

CASH MIRROR

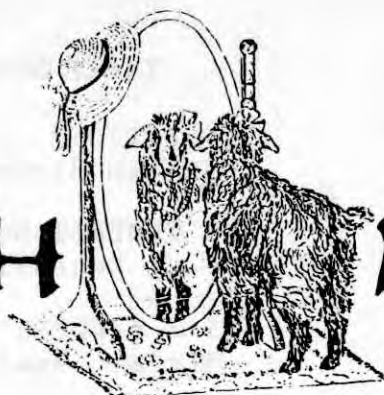


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CASH MIRROR



REFLECTING THE CASHMERE INDUSTRY

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Judith Richardson, Publisher
Wendy Paulin, Editor
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COVER PHOTO: Champagne Cashmere's Champagne Spirit born 10/31/89. Photo taken and contributed by Lisa Faulkner.

REFLECTIONS

As this Cashmere industry evolves it will be interesting to see what differences develop between the United States and Australian goat keeping. It's time to shear - that's what some of my goats tell me as I find chunks of fleece on mangers and fences. On the other hand we've had our worst winter weather this past week with gusting winds and 18" of snow. Our snow is not the dry fluffy snow of the Rockies but the wet heavy snow of a maritime climate. Because of the dampness my goats exhibit cold at 35 degrees. At 20 degrees when the air is dry they are enjoying themselves. We've always said it's a red letter day when the mud is frozen.

We currently run about 150 imports and some of them are hanging on tight to their fleece with no indication that they will ever let it go. Some shed off early December and have now grown a totally new fleece and some are just now releasing fleece.

Some breeders in the colder areas of the U.S. seem to be doing O.K. with just small three sided sheds for their goats. But in our wet maritime climate we would lose our goats. Goats tolerate heat and cold very well - as long as it's dry. They do not do well in wet areas, especially cold wet areas. Therefore we go to tremendous expense and labor to keep our goats hale and hearty. We have a 100' x 60' barn for them with lots of sliding doors that can be opened and closed depending on the winds. It means putting in shavings and straw for bedding as the goats are literally barn bound for weeks on end with the rain. It means feeding hay in the barn when the grass is green and ankle deep even in the winter. It also means trimming feet on a continual basis as there is no rock to wear them down. We've tried rock and cement races exiting the barn but the goats soon track in enough mud to bury it. It means worming and delousing the goats every 2 to 3 months because parasites thrive. It means it is expensive and labor intensive!

Most of Australia has one method of goat keeping. Turn them out and it's "survival of the fittest". And while my emotions are such that I could not operate that way, intellectually, I approve of this method. It has put Australia and New Zealand at the top of the world sheep industry. But as you buy your Australian goats keep in mind that Australia is not the United States. The coldest (Southern) part of the Australian continent has a climate like Southern California and as you go north it becomes warmer. On the north east coast you have tropics and the vast area in the center is desert. Australia has it's own climate problems, it is not paradise. While the Australian method of survival of the fittest works for them, they haven't paid \$3000.00 for their goats! I would hate to see people spend thousands of dollars for goats and then lose them because they are trying to raise them "the Australian way". In the United States there will never be an "American Way" as our climate is too diverse. We must all raise our goats according to our own microcosm climate. It may differ from the farm over the hill or around the bend. It will certainly differ from the farm in the next state.

So if you've not raised goats before and are considering purchasing some cashmeres, I strongly suggest you talk with someone in your area who does. And I don't mean that hard scrabble run down farm with a half starved goat tied to a tree. I mean talk with someone who is successful with their goats. Find about and what kind of shelter is necessary in your area. And lets not forget that summer brings its problems too. Ask about raising goats in all seasons!.

Sincerely

Judith Richardson

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**THE INHERITANCE OF CASHMERE IN AUSTRALIAN GOATS
PART I-CHARACTERISTICS OF THE BASE POPULATION
AND THE EFFECTS OF ENVIRONMENTAL FACTORS**

by B.J. Restall and W.A. Pattie

ABSTRACT

Restall, B.J. and Pattie, W.A., 1989. The inheritance of cashmere in Australian goats. 1. Characteristics of the base population and the effects of environmental factors. *Livest. Prod. Sci.*, 21:157-172.

Fleece, liveweight and skin follicle data are presented for 1150 unselected feral female goats mated over a period of four years (1981-1983) to 45 unselected male goats, and 1169 of their offspring. Liveweight, down weight, down diameter, length, primary and secondary follicle density and S/P ratio of female adults were 29.4 kg, 53 g, 15.4 mm, 2.37mm², 14.62 mm⁻² and 6.17, respectively. The adult males were heavier and had greater down production but follicle densities were lower. Between-animal coefficients of variation ranged from 20 to 65% with the exception of down diameter for which the coefficient was less than 10%. Pregnancy reduced down production by 30%, lactation reduced it by 48% and together they reduced it by 65%.

Female progeny of the foundation adults averaged 24.7 kg liveweight, 75g down 15.5 mm down diameter, 62.2 mm down length, 3.42 primary follicles mm⁻², 23.4 secondary follicles mm⁻² and 6.81 S/P ratio, respectively. Males were 14% heavier than females while down weight and length were slightly, but not significantly, greater. There was no difference between the sexes in down diameter.

Differences caused by birth type and age were greatest in their first year. Single-born animals averaged 6.3% heavier than twins and grew 6.6% more down which was longer and coarser (16.3 and 20.6% respectively). Age differences were significant for all parameters; in particular down diameter increased by 1.1 μ m from first to second fleece, 0.7 μ m from second to third fleece, and 0.4 μ m from third to fourth fleece. Differences in skin-follicle densities between sex, birth type and age groups reflected differences in liveweight.

INTRODUCTION

Goats may have been introduced to mainland Australia as early as the 16th century, but substantial numbers were not imported until after European settlement. During the 19th century various societies and individuals

introduced Angora, dairy and cashmere goats, many of which were released or escaped following the development of large sheep and cattle populations. These goats formed large feral herds in the semi-arid areas and are now, after a long period of natural selection a valuable genetic resource.

The growth of down on Australian feral goats was first reported by Smith et al.(1973). Since then, substantial numbers of these goats have been redomesticated in mixed grazing enterprises and used for the control of woody weeds, production of meat and cashmere, and for foundation stock in Angora upgrading programmes. These developments have led to a demand for appropriate methods of management and breeding (Restall and Mitchell, 1986).

The world demand for cashmere is strong and the development of processing facilities in China has restricted supplies of raw cashmere for the traditional processors. These factors have led to an interest in alternative supplies and because of its feral goat population, Australia is a potential source of raw cashmere for the world trade.

