The potential utilisation of South African indigenous goats for cashmere production

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Abstract
In this paper, reference is made to the fibre properties of luxury fibres, such as cashmere, and to the ability of South African indigenous goats to produce cashmere type of fibres. Against this background, the paper discusses Textek/CSIR's involvement in the utilisation and promotion of fine down (cashmere type) fibre production from indigenous goats in a joint project with Grootfontein and Döhne Agriculture Development Institutions. This paper report on the progress that has been made that records the results obtained on samples received during the past two years of harvesting. Reference is made to the down fibre quality, yield and profile of the samples compared to those of Chinese cashmere. This paper concludes with the reasons why cashmere production is ideally suited for subsistence farmers and the importance for South Africa to utilise and improve the fine fibre production potential of indigenous goats.

Introduction
Rare, luxury or speciality animal fibres have an exclusivity that is rarely associated with other fibres. Their scarcity is due to the fact that they are difficult to produce on a large scale, because of climatic conditions and/or genetic factors. These fibres are characterised by their high quality, particularly in terms of fibre properties, such as fineness, softness, warmth, lightness, lustre etc. which make them unique in processing and wear performance, notably comfort and softness. Such fibres include goat hair (mohair, cashmere), camel hair, Llama hair (Alpaca), Vicuna and Angora hair from the Angora rabbit.

During the past two decades, consumers have exploited these unique fibre properties to their limit, causing the world textile industry to go through a revolutionary change, moving towards more comfortable, lighter, casual, and easy care type of garments. Manufacturers have had no alternative but to go for lighter fabrics with finer fibres (e.g. micro fibres) with a soft appealing handle and added comfort. For this reason cashmere, being the second finest animal fibre produced in fairly large quantities, has become one of the world's most sought after naimal fibres today.

Pilot project
Even though cashmere is defined as 18,5 μm and finer there are world-wide several goat breeds, rather than one distinct breed, which possess the ability to produce cashmere. This has led to numerous studies in various countries in search of goats that possess the ability to produce this highly wanted durable fibre as an undercoat or down and South Africa is no exception. Studies carried out in South Africa indicated that indigenous goats such as the South African Boer Goat, have two coats - the one comprising the coarse guard hair, and the other the fine or cashmere type of fibre. Nevertheless, the quantity of down or cashmere fibre produced per goat was generally not at a level commercially acceptable. However, recognising South Africa's rich resource of approximately six million goats such as the Boer, Savannah and other

traditional goats (owned by small farmers), it was felt that if the highly priced cashmere type of down fibre yield could be increased and exploited, this could lead to the possibility of creating a viable cashmere industry in South Africa, thereby adding value to existing animals. For this reason, the CSIR, Division of the Textile Technology (Textek) joined hands with Grootfontein and Döhne Agriculture Development Institutions in a pilot project in which the cashmere producing potential (quantity and quality of the hair) of the various breeds is being investigated throughout the country.

Grootfontein and Döhne Agriculture Development Institutions concentrate on the breeding and genetic side (selection, upgrading etc.) whereas Textek concentrates on rapid techniques for analysing the fibre quality (fineness and down yield), fibre evaluation, processing techniques, product development and marketing.

Progress

The cashmere project represents a national programme and is guided by the Cashmere Working Group which comprises the following organisations:
CSIR Division of Textile Technology (TEXTEK)
Agricultural Research Council (ARC): Animal Nutrition and Products Institute, Irene
Grootfontein Agriculture Development Institute (ADI)
Döhne Agriculture Development Institute (ADI)
Halesowen Experimental Farm-Cradock
Cedara Agriculture Development Institute (ADI)
Vredendal Agriculture Development Institute (ADI)
Towoomba Agricultural Development Centre (ADC)
Mara Agricultural Development Centre (ADC)
Potchefstroom Agriculture Development Institute (ADI)
Agricultural and Rural Development Institute (ARDRI)
Department of Agriculture, Unviersity of Fort Hare
Fort Cox Agricultural College
Boer Goat Breeders' Association
Cashmere Breeders' Society (Gorno Altai)
Emerging Disadvantaged Farmers' Union (EDFU)

The Cashmere Working Group also receives support form the National Department of Agriculture and Provincial Agriculture Departments in various provinces.

