Newsletter of the European Fine Fibre Network

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Editorial

by Claire Souchet, Project administrator

The Thematic Network - Increased competitiveness of high quality European animal textile fibres by improving fibre quality (FAIR3 CT96 1597)- is nearly at the end of its first year of existence and can be considered as well established. It is widely identified as the European Fine Fibre Network.

The partners have shown great interest in its activities, especially during the first workshop held in Spain in October. This workshop, on "*Development of European standards for the objective measurement of genetic parameters based on quantity and quality fibres traits*" was hosted by Dr Koldo Osoro, in Villaviciosa, Spain, on the 10-11th October 1997. Forty participants were present; scientists and producers involved in cashmere, mohair, angora and fine wool fibres. The discussions were very fruitful and advances were made in term of standardising fibre measurements. A report, covering the papers presented and a summary of the discussions, is being prepared.

The round trial of fibre quality measurements using OFDA methodology, organised by Dr Ho Phan (DWI, Germany) for cashmere and mohair fibres, is well advanced. Results, to assist in demonstrating the value of the OFDA methodology, will be available early next year.

After the success of the first EFFN workshop, we hope that the second workshop, on "*Establishment of common European protocols for the recording of genetic performance data for speciality fibre producing animals*", will be as profitable. It will be held in France, on 9-10th March 1998, and will be hosted by Dr Daniel Allain, from INRA, Toulouse.

Finally, after the great response we had following the publication of the first issue of EFFN news, we hope that this second issue will arouse as much interest and we look forward to hearing further from those who will receive it. Those who have not been yet contacted and who would wish to participate to this network, should contact the network administrator, Ms Claire Souchet.

This issue of the Newsletter concentrates particularly on the types of breeding programmes that currently exist in Europe.

ANGORA FIBRE

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From Finnish Angora to the product of the future

by Arja Simola
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From Finnish Angora to the Product of the Future is a three year research and development project on Angora wool production. The project was launched on May 1997 in the county of Jokioinen and has the following objectives:

1.All production is to be based on standardised Angora rabbit breeding and fibre production. This requires entering all animals into a centralised register, developing a set of Angora rabbit evaluation guidelines and basing the feeding on grains produced in Finland.
2.A producer network for production, product development and marketing is to be established. This will serve as the quality controlling organ at all stages of production and be responsible for developing and promoting a uniform product line.
3.A training programme for producers is to be set up. The goal of the programme is an Angora Entrepreneur's trade qualification (under development).

Angora fibre production can be developed into a significant and innovative livelihood to replace jobs lost in the structural changes in agriculture. The key to building a successful approach is in high quality animal stock, practical training and utilising the already existing resources and knowledge in the field.

The project is governed by Jokioinen county and its administrative head is the regional agriculture commissioner, Mari Klemelä. The project head and general manager is Arja Simola. Setting up the animal register and developing the evaluation and feeding guidelines is handled by the Institute of Animal Production at the Agricultural Research Centre of Finland (contact person : Prof. Asko Mäki-Tanila). The College of Arts and Design at Tammela (part of the Forssa Vocational Institute) is the responsible establishment for setting up training programme (Institute Rector, Sirpa Järvenpää).

The French Angora rabbit

by René-Gérard Thébault
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1-Angora rabbit production in France

Historical background

The angora rabbit was introduced in France in 1723, from England or Turkey. Genetic selection began in the 1930's, but mainly since 1956-57. A herd book was then created, the "Angora Rabbit Book of France". In it, a French Angora rabbit type appeared, with a special wool quality due to the breed (selection effect) and the harvest process (plucking and later defleecing).
By 1988, there were about 250 000 angora rabbits, more than 2000 breeders and a production of wool of 200 tonnes, exported as a raw material. In 1997, there are only 13 000 rabbits left, 100-120 breeders and a production of 12 tonnes, for manufactured clothes.

Herd book "Angora Rabbit Book of France"

Created in 1956, the herd book is run by a breeders organisation, the "Syndicat National Angora Qualité".