The components of the feral goat fleece are very variable although some characteristics have high repeatabilities (Holst et al., 1982a; Restall, 1982; Couchman and McGregor, 1983; Pattie et al., 1984). However, apart from preliminary reports from the project described here (Restall et al., 1985; Pattie and Restall, 1985), no systematic studies of the genetic basis of production among these animals have been reported.

Since 1980, we have conducted a large scale breeding project with the objectives of determining the inheritance of cashmere production, growth and reproduction of domesticated feral goats. This has involved sampling the feral population to establish a foundation herd, determining genetic and phenotypic parameters and establishing selection lines. In this paper, the foundation herd and management systems will be

described and analyses of environmental factors affecting cashmere production will be presented. Subsequent papers will present the result of genetic analyses and selection responses.

METHODS

Location

The project was carried out at the North Coast Agricultural Institute, Wollongar, in north-eastern New South Wales, a humid subtropical environment (29 degrees South, 154 degrees East) with a mean annual rainfall of 1678 mm, showing summer dominance (65% between November and April). The mean maximum and minimum temperatures for the hottest month (January) are 26.4 and 18.5C and for the coldest month (July) are 17.6 and 8.9 degrees C.

Stock were grazed at the Pearces creek Sub-Station, situated on the Alstonville plateau (altitude 150 m) in an area of volcanic red kransozem soil (pH4) that has been heavily leached since the removal of the original

rainforest. An area of approximately 170 ha of predominantly kikuyu pasture (*pennisetum clandestinum*) with some white clover (*Trifolium repens*), green panic (*Panicum maximum* var. *trichoglume* cv. "Gatton") and carpet grass (*Anonpus affinus*) was available for the stock

Base population

Female goats were obtained from feral herds mustered in the Cobar-Bourke area of western New South Wales (NSW); no selection was exercised except for the absence of skeletal deformities and extreme age. Male goats were also obtained from mustered feral stock or purchased from goat breeders, providing that the breeder had obtained the base stock from the western area of NSW and had not closed the herd for more than two years. The purchased males (referred to as 'domestic') were thus the offspring of mustered feral goats. The males used in the project represented the range of types available to goat breeders. Table 1 shows the numbers of goats obtained and the year of introduction.

TABLE 1

Base population of Australian goats: origin and year of introduction

Year	Sex	Type	Number	Area of origin
1980	F	Feral	800	Cobar
	M	Domestic	23	Western NSW
1982	F	Feral	150	Bourke
	M	Domestic	6	Cobar
	M	Feral	10	Wanaaring
1983	F	Feral	200	Cobar
	M	Feral	10	Cobar

TABLE 2

Numbers of animals joined each year

Date of joining	Does			Bucks		
	No.	Type	Origin	No.	Type	Origin
Aug. 1981	560	Feral	Cobar	18	Domestic	
Apr. 1982	617	Feral	Cobar	17	Domestic	
Apr. 1983	354	Feral	Cobar	10	Feral	Wanaaring
	131	Feral	Bourke	4	Domestic	
Apr. 1984	176	Feral	Cobar	14	Feral	Cobar
	123	Feral	Bourke	9	Domestic	
	179	Feral	Cobar			

Management

The goats were grazed on available pasture but pregnant and growing stock were fed supplements of oat grain and good quality lucerne or pasture hay to maintain body weight at times of declining pasture quality. All animals were drenched with anthelmintics at intervals of approximately two months to control internal parasites; feet were trimmed three times a year and regular footbathing in formalin was carried out during wet weather or when animals were mustered frequently for experimental purposes. Kids were injected with sulphamethazine at one month of age and at weaning to prevent coccidiosis.

The first group of goats was joined in August/September 1981; from 1982 onward the breeding herd was joined in April of each year. The numbers of animals and their origin for each joining are shown in Table 2. The males listed for each mating include those used for two joinings, with progeny being obtained from 45 different sires.

Sires and dams were randomly mated by artificial insemination, and pregnancy status and number of fetuses determined by real time ultrasonic scanning (Fowler and Wilkins, 1982) at around 60 days of gestation. Twin bearing does kidded in individual pens to facilitate the identification of dam and offspring, and single-bearing does kidded in small groups under close supervision. Does and kids were penned for a maximum of three days before being grouped together in large paddocks. All kids were weighed and tagged at birth and birth type (single or twin) and sex recorded. Kids were weaned at approximately four months of age.

Measurements

All animals were weighed at birth, weaning, shearing and before mating and kidding. At weaning a physical description of each animal was recorded together with various skeletal measurements.

Prior to shearing, in each year since 1983, the length of down was measured on the neck, midside and hip of each animal. On each site the fleece was parted and the end of short rule was placed on the skin. The length of the longest unstretched down fibers was recorded and the average of the three measures used as an index of down length.

Skin biopsies were taken from the midside of all adult animals after their introduction and

from all offspring in May of each year using the procedure described by Carter and Clarke (1957). The skin samples were processed, sectioned and measured according to Parry (1987), and the density of primary and secondary follicles and their ratio recorded.

In July of each year, all goats were shorn with each fleece being identified and bagged separately. Subsamples drawn from whole fleeces of animals shorn in 1981 and 1982 were measured at the Research and Development Center of Dawson International at Selkirk, Scotland. These subsamples were dehaired and yield of down (percentage of down by weight in sample) recorded. The diameters of 100 fibers were measured using a projection microscope and fibre length was measured using the 'fibre draw' method used for tops. Fleece sub-samples from subsequent shearings were sent to the Australian Wool Testing Authority where yield was determined by separating down from guard hair with a Shirley Analyzer and the diameters of 1000 fibers measured with a Fibre Fineness Distribution Analyzer (Hopkins 1985).

STATISTICAL PROCEDURES

Foundation Stock

At the first shearing in 1981, some of the introduced does were pregnant or lactating. On the basis of kidding dates, the does were classified as pregnant or not, and lactating or not during the cashmere growing season. A fixed effects analysis of variance was then carried out to examine the effects of pregnancy and lactation on live weight and fleece-production characteristics. Differences between age groups were included in the analysis. The assessment of age was approximate, as judged by the number of permanent incisors, and the herd consisted of 1 and 2 year old animals, and animals more than 4 years of age. These groups were confounded with year of birth and were included in the analysis to remove their effects, not to estimate age differences. The model used was:

$$Y_{ijk} = \mu + P_i + L_j + (PL)_{ij} + A_k + e_{ijk}$$

where Y_{ijk} measurement on individual animal; μ =population mean; P_i =effect of pregnancy ($i=0,1$); L_j =effect of lactation ($j=0,1$); $(PL)_{ij}$ =pregnancy x lactation interaction A_k =effect of age group ($k=1,2,aged$); e_{ijk} error

At subsequent shearings, does were pregnant for less than two months of the cashmere growing season so the classifications of pregnancy and lactation status were not used in further analysis.