Significant progress has been made during the two past seasons to identify the relevant role players, such as the Directors of Extension, Extension Officers and animal scientists of the various regions, the foundation and first National Strategic Meeting of the Cashmere Working Group (Ausgust, 1997) to determine the goals and objectives of the project.

Various avenues, such as Agriculture Extension Officers in various goat producing provinces, Farmers' Associations, Community Leaders, Boer Goat Association members, magazines such as Agriculture News, Farmer's Weekly, Landbouweekblad, Land, Agriforum (TV programme) and brochures in various languages were used to communicate information as widely as possible and to motivate farmers to become involved in the project and to harvest the fine down (i.e. cashmere) of their goats for with-in breed evaluation purposes.

Workshops were also set up in the various provinces for training interested farmers and Agricultural Extension Officers who play a key role in the cashmere project and who act as consultants and organise the fibre harvesting and collection of combed hair in rural areas. Approximately 280 combs were constructed at Textek during the past two seasons and distributed countrywide, free of charge, to interested parties.

During the past two seasons, a total of about 2500 samples (from ± 3000 goats) with a total mass of 97 kilograms from some 280 goat owners were collected and then evaluated by Textek. The harvested fleeces collected were sent to Textek for evaluation in terms of down fibre quality (fineness) and yield. The results were reported to the producers.

An accurate and rapid method, using the advanced image analysis Optical Fibre Diameter Analyser (OFDA) instrument, for the simultaneous determination of down fibre fineness and yield (ratio of down fibre to guard hair) without prior physical separation of the fractions, has been developed by Textek and used for evaluating the samples.

Results to date

Table 1 gives a summary of the down fibre characteristics (quality and quantity) of the different goat breeds or strains over the past two seasons, as determined by means of the OFDA instrument and also subjectively.

Table 1 Down fibre quality and quantity in various double-coated goat breeds

	South African			**Russian**
	Boer goats	**Savannah goats**	**Traditional goats**	**Gorno Altai goats**
Down diameter (μm)	16,0 - 18,5	16,0 - 18,5	14,0 - 16,5	18,5 - 19,0
Down length (mm)	20 - 31	20 - 31	15 - 30	28 - 31
Down crimp	Good	good	good	Poor
Down style	Good	good	good	Poor
Down weight (g)	10 - 50	10 - 50	5 - 15	100 - 500
Down yield (%) (combed fleeces)	50 - 70	50 - 70	60 - 80	50 - 70
Down colour	white and coloured	white	white and coloured	Brown
Other comments	-	-	-	silky handle very matted intermediate fibres

In summarising the results, it is clear that the down fibre form the three indigenous breeds or strains (Boer, Savannah and traditional goats) are superior to the Gorno Altai goats in terms of crimp, style, down fibre diameter and a good diameter profile (i.e. without indications of intermediate fibres) but not in terms of down fibre production. The short down fibre length (less than 40 mm) would be problematic in terms of fibre loss and waste during dehairing. Although the Gorno Altai goats have commercially acceptable down fibre weights, the down fibre diameter of most of the fleeces tested to date, exceed the commercially accepted value of 18,5 micron and

finer for cashmere. Furthermore, the poor crimp and style of the down fibres together with the presence of an intermediate or third fibre component (Cashgora type) does not allow the Gorno Altai to be classified as cashmere of good quality.
The presence of intermediate fibres in fleeces is undesirable because it is difficult to remove the fibres during the dehairing process. Consequently, the value of such fleeces is adversely affected. For this reason, industrial dehairing of raw cashmere requires a strong distinction between the two fibre populations (fine and coarse) to enable easy and effective dehairing. It is generally desirable that the ratio of the diameter of the guard hair to that of the down fibre be 4:1 and that the guard hair has a mean fibre diameter greater than 60 μm.