The improvement of rabbit production is done by mass selection. The breeders send a birth registration form for each litter. The animals are individually identified at weaning (provisional number). The animals are graded prior to their fourth harvest by a qualified judge and receive a final official number (ear tag).

The breakdown of the total of 100 marks in the grading scheme is as follows:

20 for the body conformation (according to the official standard for body development, ears, head, legs…)

40 for the wool quantity

40 for the fleece quality of which 15 marks are for homogeneity (bristly fleece rate), 15 marks are for tautness (intensity of bristly character) and 10 marks are for structure.

On farm, data are registrated on card for each animal, on which the harvest dates, weight of the harvested wool (by categories) and hair length are recorded.

2-Angora production criteria:

The Angora wool can have several uses:

1) knitted-usually clothes with a moderate fluffing effect, such as pullovers, woollen hats, socks, gloves

2) woven material

3) knitted fantasy clothes with a great fluffing effect.

The raw angora wool requirements are therefore different according to the specific textile use and the final product.

There are two different angora types, the bristly angora (French type), which gives the fluffy effect, and the woolly angora.

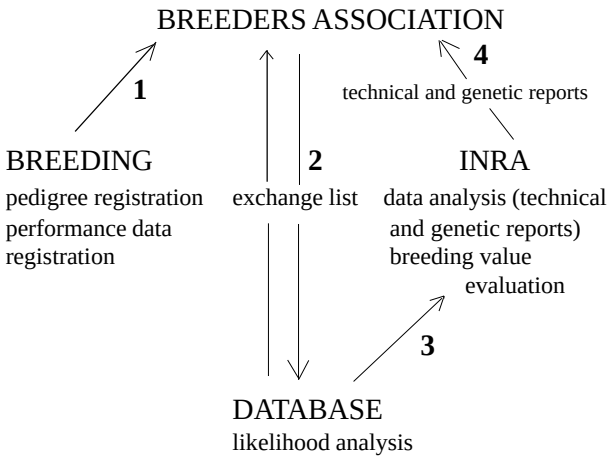
3-Fleece characteristics measurements:

The angora fleece is heterogeneous. Over the body, there are 5 different grades, whose quality criteria are based on the bristly or woolly aspect, length, the degree of felting and the cleanliness. Inside the lock, there are three fibre types, in which quality criteria are linked with the fibre dimensions and the fleece composition.

The fleece measurements, made on the farm are the total fleece weight of each different grade and the length of each fibre type (bristle, downs). In the laboratory, the measurements are from the fleece samples, and they concern the diameter of each fibre type (bristle, awns, downs) by the OFDA method, and the content of each fibre type (bristle rate), using the INRA Cross Section method.

4-Structure of the French Angora Rabbit breeding programme

Outlined below is a schematic description of the structure of the breeding programme:



5-Improvement programme for angora rabbit:

Selection goals for fleece traits concern quantity and quality, as measured by fleece weight, and the proportion of woolly or bristly fleece.

Selection decisions are based on the measurements of fleece characteristics and the selection pressure (culling).The performance data management (database, breeding value evaluation) and the reproductive programme (increase of the offspring number/selected animal) are the two selection tools used.

Angora rabbits in Finland

by Liisa Nurminen[1] & Arja Simola[2]
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1-Definition and choice of selection criteria

There are four different grades of angora rabbit fibres in Finland:

grade 1:

length > 6 cm, clear, untangled (loose).
The fibre is from females older than 8 months and younger than 4 years, and from males older than 8 months and younger than 3 years.

grade 2:

length < 6 cm but > 3 cm, clear, untangled.
The fibre is from female and males in breeding, males older than 3 years and females older than 4 years. The fleece is from the second shearing.

grade 3:

length < 3 cm, clear, softly matted.
The fibre is from the first shearing fleece.

grade 4:

The fibre is dirty, tangled and contaminated with vegetable matter.

2-Measurement of fleece characteristics : objective and non-objective measurement of fibre quality

1-Fibre:

The fineness (SFS 4463) and the length (SFS 5017) of fibre are measured. This is done by the Technical Research Centre of Finland (TRC), Tampere.
The bristle percentage is measured microscopically.