The liveweight and fleece production data collected from 1981 to 1984 were analyzed to provide estimates of overall means of variability in the foundation stock. For females, only data from non-pregnant and non-lactating animals were used for the 1981 measurements to be comparable with later years. Measurements were repeated in at least two years for many goats so a random effect for animals was fitted in addition to the fixed effect of age group using year-adjusted data. Phenotypic variances were estimated as the sum of between and within animal components of variance obtained from the mixed model analyses. The programme LSML76(Harvey, 1977) was used for these and subsequent analyses.

Only one set of measures of skin follicle populations was available for each female, so variances were estimated from the residual error of fixed analyses which removed age and year effects.

Progeny

A preliminary analysis showed that liveweight, fleece weight, down weight and length had small but significant regressions on age at first shearing. The regression coefficients with standard errors in brackets were: 0.088kg day⁻¹ (0.009), 0.748 g day⁻¹ ((0.177), 0.242 g day⁻¹ (0.048) and 0.088 mm day⁻¹ (0.048), respectively. For all subsequent analyses, the first shearing records for these characters were adjusted to the average age within years. Data from all progeny were then analyzed in two stages because of automatic confounding between year, age and individual animal effects. first a fixed model was used to estimate year effects; this included the effects of sex by type-of-birth subclass (sex/birth), age, year and interactions among them. There were no significant interactions so the data were reanalyzed with interactions omitted from the model. The estimated year effects were then used to adjust all data to a 1984 base. These adjusted data were analyzed using mixed-model least squares methods which included individual animals and fixed effects. The model was:

$$Y_{ijkl} = \mu + S_i + p_j (S_i) + A_k + (SA)_{ik} + e_{ijkl}$$

where Y_{ijkl} =individual year adjusted measurement; μ =population mean; S_i =effect of sex/birth subclass ($i=1-4$); $P_j(S_i)$ =random effect of progeny j within sex/birth; A_k =effect of age group ($k=1-4$ or 3); $(SA)_{ik}$ =sex/birth x age interaction; e_{ijkl} =error.

the sums of squares and degrees of freedom for age were partitioned into linear and non-linear components using orthogonal polynomials. Separate estimates of means and standard errors for sexes and type-of birth were calculated from linear combinations of appropriate sex/birth subclasses. The significance of these effects was tested against the progeny-within-subclass mean squares while differences between ages, and the interactions, were tested against the residual mean squares.

RESULTS

Characteristics of the foundation stock

The means and variances for all production measures on the foundation females are shown in Table 3 and those for males in Table 4.

There was considerable variation between animals for all production characters with the exception of down diameter, which was relatively fine with a low coefficient of variation. This small between-animal coefficient of variation contrasts with the coefficient of approximately 20% within fleeces.

The sires were heavier than the females, grew more down of greater diameter and have fewer secondary follicles. The variances of the characters were similar to those for females; the between-animal coefficient of variation for diameter is relatively low while that for down weight is high.

The results of the analysis of variance for pregnancy and lactation effects are given in Table 5 with least squares means for the various subclasses in Table 6.

Both pregnancy and lactation significantly reduced fleece weight, down weight and down length, but had no effect on the diameter of down. Yield was significantly reduced by lactation, but the apparent reduction owing to pregnancy was not significant. There was no significant interaction between pregnancy and lactation for the fleece parameters, however they appear to act multiplicatively as does that were both pregnant and lactating showed the reduction in down weight that would be

TABLE 3

Characteristics of female goats used in the breeding herd

Character	No. animals	No. records	Mean	SD
Liveweight (kg)	982	1887	29.4	6.09
Fleece weight (g)	1010	1794	294.0	98.78
Yield (%)	1101	1549	19.1	10.51
Down weight (g)	886	1088	53.0	34.21
Down diameter (μm)	895	1100	15.4	1.22
Down length (mm)	898	1194	51.4	32.66
Primary follicle density (mm^{-2})	844	844	2.37	0.49
Secondary follicle density (mm^{-2})	844	844	14.62	3.23
S/P ratio	844	844	6.17	1.11

TABLE 4

Characteristics of male goats used as sires in the breeding herd

Character	No animals	No. records	Mean	SD
Liveweight (kg)	47	96	38.3	8.89
Fleece weight (g)	45	111	500.3	583.61
Yield (%)	45	111	27.19	12.70
Down weight (g)	45	111	117.3	67.37
Down diameter (μm)	45	111	16.1	1.51
Down length (mm)	41	80	69.6	18.67
Primary follicle density (mm^{-2})	48	48	2.15	0.45
Secondary follicle density (mm^{-2})	48	48	12.52	2.74
S/P ratio	48	48	5.84	0.89

TABLE 5

Summary of analysis of pregnancy and lactation status. Figures presented are degrees of freedom and mean squares

	df	Live-weight	Fleece weight	Yield	Down weight	Diameter	Down length
Age	2	3668.70 ^a	262934 ^a	683.63 ^a	1332.2	14.072 ^a	557.6 ^c
Pregnancy	1	254.59 ^a	40905 ^c	90.30	3255.2 ^b	1.290	1067.5 ^b
Lactation	1	437.57 ^a	79276 ^b	498.47 ^b	9189.0 ^a	1.237	1614.0 ^a
Lactation $\times$ pregnancy	1	205.63 ^a	13781	154.76	244.2	1.899	73.7
Residual	450	19.44	12674	88.89	760.5	1.303	195.2

^a $P < 0.01$; ^b $P < 0.05$; ^c $P < 0.10$.

TABLE 6

Production characteristics for does in various reproductive states during the down growth period. Figures presented are least square means and standard errors

Parameter	Empty	Pregnant	Lactating	Pregnant + Lactating
No. of does	390	29	20	12
Month of kidding	Aug.	June	Dec.	April
Liveweight (kg)	24.3 (0.43)	31.2 (0.92)	22.9 (1.08)	23.3 (1.33)
Fleece weight (g)	260 (11.02)	241 (23.37)	224 (27.63)	152 (34.07)
Yield (%)	20.1 (0.92)	15.2 (1.96)	12.4 (2.31)	13.0 (2.85)
Down weight (g)	51.9 (2.70)	35.6 (5.73)	27.2 (6.77)	17.9 (8.35)
Down diameter (μm)	15.1 (1.37)	15.6 (0.24)	15.1 (0.28)	15.1 (0.35)
Down length (mm)	57.5 (1.37)	48.2 (2.90)	46.6 (3.43)	41.2 (4.23)

expected from the independent proportionate reductions of each effect acting sequentially. Liveweight varied significantly with the physiological state of the doe, as would be expected

Characteristics of the progeny

Analyses of variance for the production data and skin characteristics from progeny are given in Table 7. Least squares means for singles and twins at each age are given in Table 8, those for the two sexes at each age in Table 9 and the overall age means in Table 10.