The down fibre diameter profile of the South African indigenous goat breeds/strains generally compares very favourably with that of Chinese cashmere as shown in Table 2 for the Boer goat.

Table 2 Down fibre diameter profile in fleeces of male and female SA Boer goats and Chinese Liaoning goats

Down fibre diameter class	Percentage of fibres per diameter class			
	SA Boer goat		Chinese Liaoning goat	
	Males	Females	Males	Females
<10 μm	2,1	2,9	4,3	8,4
10 - 20 μm	88,9	91,1	77,9	85,6
20 - 30 μm	8,8	5,9	17,3	5,7
>30 μm	0,2	0,1	0,6	0,3

The proportion (%) of animals producing cashmere type of down fibre in the different yield classes is given in Table 3.

Table 3 Proportion (%) of animals producing cashmere type of down fibre in the different yield classes

Yield	<10 gm	10 - 50 gm	50 - 100 gm	100 - 150 gm	150 - 200 gm	>200 gm
% Boer and Savannah goats	0,6	76,3	17	4,5	1,1	0,5
% Traditional goats	46	41	11,7	0,8	0,5	-
% Gorno Altai goats	-	-	-	-	5	95

The Boer- and Savannah goats showed an average down weight of ± 25 g/goat whilst traditional goats averaged ± 12 g/goat, with a coefficient of variation as high as 55%, indicating a considerable variation in down weight within breed/strain, and therefore a good genetic pool for future improvement by selective breeding. Goats with a woolly neck are generally good cashmere producers and down fibre yields of up to 150 g/goat

and even as high as 400 g/goat have been encountered. Such goats could be used as future breeding stock.
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Small quantities of the high quality Boer and Savannah goat hair received by Textek during the past two seasons were scoured, dehaired (using a Shirley Analyser laboratory machine) and processed successfully into two qualities and blends thereof with wool. Knitted garments were produced and many people were most impressed with the fine, soft handle of the garments.

The results obtained to date from the pilot project provides a good indication of the present cashmere quality and production in South Africa.

Conclusion

Owing to global trends in apparel, a large growing market exists for the finer and high quality textile fibres. It is therefore imperative for South Africa to utilise its existing potential of indigenous goats to the fullest. The vast number (± 6 million) of indigenous goats which possess the ability to produce a double coated fleece, provides a way of diversification of existing agricultural resources without a large capital outlay. The utilisation of the fibres as an additional source of income (value addition) would make the goat flocks more profitable. Furthermore, the establishment of small agro-industries which convert the fibre into the final products, with specific emphasis on tourist textiles, provides a golden opportunity for creating employment in rural areas.

The release of approximately 500 Gorno Altai cashmere goats in 1997 by Sentrachem, Australian Feral goats by a private owner in early 1999 and the selection and upgrading programme by Grootfontein/Döhne Agriculture Development Institutions will, no doubt, provide further momentum to the project.

Textek is also offering local farmers similar prices to those obtained internationally for the 1998 season for combed hair for experimental purposes. It is hoped that this will further stimulate the interest of goat owners in South Africa.

The cashmere production capacity must be seen int he light that, at present, the goats are primarily bred for their meat and milk - the cashmere type of down fibre they produce not being utilised at all. For this reason, it is important to find a balance between meat and fibre production.

Cashmere production is ideally suited for subsistence farmers who have a small number of goats and have close contact with their animals, enabling them to identify those animals with good cashmere producing potential and to know exactly when optimum shedding takes place at which stage the goats should then be combed.

This project supports the whole process of rural and economic development in South Africa, aiming to provide a potential source of supply of this high quality, high priced sought after fibre locally, together with the associated value addition industry, largely in the form of SMME'S.