Relationship of Face Cover with Productivity of Angora Does on Rangeland[1,2]

C.J. Lupton[3,4], P.V. Thompson[3], and F.A. Pfeiffer[3]

Summary

A small flock of Angora does and kids was maintained on rangeland in West Texas for three years while studying the relationship between mohair face cover and productivity of the adult females (two to seven years of age). Face cover score was negatively correlated with body weight and mohair production and positively correlated with clean yield. No other measured traits nor age were significantly correlated with face cover score. Since lower body weights have consistently been associated with decreased kid production in other studies conducted on rangeland, it is concluded that kid production would tend to decline as face cover increases.

Key Words: Angora goat, Mohair, Face cover

Introduction

In 1960, Shelton reported that goats with open faces had higher body weights and produced more kids than their partially and fully face-covered contemporaries. Face cover of Angora females did not influence lifetime mohair production. This conclusion was based on a 28-yr (1918 - 1946) data set collected from Angora does maintained at the Texas Agricultural Experiment Station research ranch in Sutton and Edwards counties. Shelton concluded that much, if not all, of the influence of face covering is through reduced vigor associated with impaired vision.

An open face is also recognized as an attribute by researchers (Waldron and Lupton, 1999) who conduct, and breeders who participate, in the annual Angora Goat Performance Test in which the Face Cover Score (FCS) is used to reduce the magnitude of the index calculated for ranking participating bucks. As a result of these studies, some considerable efforts have been expended over time throughout the U.S. and in the testing program to select Angora goats for reduced face cover.

In contrast, some breeders as well as some participants and judges in Angora goat shows view face cover as positive, believing that heavy mohair production on the goat's head is a prerequisite for a top show goat and stud prospect. Some also believe that breeding for less mohair on the head (i.e., reduced face cover) results in less mohair production at other locations on the body and point out that if it does become necessary, excess mohair on the head can easily be removed.

This dilemma in breeding goals of different segments of the Angora goat industry continues partly because the advantages of an open face are not always apparent in flocks that are either fed in pens or heavily supplemented on the range.

In September 1997, Mr. A.P. Leonards (Lake Charles, LA) donated 81 Angora goats of South African origin to the Texas Agricultural Experiment Station. These consisted of 28 males and 53 females constituting a small, but unique, genetic pool so far as the U.S. Angora goat population is concerned. Following culling, primarily for age, the flock currently (4/14/2000) consists of six mature billie goats, 55 mature nannies, 20 yearling females, and 34 kids.

Shortly after their arrival in San Angelo, it was observed that the face cover on many of these goats was greater than in

1 This article reports research conducted by the Texas Agricultural Experiment Station, The Texas A&M University System.

2 Financial support from the Cooperative State Research, Education, and Extension Service, U.S. Department of Agriculture under agreement number 99-34148-7417 is gratefully acknowledged.

3 Texas Agricultural Experiment Station, 7887 U.S. Highway 87 North, San Angelo, TX 76901-9714.

4 To whom correspondence should be addressed.

the Texas Angora goat population at large. It was suggested (Shelton, 1997) that one use of the flock would be to re-evaluate the influence of face cover on production traits, particularly since these goats were expected to produce considerably more mohair than those studied previously in the first half of the last century. Subsequently, an experiment was designed to quantify the influence of face cover on productivity of Angora does as measured by body size, kid, and mohair production.

Materials andMethods

A small flock of Angora does was maintained for three years on ranches in the Brady and San Angelo areas under control of the Texas Agricultural Experiment Station. Management may best be described as "easy care" with some supplementation provided during the winter months. The number of mature does ranged from 29 in Fall, 1997 to 53 in Spring, 2000 with ages ranging from 2 to 7 yr. The does were scored for face cover (FCS; 0 to 4, 0 = fully open...4 = closed), sheared, and weighed in August and February in each year of the study. Their pregnancy/kid status, was also recorded at these times (in Spring, 1= pregnant and 0 = open; in Fall, 1 = raised a kid, 0 = no kid raised). Shorn fleeces were individually weighed and analyzed for yield, fiber diameter, staple length, med, kemp, and total medullation. Correlation analyses (SAS, 1998) were used to calculate correlation coefficients between FCS and the other measured traits. The GLM and VARCOMP procedures of SAS (SAS, 1998) were used to establish the relative contributions of age, kid/ pregnancy status, body weight, FCS, and year on mohair production for the fall and spring shearings. For the VARCOMP analysis, FCS values were rounded to the nearest whole number and body weights to the nearest five pounds (13 categories, 40 to 100 lb in the fall analysis, 18 categories, 50 to 135 lb in the spring analysis).