Single-born progeny had a significant weight advantage at all measurement times; they also had more cashmere at first shearing than twins but the difference disappeared by four years of age. Diameter, secondary follicle density and S/P ratio were significantly larger for singles overall.

Male progeny were 14% heavier than females and grew significantly more fleece although both sexes grew similar amounts of cashmere. Primary and secondary follicle densities were significantly greater in females. Diameter of cashmere did not differ between males and females at any age.

The tables of age effects show that the progeny have relatively light body weights and continue to grow for at least four years. There were significant differences between ages in all characters, with down production and fibre dimensions increasing at each age. Diameter increased 1.1 mm from first to second fleece, 0.7 mm from second to third fleece with an additional 0.4 mm increase to the fourth fleece.

Discussion

The measurements of the foundation herd animals provide a comprehensive description of the Australian feral goats found in the Cobar-Bourke area of western NSW. The weights of these goats are in good agreement with those reported by Holst (1981) for feral goats mustered from Cobar (NSW) and Blackall (Qld) regions, and at an average of 30 kg the females would be considered to be among the smaller goat breeds (Mason, 1981). The progeny of these animals grow slowly in the sub-tropical environment at Wollongbar (Table 5) and show increases in body weight at least up to their fourth year. This slow growth contrasts markedly with growth rates observed in progeny from selected feral goats in central NSW (Holst et al., 1982b), where young female goats reached 20 kg by five months of age.

The reasons for these differences are not clear, but as the stock at both centers were obtained from the same area of NSW, the discrepancies are likely to be due to environmental differences, and in particular the difference in quality of available feed in the two environments. Domesticated feral goats at the Mt. Cotton research station (Qld) show similar growth patterns to those reported here (Ash, 1986).

The fleece characteristics of animals in the foundation herd show considerable between-animal variation with the exception of fibre diameter. Male goats were found to grow more cashmere than females which would in part be due to their larger size and their longer

TABLE 7

Summary of analysis of age, sex and type of birth effects on weight, fleece and skin characters. Figures presented are degrees of freedom and mean squares

Source	df	Live-weight	Fleece weight	Yield	Down weight	Diameter	Down length	df	Primary density	Secondary density	S/P ratio
Sex/birth ^d	3	629.67	153095	569.85	3791 ^b	3.579 ^b	1332.30 ^a	3	5.859	163.90	7.684
Animals within sex/birth	1165	17.41	9501	186.82	1703	1.533	405.62	1101	0.445	25.68	1.568
Age											
Linear	1	41824.00	306581	43.34 ^c	272939	565.690	5937.80	1	132.020	4351.50	15.041
Non-linear	2	766.74	154283	523.97	24596	15.314	1025.30	1	7.507	11.26 ^c	22.447
Age × sex/birth	8	64.46	40734	128.27	967.17 ^a	1.330	580.19	6	0.425 ^c	14.62 ^c	3.315
Residual	1053	6.28	1893	43.26	451.90	0.398	94.84	401	0.257	14.95	0.670

All significant $P < 0.01$ except: ^a $P < 0.05$, ^b $P < 0.10$, ^cNot significant. Significance levels for specific sex/birth contrasts: Singles-Twins, $P < 0.01$ for diameter, secondary density, S/P ratio. $P < 0.05$ for liveweight. All others not significant; Males-Females, $P < 0.01$ for liveweight, fleece weight. $P < 0.05$ for yield, length. All others not significant. ^dSex/birth tested against animals within sex/birth; all others against residual.

and thicker down. The prehistory of these animals is unknown but previous pregnancies and lactations among females could have contributed to the differences between the sexes. Couchman and McGregor (1983) reported greater down weights for adult bush goats (157 g) than those reported here. However there were only 12 animals in their sample and they were highly selected with considerably thicker fibers (16.9 μ m).

Down production of the progeny (Tables 8-10) was intermediate to that of their parents but closer to their sires. The superior production of the female progeny compared with their dams may be due to the absence of previous pregnancies and lactations in the young females. There was no selection exercised on any stock, so the difference is not caused by any current herd culling or selection from the base population. The large variability in down weight allows considerable scope for selection

At a mean of 15.5mm the down produced by the animals in this study would be classified as fine cashmere (Millar, 1986). The low between animal variability in fibre diameter, in contrast to that of other fleece characteristics, is similar to that in sheep (turner and Young, 1969)

Pregnancy and lactation severely restrict fleece growth (Tables 5 and 6) and appear to act multiplicatively. Pregnancy reduced down production by 30% and lactation by 48% ; together they resulted in reduction of 65%. In Australia, goats are not normally mated at a time that would result in pregnancy or lactation during the cashmere growing season, but some problems could arise in animals joined before February. In addition there may be some reduction in fleece growth if artificial breeding techniques are used for out of season breeding or to avoid unfavorable environments for management purposes.

TABLE 8

Least-squares means (with SE in parentheses) for production parameters for single and twin progeny at 4 ages

Character Type of birth	Age group				All animals
	1	2	3	4	
No. of animals*					
Single	517	415	182	35	612
Twin	510	374	188	12	557
Liveweight (kg)					
Single	16.4 (0.19)	25.3 (0.17)	31.2 (0.25)	36.3 (0.60)	27.3 (0.25)
Twin	14.1 (0.17)	24.1 (0.17)	30.3 (0.28)	33.9 (0.59)	25.6 (0.26)
Fleece weight (g)					
Single	210 (3.4)	302 (2.9)	355 (4.3)	387 (10.4)	314 (5.8)
Twin	188 (3.0)	305 (2.9)	366 (4.9)	384 (10.2)	311 (6.2)
Yield (%)					
Single	25.9 (0.51)	27.5 (0.44)	24.6 (0.65)	24.9 (1.57)	25.7 (0.81)
Twin	23.9 (0.46)	25.4 (0.44)	24.0 (0.75)	24.3 (1.54)	24.4 (0.86)
Down weight (g)					
Single	54.4 (1.64)	80.2 (1.43)	85.9 (2.09)	98.0 (5.07)	79.6 (2.5)
Twin	45.1 (1.47)	77.6 (1.42)	84.5 (2.41)	91.5 (4.98)	74.7 (2.6)
Diameter (μ m)					
Single	14.4 (0.05)	15.5 (0.04)	16.0 (0.06)	16.5 (0.15)	15.6 (0.07)
Twin	14.0 (0.04)	15.3 (0.04)	16.0 (0.07)	16.2 (0.15)	15.4 (0.08)
Length (mm)					
Single	58.3 (0.75)	60.7 (0.66)	59.1 (0.96)	64.8 (2.33)	60.7 (1.2)
Twin	54.3 (0.67)	61.4 (0.65)	62.3 (1.10)	63.5 (2.28)	60.4 (1.3)
No. of animals					
Single	350	398	54		583
Twin	336	358	18		522
Primary follicle density (mm^{-2})					
Single	3.92 (0.05)	3.08 (0.03)	2.66 (0.08)		3.22 (0.03)
Twin	4.00 (0.06)	3.04 (0.05)	2.81 (0.15)		3.31 (0.09)
Secondary follicle density (mm^{-2})					
Single	27.0 (0.36)	22.6 (0.26)	18.5 (0.64)		22.8 (0.26)
Twin	26.8 (0.44)	21.8 (0.37)	17.6 (1.13)		21.7 (0.66)
S/P ratio					
Single	6.89 (0.08)	7.29 (0.05)	7.10 (0.14)		7.09 (0.06)
Twin	6.66 (0.09)	7.03 (0.08)	6.42 (0.24)		6.51 (0.16)

*No. animals at each age and total no. animals.

