.073	1505	25.24^{a}	0.147	1502	36.73^{a}	0.119
TB_1	645	2.60^{a}	0.019	635	15.52^{ab}	0.114	391	25.09^{ab}	0.214	183	35.51^{bc}	0.308
AmF_1	1235	2.63^{a}	0.014	1217	15.59^{a}	0.087	737	24.58^{c}	0.174	940	35.15^{c}	0.126
AmF_2	133	2.63^{a}	0.035	133	15.27^{ab}	0.209	64	25.10^{abc}	0.430	33	36.28^{ab}	0.585
AmB_1	129	2.64^{a}	0.035	127	15.21^{ab}	0.210	71	24.36^{cb}	0.414	33	36.58^{ab}	0.583
Total	4536	2.61^{a}	0.005	4469	15.38	0.032	2768	24.87	0.059	2691	36.05	0.062
American												
-%25	6120	2.79^{b}	0.006	6048	16.62^{a}	0.047	2665	27.29^{a}	0.110	4065	38.04^{a}	0.116
%25-50	1408	2.86^{a}	0.016	1392	16.10^{b}	0.100	429	27.25^{a}	0.237	462	37.06^{ab}	0.326
%50	1980	2.83^{a}	0.010	1957	16.26^{b}	0.077	928	24.34^{b}	0.196	1768	36.69^{b}	0.182
%50-75	262	2.85^{a}	0.029	258	16.12^{b}	0.256	78	26.22^{ab}	0.558	101	38.28^{a}	0.674
+%75	165	2.86^{a}	0.033	162	16.04^{c}	0.221	79	27.34^{a}	0.546	103	37.26^{b}	0.652
Total	9935	2.81	0.003	9817	16.45	0.024	4189	26.61	0.062	6499	37.59	0.078

* : The values on the upper half of the table are LSMeans.
^{a,b,c} : Differences between genotype groups with different superscripts are statistically significant (P<0.05).

Table 3. Mohair yield and traits of Turkish and North American genotype Angora goat does*

Genotype	Mohair yield (kg)			Mohair traits				
				n	Length (cm)		Diameter (micron)	
	n	*Mean*	*S.E.*		*Mean*	*S.E.*	*Mean*	*S.E.*
TT	1662	1.18^{b}	0.014	965	15.25^{b}	0.094	23.88^{a}	0.106
TB_1	405	1.26^{b}	0.021	309	15.46^{ab}	0.131	23.83^{ab}	0.148
AmF_1	812	1.37^{a}	0.016	532	15.50^{a}	0.111	23.54^{b}	0.125
AmF_2	67	1.28^{b}	0.042	44	15.75^{ab}	0.285	23.39^{abc}	0.323
AmB_1	78	1.43^{a}	0.040	62	15.53^{ab}	0.248	22.99^{c}	0.281
Total	3024	1.30	0.005	1912	15.50	0.040	23.53	0.045
American								
-%25	2985	1.31^{c}	0.007	1274	15.30^{b}	0.272	23.87^{a}	0.415
%25-50	502	1.42^{b}	0.023	-	-	-	-	-
%50	1050	1.45^{b}	0.012	576	15.52^{a}	0.266	23.53^{a}	0.386
%50-75	90	1.48^{b}	0.558	-	-	-	-	-
+%75	87	1.59^{a}	0.049	62	15.53^{b}	0.248	22.99^{b}	0.281
Total	4714	1.36	0.003	1912	15.37	0.107	23.74	0.196

* : The values on the upper half of the table are LSMeans.
^{a,b,c} : Differences between genotype groups with different superscripts are statistically significant (P<0.05).

Table 4. Mohair yield and traits of Turkish and North American genotype Angora goat kids*

Genotype	Mohair yield (kg)			Mohair traits				
				n	Length (cm)		Diameter (micron)	
	n	*Mean*	*S.E.*		*Mean*	*S.E.*	*Mean*	*S.E.*
TT	1980	2.40^{d}	0.016	880	17.17^{b}	0.106	29.83^{a}	0.137
TB_1	266	2.59^{b}	0.039	164	17.67^{a}	0.212	29.60^{a}	0.274
AmF_1	1153	2.81^{a}	0.017	537	17.50^{a}	0.102	29.37^{b}	0.132
AmF_2	41	2.58^{bc}	0.080	23	18.02^{a}	0.412	28.33^{c}	0.532
AmB_1	57	2.74^{ac}	0.069	34	18.13^{a}	0.351	28.29^{c}	0.453
Total	3497	2.62	0.008	1638	17.70	0.062	29.08	0.088
American								
-%25	5668	2.53^{c}	0.015	1044	17.25^{b}	0.294	29.79^{a}	0.489
%25-50	762	2.50^{c}	0.038	-	-	-	-	-
%50	2320	2.92^{a}	0.028	560	17.52^{ab}	0.233	29.33^{ab}	0.366
%50-75	148	2.73^{b}	0.088	-	-	-	-	-
+%75	161	3.04^{a}	0.095	34	18.13^{a}	0.351	28.29^{c}	0.453
Total	9059	2.64	0.007	1638	17.36	0.115	29.60	0.242

* : The values on the upper half of the table are LSMeans.
^{a,b,c,d} : Differences between genotype groups with different superscripts are statistically significant (P<0.05).

Table 5. Reproductive traits of Turkish Angora goat does inseminated with South African frozen semen

Does at mating	Pregnancy		Kidding		Twinning	
	n	*%*	*n*	*%*	*n*	*%*
187	79	42.25	79	42.25	23	29.11

Table 6. Some traits of Turkish and South African crossbred Angoras (kg)

Traits	Genotype					
	TT			AfF_1		
	n	*Mean*	*S.E.*	*n*	*Mean*	*S.E.*
Kids						
Birth weight	389	2.76^{a}	0.024	102	2.72^{a}	0.044
Weaning weight	385	14.48^{b}	0.135	102	15.12^{a}	0.290
BW at 12 months	186	22.31^{a}	0.303	62	20.81^{b}	0.433
Mohair yield	186	1.14^{a}	0.025	62	1.15^{a}	0.045
Does						
BW at mating	323	35.73^{a}	0.349	85	35.47^{a}	0.700
Mohair yield	404	2.44^{b}	0.051	102	2.55^{a}	0.108

^{a,b}: Differences between genotype groups with different superscripts are statistically significant (P<0.05).

Discussion and Conclusion

The use of North American Angora goat breeders at the study in Anadolu State Farm caused a slight decrease in the body development and weight of the animals in that population. But a significant improvement in the fleece yield and quality was achieved. By these crosses, animals having various amounts of North American genotype yielded thinner fibered fleece in greater amounts. However, the findings specially the fleece yield and characteristics are at a lower level for the American Angora goat.

At the other stage of the study, at the crossbred generation of the South African genotype an increase was observed in the fleece yield at older ages with no difference in the live weight. This situation made it necessary to continue the studies to increase the South Africa genotype rate in the herd and relating the evaluation of the data to this. Meantime, it must be taken into consideration not to carry the abort problem in this study to the Turkish Angora goat population which have had never been encountered before.

Generally in order to reach the high mohair yield of other countries in Turkey, beside using the genotypes of Angora goat in other countries, selection must gain more importance. Also, sheering twice a year, improving environmental conditions and good management must all be provided. The high yielding breeder Angora goats in this herd could be delivered to breeders in abundance to improve the yields of other Angora goats and accomplish a more rapid development in mohair yield in the country.

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