Results and Discussion

The means and variability of all measured traits are summarized in Table 1. This flock is somewhat exceptional for its high yielding fleeces, low kemp content, and (unreported) ringlet style locks. The mohair produced by these does is not particularly fine, but is of adequate lock length containing low levels of medullated fibers. However, as stated earlier, several of the goats have more face cover than may be desirable in range situations.

Table 2 shows the correlation coefficients between FCS and production and quality traits and age. In addition, this table contains correlation coefficients for some of the same traits calculated for male Angora goats (~ 18 mo old) on a central performance test in a feed lot situation (Lewis and Shelton, 1985). Face cover score is significantly related to BW in a negative manner in both situations, these results also being in agreement with those in Shelton's 1960 report. Grease and clean fleece weights (GFW) of the South African does maintained on the range also tended to decrease with increasing face cover. In contrast, the opposite effect was observed with male Angoras in the feed lot indicating that in this latter situation where the food source was readily available (ad libitum), face cover was related to mohair production in a positive manner. Hence, the aforementioned dilemma in breeding goals of different industry segments. Shelton (1960) reported no significant effect of FCS on GFW. In the current study, when grease mohair production was expressed in terms of lb/unit of body weight (GMP), the relationship between GMP and FCS is not significant (P = 0.1657). Clean yield and FCS are positively and significantly (P = 0.0001) correlated for range animals whereas no significant relationship existed for goats in the feedlot. Certainly, yields in the feed lot tend to be uniformly lower than those produced in most range situations. The implication is that ranging goats with higher face cover score tend to produce higher yielding fleeces.

Again referring to Table 2, FCS is not correlated with age of goat, average fiber diameter, lock length, nor medullated fibers. The correlation between FCS and kemp for these does is not significant (P = 0.36) but it is, interestingly, a negative association similar to that observed for kemp score versus FCS for the goat test billies. Certainly, there is a perception in the industry that high face cover scores are associated with lower levels of kemp.

Using the GLM procedure of SAS and the model statement: grease fleece weight (GFW) = age pregnancy/kid sta-

Table 1. Simple statistics for production and quality traits of mature Angora females on rangeland.

	n	Mean	SD	CV	Min	Max
Bodyweight, lb	189	81.2	23.4	28.8	38.0	136.0
Grease fleece weight, lb[a]	189	4.7	1.5	31.8	1.6	10.6
Clean yield, %	136	84.7	5.7	6.8	63.5	95.9
Clean fleece weight, lb[a]	136	4.4	1.4	32.6	1.3	9.0
Average fiber diameter, µm	136	36.4	3.7	10.3	26.8	50.1
SD of fiber diameter, µm	136	9.8	1.7	16.9	6.7	14.8
CV of fiber diameter, %	136	26.9	3.2	11.9	20.7	35.0
Average lock length, in[a]	136	5.1	0.6	11.4	3.7	6.4
SD of lock length, in[a]	136	0.5	0.2	33.0	0.2	1.1
Med, %	136	0.68	0.79	116.5	0.06	7.20
Kemp, %	136	0.14	0.18	130.2	0	1.00
Total medullation, %	136	0.82	0.92	113.1	0.06	7.90
Face cover score, 0-4	189	2.57	0.86	33.5	0.83	3.93

[a]These values represent 6-mo growth.

Table 2. Phenotypic correlation coefficients between face cover score versus production and quality traits and age of Angora goats.

Trait	Range does		Performance test billies (Lewis and Shelton, 1985)	
	r	P	r	P
			Initial – 0.212	< 0.01
Bodyweight	– 0.3478	0.0001	Final – 0.292	< 0.01
Grease fleece weight	– 0.2346	0.0012	0.155	< 0.01
Grease mohair/unit body weight	0.1012	0.1657	—	—
Clean yield	0.4054	0.0001	0.063	> 0.05
Clean fleece weight	– 0.1916	0.0254	0.183	< 0.01
Average fiber diameter	0.0255	0.7687	– 0.053	> 0.05
Average lock length	0.0338	0.6963	0.057	> 0.05
Med	0.0315	0.7162	—	—
Kemp	– 0.0786	0.3629	(Score) – 0.213	< 0.01
Total medullation	0.0555	0.5209	—	—
Age	– 0.0113	0.8775	—	—

Table 3. Least squares means of grease fleece weight (lb) by face cover score and season.