Some important differences between birth type, sex and age have been found. In addition, time of birth affected productivity at nine months with kids born earlier in the season having greater down weights than those born later. Consequently, in cases where there is an extended kidding period, adjustment for age or selection within age groups may be necessary if selection is to be based on productivity at first shearing.

Single-born animals had a slight weight advantage and grew more down than twins, their down being significantly longer and coarser. These differences were greatest at the first shearing but small differences still remained at the fourth shearing. At the first shearing the difference between singles and twins was sufficiently great to require allowance for twins in selection. However the twin handicap is not so great as to negate the advantages of improving reproductive rate through increased twinning levels.

Males tend to have a small liveweight and down weight advantage over females (Table 6), but diameter and length of down are similar. The absence of a difference in fibre diameter between sexes is in contrast to the commonly held belief amongst breeders that males are consistently 1-2µm coarser than contemporary females. This has important implications for cashmere breeders, so to check the point an examination was made of unadjusted records from all contemporary groups of males and females amongst the animals in this study. Of 20 such groups, males were coarser than females in 11, while females were coarser than males in 9 and in each case the differences ranged from 0 to 0.7 µm. The groups varied from a mean diameter of 13.6 to 16.6µm and from 9 months to 4 years of age. These variations in diameter and age cover the ranges found among many breeding herds, consequently it would not be wise for breeders to base male selection or purchase on the assumption of phenotypic sex difference in diameter.

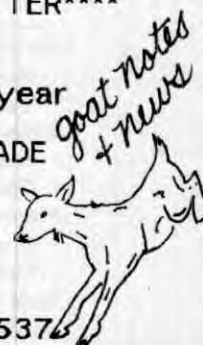
Differences between ages were marked and significant for all parameters (Table 5). There was a significant non-linear component showing rapid increases in down weight, diameter, length and liveweight between the first and second fleece with reduced increases thereafter. The continuous growth in liveweight is accompanied by increased down production and fiber dimensions at each age. The changes in diameter are particularly important, with a total increase of 2.2 µm for the first to the fourth fleece. As this herd

produces fine cashmere, these increases in diameter present no economic problems, however it is clear that goats with a greater diameter at nine months could quickly approach the limit for cashmere. The implications of these changes for cashmere breeding programmes will be examined in another paper in this series.

Differences between age groups, sexes and birth types in primary and secondary follicle densities reflect differences in body size as indicated by liveweight. As animals grow and skin expands, densities decrease because follicle populations are established by 6 months of age (Parry 1987). Both primary and secondary follicle densities decrease in this way so the secondary: primary ratio remains relatively constant. There were significant differences in this ratio between groups, but they were small and there was no consistent trend with increasing size. The densities and the ratios of these goats at their first shearing was similar to those reported for 10 month old animals by Holst et al. (1982). °

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TABLE 9 Least-squares means (with SE in parentheses) for production parameters for each sex of progeny at different ages

Character Sex	Age group				All animals
	1	2	3	4	
Numbers*					
Male	504	373	74	7	583
Female	523	416	296	40	586
Liveweight (kg)					
Male	16.7 (0.21)	25.5 (0.20)	32.7 (0.34)	37.9 (0.74)	28.2 (0.32)
Female	13.7 (0.16)	23.9 (0.15)	28.7 (0.16)	32.2 (0.49)	24.7 (0.21)
Fleece weight (g)					
Male	204 (3.7)	332 (3.4)	404 (5.9)	412 (12.8)	338 (7.4)
Female	194 (2.8)	275 (2.5)	318 (2.8)	359 (8.5)	287 (4.7)
Yield (%)					
Male	25.3 (0.56)	25.9 (0.51)	22.3 (0.89)	21.9 (1.94)	23.9 (1.04)
Female	24.6 (0.42)	27.0 (0.38)	26.3 (0.43)	27.3 (1.28)	26.3 (0.66)
Down weight (g)					
Male	51.3 (1.81)	83.1 (1.66)	87.0 (2.87)	95.5 (6.23)	79.2 (3.13)
Female	48.2 (1.34)	74.7 (1.23)	83.4 (1.39)	93.9 (4.14)	75.0 (2.00)
Diameter (μm)					
Male	14.2 (0.05)	15.4 (0.05)	16.0 (0.09)	16.4 (0.19)	15.5 (0.09)
Female	14.2 (0.04)	15.3 (0.04)	16.0 (0.04)	16.3 (0.12)	15.5 (0.06)
Length (mm)					
Male	56.3 (0.83)	61.0 (0.76)	57.7 (1.31)	60.4 (2.87)	58.9 (1.53)
Female	56.3 (0.62)	61.0 (0.56)	63.7 (0.63)	67.9 (1.90)	62.2 (0.97)
Numbers					
Male	344	363	36		544
Female	342	393	36		561
Primary follicle density (mm^{-2})					
Male	3.73 (0.05)	2.93 (0.04)	2.57 (0.13)		3.08 (0.05)
Female	4.19 (0.05)	3.19 (0.04)	2.89 (0.11)		3.42 (0.04)
Secondary follicle density (mm^{-2})					
Male	26.7 (0.42)	21.6 (0.34)	16.1 (0.98)		21.5 (0.38)
Female	27.3 (0.39)	22.8 (0.30)	20.0 (0.85)		23.4 (0.33)
S/P ratio					
Male	7.15 (0.09)	7.23 (0.07)	6.58 (0.21)		6.99 (0.09)
Female	6.40 (0.08)	7.09 (0.06)	6.94 (0.18)		6.81 (0.08)

*No. animals at each age and total no. animals.

TABLE 10 Body weight and cashmere production of progeny from the breeding herd. Least-square means (with SE in parentheses) for each age group

Character	Age group			
	1	2	3	4
Numbers	1027	789	370	47
Liveweight (kg)	15.2 (0.22)	24.7 (0.21)	30.7 (0.26)	35.1 (0.51)
Fleece weight (g)	199 (5.1)	303 (5.0)	361 (5.6)	386 (9.6)
Yield (%)	24.9 (0.72)	26.4 (0.71)	24.3 (0.80)	24.6 (1.42)
Down weight (g)	49.7 (2.18)	78.9 (2.13)	85.2 (2.45)	94.7 (4.51)
Diameter (μm)	14.2 (0.07)	15.4 (0.06)	16.0 (0.07)	16.4 (0.13)
Length (mm)	56.3 (1.06)	61.0 (1.04)	60.7 (1.17)	64.1 (2.10)
Numbers	686	756	72	
Primary follicle density (mm^{-2})	3.96 (0.04)	3.06 (0.04)	2.73 (0.09)	
Secondary follicle density (mm^{-2})	27.0 (0.33)	22.2 (0.34)	18.1 (0.67)	
S/P ratio	6.78 (0.08)	7.16 (0.07)	6.76 (0.15)	

Acknowledgements

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SHE'S KIDDING!
By Miriam Jeswine

Goats are very reliable. You may rely on them to kid between 142 and 158 days after breeding. (The average is 150, but they didn't read the book.) You may rely on them to look like giving birth is the most remote notion in the world, and as soon as you turn your back, pop out a kid or two. Of course you may rely on them to drop kids in the dirtiest spot they can find, or pick the nastiest weather. I even came home one day to find a massive goat fight, and the most embattled doe had a half-born kid hanging out behind, breathing and squawking. Yes, they can stop having contractions if they don't want someone to see them, or in this case, to fight. I must admit, that was unusual.

Usually you can get an idea of when the doe is about to kid. She has been eating voraciously and getting rounder and rounder. You may feel the lower left side of her belly and the kids will kick your hand. Her udder will begin to enlarge a month or so before her due date. One day, maybe two weeks or less before she is due, the load will shift, and her flanks will seem hollow because the kids have shifted to the lower abdomen. Her backbone becomes prominent. She also will develop a ridge above her tail between the hips as her pelvis shifts to make way for kids. All this may happen a couple of weeks, or a couple of days, or a couple of hours before she gives birth. It varies from one doe to the next.

You should be checking several times a day beginning about two weeks before the due date. One morning she will seem to have changed shape. The cargo will have shifted back up and filled the hollow below her back bone. At that point the kids have moved into position to be born. Looking under the tail, you may observe that the vulva are very loose, and mucous may have begun to flow. She is now very close to delivery. She probably will try to find a quiet place, away from the rest of the flock, and maybe away from you. She may paw the bedding, lying down and getting up restlessly. If she is quite tame, she may lick you when you go over to her. One final sign which always tells me a doe is kidding within a very few hours is that she starts talking mama talk, a low, short bleat that does use on their kids. Now it is time to cancel your other plans if you want to be

present for the big event.

Once the process of kidding begins, it proceeds rapidly. In a healthy doe the contractions are strong and it may take an hour or less to deliver the first kid. The second and third, if there are more, will come even more quickly. She may go through the whole process standing, or she may lie down for the final push. It doesn't matter either way, but it is a good idea to make sure she can't drop a kid into a water bucket.

If you observe under her tail, you will see the emerging kid, most likely still in the amniotic sac, which usually won't break until the kid's head is just about out. First you will see a foot, sole down, then another foot, and the nose. The kids are presented with their heads stretched along their forelegs, and once the head is out, the rest seems to fall out. If you see the feet with the soles up, it means the kid is coming backward. In goats this is not usually a problem as long as the kidding process is rapid. In fact, it is rather common in multiple births. If it is twins or triplets, the afterbirth will come after all the kids are born. If the afterbirth, or placenta comes shortly after the first kid, then it is probably a single birth. The cord usually breaks by itself, but if not, just pull it apart with your hands so that the blood supply is pinched off. The doe may want to eat the placenta, and that is quite normal. It may replenish some lost nutrients. I have heard of a doe choking on it, but have not seen such myself. The doe may really prefer a bucket of warm water to eating the afterbirth. Anyway, she usually is more interested in the kid.

As soon as the kid is born, the doe will turn and begin licking it, talking mama talk the whole time. I like to be there to make sure it starts breathing right away. I clear the mucous away from the nose and mouth if the doe has not done so already. If the kid is a little slow to begin breathing, I may rub it vigorously with a towel, or pick it up and toss it lightly from hand to hand. Once it's a great while, I give it mouth-to-nose. Usually, however, the kid will sneeze, gasp, and it is on its way. Some people like to stick a small straw up the nose to cause a sneeze. If left alone, the nudging and licking by the doe will stimulate breathing. Pretty soon the kid will struggle to its feet, and probably fall over several times while it practices walking. It will nose around the

doe looking for the udder, not knowing quite what to do at first when it does find it. Finally, it will start nursing. A healthy kid has a strong desire to suck, and will suck your fingers or another kid's ear in the process of learning about its food supply.

The first milk, called colostrum, is thick and yellowish. It is important that the newborn kid get it in the first twenty-four hours of life. There are important immunoglobulins and antibodies which help the kid's immunity to disease until it is capable of developing its own immune system. Some people like to keep some colostrum on hand, frozen, in case a doe does not provide her own for her kid. If you do that, be sure to warm it very carefully and slowly to keep it from turning to pudding. The freezing and rewarming to body temperature do not harm the factors which help the kid's immunity.

To further prevent infection and to speed the drying process, dip the umbilical cord in a solution of tamed iodine, available at feed stores and veterinary offices. I buy it in a pint bottle, and then put a couple of ounces in a small plastic jar with a plastic lid. Iodine corrodes metal, stains your hands and clothes and is messy. Plan to look strange during kidding season.

Most kids are born in late winter and early spring, and the weather can be treacherous. Give the doe and her kids a dry, sheltered place. It need not be fancy, but it must be dry, and, if the weather is sub-zero, a source of heat to prevent frozen ears is nice. If kids have something to crawl under such as a box on its side, they will, and keep warmer that way. I have found that the kids dry off more quickly in temperatures below freezing. In our wet Oregon weather they may be damp for a day or more, so I have a pile of clean towels in the barn to dry newborn kids and prevent chilling. Once they are all dry and fluffy, they can stand the cold quite well.

Even though I have seen hundreds of kids born, I still get a big thrill every time. It is really great to see a mother goat one minute, and a little while later, a mother and one or two healthy new babies. It is reassuring to know that nearly all the time the whole process takes place without a problem and I can depend on the does to do a good job.

Next month: Problem kiddings.

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DOC BOGART SAYS.....

Dr. Ralph Bogart is Professor Emeritus of Animal Science and Genetics of Oregon State University.

There is a great deal of interest in raising cashmere goats in the United States. Some people are raising the goats in order to sell the fleece or use it themselves. Other persons are hoping to sell progeny at good prices in order to supplement their income or their goat ventures.