FCS	Fall	Spring
1	4.55[a]	6.25[a]
2	4.29[a]	5.59[a,b]
3	3.79[b]	5.14[b]
4	3.62[b]	4.91[b]

[a,b] Within a column, means without a common superscript differ ($P < 0.05$).

Table 4. Proportion (%) of total variance in grease fleece weight due to age, body weight, face cover score, kid/pregnancy status, and year, by season.

	Fall	Spring
Age	3.8	10.3
Body weight	22.4	25.3
Face cover score	8.2	3.9
Kid/pregnancy status	3.8	1.8
Year	1.8	19.8
Error	60.0	38.9

tus FCS and year, it was shown that the only significant main effect on fall-shorn fleeces was FCS ($P = 0.04$). Least squares means of the grease fleece weights associated with each level of FCS are shown in Table 3. For spring-shorn fleeces, the effect of FCS was again significant ($P = 0.006$) as were the effects of age ($P = 0.02$) and year ($P = 0.0001$). The relative magnitudes of the spring and fall shorn fleeces (opposite of that which is normally observed for Angora goats) reflect the relatively mild winters and exceptionally harsh (hot and dry) summers experienced during the study period, particularly in 1999 and 2000.

When the data were re-analyzed using bodyweight (BW) as a covariate, BW was the only significant ($P = 0.005$) effect on GFW in the fall. For spring-shorn fleeces, BW ($P = 0.0001$), pregnancy status ($P = 0.02$) and year ($P = 0.03$) produced significant effects on GFW. Results of these two analyses are interpreted to mean that the effect of FCS on GFW is overshadowed by that of BW. The VARCOMP procedure of SAS was used to calculate the relative proportions of total variance in GFW attributable to the various effects. These are summarized in Table 4.

For fall-shorn fleeces, the proportion of the variance in GFW due to FCS is twice the magnitude of Spring. But both these values are relatively small compared to the contribution of BW that is consistently high in both seasons. It is concluded that BW has a much greater effect on mohair production than does face cover score. Since BW is also a well established indicator of kid production by Angora does (Shelton, 1961; Shelton and Groff, 1974), it is obvious that this trait should be given a high priority in any Angora goat selection scheme. Because of the negative correlations that exist between FCS and BW and mohair production, it would also appear to be advisable for breeders to select animals having FCS of 1 or 2. The GLM procedure of SAS was also used to calculate the effect of FCS on kid production. The trend in fall data (kid actually present with doe) was for increasing kid production (0.62 to 0.87) with decreasing FCS (4 to 1, respectively), but the differences attributable to FCS were not significant ($P > 0.09$). More kid production data need to be collected to clarify this situation.

Implications

Results to date indicate that higher face cover scores in these South African Angora does are associated with lower mohair production and lighter body weights when the does are maintained on native rangeland with minimal feed supplementation. Range operators are advised to avoid does having face cover scores 3 and 4. Progress in selecting for reduced face cover is expected to be relatively rapid since heritability of face covering is high (0.5 - 0.9; Shelton, 1960).

Literature Cited

Lewis, R. and M. Shelton. 1985. A review of four years work in Angora performance testing. Texas Agric. Exp. Sta. Res. Cen. Tech. Rep. No. 85-1.

SAS. 1996. SAS/STAT® User's Guide (Release 6.12). SAS Inst. Inc., Cary, NC.

Shelton, M.S. 1960. The relation of face covering to fleece weight, body weight, and kid production of Angora does. J. Anim. Sci. 19, 1:302-308.

Shelton, M.S. 1961. Factors affecting kid production of Angora does. Texas Agric. Exp. Sta. MP-496.

Shelton, M.S. 1997. Personal communication.

Shelton, M. and J.L. Groff. 1974. Reproductive efficiency in Angora goats. Texas Agric. Exp. Sta. B-1136.

Waldron, D.F. and C.J. Lupton. 1999. Angora goat performance test report. Texas Agric. Exp. Sta. Res. Cen. Tech. Rep. No. 99-3.