There are cashmere bearing goats in many parts of the world, but most countries have diseases such as Foot and Mouth that prevent the importation of animals into the United States. However, recently the import protocol between Australia and the United States was approved.

The Australian cashmere goats have come from the feral flocks of that island continent. The word feral meaning a once domesticated animal now living in a wild state. These feral animals come from goats that were turned out to fend for themselves or escaped from domestic herds. They were probably turned out when farmers went "bust" during the depression in the '30's. The flocks are made up of genes contributed by all breeds of goats.

Over the decades there has been much loss of goats but because of their ability to reproduce quickly they have increased in numbers to the millions. Those animals that were capable of caring for themselves and their off spring survived, while others perished. Thus a feral goat population of wild goats eventually evolved after having undergone rigid environmental pressure. These goats were found to produce a good quality cashmere fleece.

It appears that the environment under which they existed favored a hardy goat that could survive on coarse feed such as brush, briars and weed. They could also kid by themselves because those that could not were quickly lost from the population. The down (cashmere) undercoat was important to them for survival during the winter and could be shed off for the heat of summer.

Australians went through these feral flocks and selected those goats that exhibited both quality and quantity of cashmere. It is from these selected feral goats that the current

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flocks originated and from where our current United States imports are originating.

Even though there is excellent stock coming into the country, it should be the goal of every breeder to apply strong selection pressure to these import flocks. "Super goat" has not yet been developed! Although these goats have done well in Australia they need improvement in some traits to make them ideal cashmere goats for the United States. Thus, I feel strongly that a good selection program should be established and adhered to in all of the flocks of cashmere goats in the U.S..

In my next article I will discuss the traits that should be given strong consideration in selecting cashmere goats in the United States.



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HANDSPINNING CASHMERE

By Florence Feldman-Wood, Andover, MA.

Handspinners have been watching with keen interest the changes in the international cashmere-goat producing industry. Since 1985 I have been writing about these developments for SPIN-OFF, The Magazine for Handspinners [Interweave Press, Loveland, CO.] I have tried to report on the industry growth, first in Australia and New Zealand, and now in the United States. It hasn't been easy, since the pace has been so rapid. Spinners are eager to literally "get our hands on" this wonderful fiber.

At the end of my first article on "spinning Cashmere and Cashgora" SPIN-OFF, (December 1985), I asked for responses from cashmere goat raisers who are also handspinners. I felt as if I was sending a message in a bottle into the ocean. so I was quite pleased when I did in fact hear from three spinners/goat-raisers from Australia. That was how I became acquainted with Jenny Eddington from Tasmania. In her second letter, January 1988, she told me of her partnership with Judith Richardson to bring cashmere goats into the United States. The rest, as they say, is history.

Like the commercial processors, handspinners are looking for fleeces where the coarse guard hairs can be easily separated from the short down fiber. Now, I thought, here is the person who can help in my quest for the key to easy dehairing. When I asked, "Do you have a special technique for dehairing the fibers?" Jenny wrote, "I have no real magic formula for dehairing besides removing it by hand." She selects a few goats who she thinks will have especially good fleeces, and "hand harvests" them by combing the goat just as it is about to shed naturally, as opposed to shearing it. As a result, the amount of guard hair is low, and easy to pull out by hand before spinning. Jenny puts coats on the goats that she plans to comb, to hold the fiber til natural shedding occurs.

Well, she was right. With the fiber samples Jenny sent me, it was very easy to remove the guard hairs which were much coarser and longer than the down fiber. As a result I developed a method that I think of as "telephone dehairing." A baggie of raw fiber sits next to the telephone on my desk. When

I have to make a series of phone calls, or know I'm going to be chatting with a friend, I put down a piece of cardboard on the desk, pick up a handful of raw fiber and start pulling out the guard hairs. If you squeeze the fibers together, the longer guard hairs protrude and are easy to remove.

Wool is a popular fiber with handspinners because it is readily available and comes in many staple lengths, 3 to 6 inch staples being the most popular. It has microscopic scales which grab onto each other making it easy to twist into a continuous thread. Cashmere is also a wool with these microscopic scales, but the ideal form has only a 1 to 2 inch staple length, like cotton. From my earliest explorations, I have been adapting cotton preparation and spinning methods to cashmere.

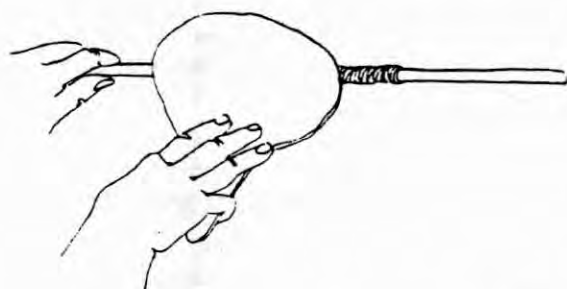
After the fiber is dehaired, either by hand or by commercial processors, there are two ways it can be handspun. the simplest, is to just fluff up a handful and spin [see Hochberg, 45-47]. This gives a textured yarn. The other is to make a puni, a long, thin compressed rolag. The resulting yarn will be smoother and more even.

To make a puni, I place a flat layer of fibers on a smooth board or piece of cardboard, which is propped at a slight angle. A smooth dowel or large knitting needle (size 10+) is laid on the fibers and rubbed with a paddle. The paddle is rolled up and around, always in the same direction, while rotating the dowel, until all the fibers are tightly compressed. Then the puni is pushed off. As with rolags, less fiber is better than more. A cuff can be fashioned from a scrap of leather, and be used instead of the paddle. This leaves the fingers free to rearrange the the fibers or pick out a stray guard hair if necessary. [Illustrations from 'Continuing Adventures with Cashmere and Cashgora,' SPIN-OFF, June 1989, pp 67 and 68.]

Before beginning to spin a luxury fiber like cashmere or silk, I always give my wheel a tune-up, as described in THE CARE AND FEEDING OF SPINNING WHEELS. I carefully clean the orifice and hoods, removing any greasy residue left by wool fleece. I put on a bobbin about a third full of thread, and for the Louet wheel, place the larger end of the bobbin under the drive band.

This gives a slower ratio (7:1), and consequently more control. To start I treadle very slowly, but gradually return to my normal moderate treadling speed. The tension is reduced to almost nothing. Just enough to grab the fibers and twist them. This is important because short staple fibers require a high number of twists per inch to produce a sound yarn. I work with my hands close together but keep them about 5" away from the orifice so that a lot of twist will go into the yarn before feeding it onto the bobbin.

To finish the yarn, I make a skein and tie it loosely in several places. I wash it in moderately warm (hand-hot) water and mild soap (Ivory liquid or Orvus). As with wool, be careful not to have any major changes in the water temperature or the yarn will felt. Do one clear rinse, then a rinse with a little vinegar (to remove the soap residue), then a final clear rinse. Hang to dry.



Punis can be made by rolling fibers around a dowel, with the help of a paddle.



A scrap of leather, made into a cuff, does the same job in puni-making as the paddle

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WHEN I SAY "GOATS" TO MY BANKER, I MEAN BUSINESS !
by Wendy Paulin

After staying up all night with a weak kid or spending the greater portion of the day cleaning goat barns, it's hard to walk into a bank and look like you mean business. It's also hard to convince some bankers that a little ol' goat has potential to bring big bucks in the sale ring. A maverick Washington state businessman has changed all that and finally brought finance down home to the farm.

Western AG Credit corporation was founded in 1984 by President, Scott Hamilton. Having been raised in a farming family, Scott knew all too well how seasons and markets effect the farmer. He wanted to help farmers get the help they needed but knew they didn't always feel comfortable on a banker's turf. As a result, Scott created an organization to make short-term and intermediate loans, specifically designed for agri-businesses.

Scott's modest beginning six years ago has now grown to service over \$15,000,000. in loan volume to farmers throughout the state. In order to meet the demand for loans, one year after it's establishment, Western AG Credit sold it's controlling interest in stock to Security State Bank. They now operate as a subsidiary of Security State. By doing this, Western AG Credit Corporation provides a broader range of financing alternatives for their customers. Loans made by Western AG Credit Corporation are discounted through the Federal Intermediate Credit Bank in Spokane, which is the primary source of funds for the loans. According to Sue Rosbach, agricultural finance specialist, for Western Ag, "Banks can be limited to one service area or service type, but Western Ag Credit is not. We can look at all the different programs, rates and financial institutions, and help the farmer to decide on the best financing for their operation." "not only that", she added, "We will put on our boots and go to the farm to help do the deal."

Western Ag can structure loans with many types of institutions including: commercial banks, Small Business Administration, leasing companies, Federal Farm Credit, or savings and loan companies. Western Ag Credit Corporation's staff consists of three full-time

and one part-time employee. They make agricultural loans for such things as:

- Operating lines
- Cropping lines
- Animal purchase
- Feed purchase
- Equipment
- Real estate
- Leasing
- Refinancing

The staff of Western Ag Credit, are all from farming backgrounds and are ready to assist anyone who is interested in exploring financing alternatives. Western AG Credit Corporation is located in Chehalis, Washington. If you have questions regarding farm financing, please call Ken Sabin or Sue Rosbach at 206-748-1323.

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CAPRA GOES TO THE NATIONAL WESTERN STOCK SHOW

Jill Darrah, Cashco, Longmont, Co.

Six hundred thousand people attended the National Western Stock Show in Denver Colorado this January. Simmentals to miniature horses were exhibited and sold at this major livestock event. CaPra saw the National Western as an excellent opportunity to set up a display to promote growing cashmere in the United States. The results were impressive as people from all over the U.S. showed a genuine interest in the emerging cashmere industry.

The display used by CaPra will soon be available to all members who wish to promote CaPra, the cashmere industry, as well as their own business. CaPra has purchased a display booth 8' by 8'. It is a portable display, easily shipped, and quickly assembled. (About 10-15 minutes.) The booth comes with a header displaying CaPra's new logo as well as educational pictures and information about cashmere, creating a highly professional look.

CaPra is working hard to promote our industry. Several new brochures are now available. The brochure "Cashmere Connection" gives an overview of the U.S. industry as well as basic management advice to interested growers. CaPra also has a flashy new brochure on the benefits derived from membership in CaPra. Both brochures are available by request from the CaPra office.

Cashmere goats have been exhibited for the past 3 years at the National Western. Denver has recently passed a large bond to improve the stock show facilities. CaPra has approached the stock show organizers and they have agreed to include a cashmere goat show and sale next year. If there is enough interest among cashmere growers to bring animals to the National Western, CaPra could have a major cashmere show and sale. Growers interested in participating can contact the CaPra office.

The Cashmere Goat industry is on the move. The 1990's will see the establishment of a new and profitable agribusiness in the United States.

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CASHMERE TERMINOLOGY

AGED: An old goat, for example 8-10 years or older, usually indicated by very worn or the lack of teeth.

BUCK: A male goat who is entire or intact

CONDITION:

A) Body-refers to the degree of fleshing or fatness of stock.

B) Fleece-refers to the amount of natural grease present in fleece.

C) To bring a sample or specimen to moisture equilibrium with specified atmosphere.

CRIMP: The waviness of a fibre expressed as "waves or crimp" per unit length.

DERMATOPHILOSIS: Scabbiness around the nose, ears, backline, feet, and legs. Caused by dampness. Usually follows long periods of excessive rain. Treatment would require veterinary care with prescribed doses of antibiotics and antimicrobial topical ointment.

EPIDERMIS: The outside or surface layer of the skin consisting of flat, irregular, horny cells or scales.

GENETICS: The branch of biology that deals with heredity and variation in cashmere goats.

GUARD-HAIR: The coarse fibre forming the primary coat of a two coated goat. These fibers usually have a large diameter, are generally derived from the primary follicles and are often medullated.

GUMMY: An aged goat that has lost its incisor teeth.

MEDULLATED FIBER: Relates to fibers having a core of air-filled cells. These fibers have irregular dyeing properties.

PNEUMONIA: Caused by a viral or bacterial infection. Affected animals are usually short of breath and breathing rapidly. A cough can be, but is not always present. A noticeable loss of appetite and condition can be present. Can be caused by stress, poor ventilation, shearing, weather, and undernutrition. Veterinary attention is necessary to determine which antibiotic is necessary for treatment.

POLLED: A goat that is born and remains without horns.

PROJECTION MICROSCOPE: A microscope that projects the image of fibers onto a frosted screen to facilitate measuring as opposed to monocular or binocular microscope.

SIX TOOTH: A goat which has six permanent incisors (front teeth) which would normally be three years old or older.

S.P. RATIO: Follicle - the ratio of secondary follicles to primary follicles in an animal's skin. The term is used as a measure of secondary follicle density. It is sometimes written as S/P Ratio.

S.P. RATIO: Fiber - as above but used in respect of fibers and not follicles.

SOFTNESS: Pleasantness or smoothness to touch, generally meaning a low micron count, i.e. the softer the lower count.

SOUND MOUTH: A goat whose teeth are still firm and retain their natural position. The term usually refers to an aged goat.

TOP: A continuous ribbon of untwisted fibers which have been combed to lay parallel with the short fibers (noils) removed.

WEANER: A kid that has been weaned from its mother, or has stopped sucking its mother, (six to nine months old).

WET DOE: A doe that is rearing a kid.

WOOL: The fiber from the fleece of a sheep.



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