2-Fleece and product:

The non-objective measurement is done by the feeling of softness on the human skin (touch).
All the objective measurements (standing long wearing in the final product, standing capacity of scouring and felting ability) are done by TRC, Tampere.

Management of the collected data within a breed database

There is an ACCESS program for the data collection and management in the Agricultural Research Centre of Finland, Institute of Animal Production.

ULL10MATUM
Angora fibres in Norway

ULL10MATUM, a recent a "one woman company", was started by Anne Katrine Jensen. The idea of this company is to collect angora fibre from the producers, sort it and send it to a mill and have it spun or felted. The felt is used for soles and some of the yarn is sent to companies knitting socks or underwear.
Most of the yarn and the other products are sent back to the producers, who distribute them themselves. The rest is sold by ULL10MATUM through its own distribution channels.

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FINE WOOL FIBRE

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Selection criteria and fleece characteristics for the Finn sheep

by Marja-Leena Puntila
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1-Definition and choice of selection criteria:

The selection objectives are to develop a wool line for the Finn sheep nucleus flock. Research is orientated towards the quantity and quality of the wool. The selection criteria are:

- wool weight of ewes and lambs
- fleece characteristics (lambs)
- staple length
- fineness grade
- formation of staple (uniformity)
- density and lustre

Our target is to preserve the special characteristics of Finn sheep wool, such as softness, lightness, fineness, elasticity, lustre and different coloured types (pure black, brown and grey).

2-Measurement of fleece characteristics : objective and non-objective measurement of fibre quality

The objective measurements concern the staple length (cm). The average of three estimates measured by a ruler is taken. The fineness grading is subjective but it corresponds with a crimp frequency per 3 cm, so it is in-between objective and subjective measurements.

The subjective measurements are:

- density and lustre, scored originally as a point scale of 1-3 but now on a scale of 1-6.
- fineness, assessed according to grades (48-60), using the average of the estimates from front, mid-side and back of the animal.
- uniformity, based on fineness grades (point scale 1-3)

3-Management of the collected data within a breed database

After collection of the data, they are stored on a PC in the state farm by a technician, and sent to the Agricultural Research Centre for analyses.

Fine Wool in Portugal

by Luis Pinto de Andrade & João Pedro Várzea Rodrigues
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1-Introduction

In the last few years, world wool prices have declined. Furthermore, and unlike all other textile fibres and animal products, wool is not recognised as an agricultural product under the treaty of Rome. It cannot benefit therefore from any of the agricultural subsidies granted within the European Union. Since fine wool of high quality has been "rediscovered" by the fashion industry in recent years in many European countries, there is a potential demand for locally produced fine wool.

It is relevant to re-evaluate the present situation in what constitutes wool quality in order to improve, or at least maintain, the wool quality of some flocks, although it is necessary that herd books redefine and reintroduce "wool criteria" in genetic selection criteria so that breeding stock with improved wool characteristics may be identified. Premiums would provide an incentive to produce and disseminate approved breeding stock. This purpose fits into the national policy of conservation of genetic resources and autochtonous breeds. Therefore it is important to carry out an objective and directed survey of wool quality and to identify the best genetic basis in order to set up an initial fine wool flock ($\leq 20\mu m$).

2-Wool Chain

Since 1940, Portugal has had established a system for collecting (livestock co-operatives that also work as wool storage centres) and classifying wool (technicians from the Ministry of Agriculture), so that batches can be grouped for sale to industrial concerns.

Several scientific studies on wool quality and improvement were carried out from 1938 until the 1970's (Morais, 1938; 1947; 1951, Ferreira *et al*, 1974).
As we can see in Table 1 in a study done in 1938 in some areas of South Portugal, it was possible to find quite a reasonable percentage of animals with fine wool (15-20 μm). The genetic bases of these flocks (Portuguese white Merino) are still available since most farmers in this region have maintained pure-bred flocks.

Table 1-Proportion of animals with different fibre diameters in Southern Regions of Portugal

	Diameter			
	15-20μm (%)	20-25μm (%)	25-30μm (%)	30-40μm (%)
Regions				
Arraiolos	26.3	10.5	42.1	21.2
Evora	9.9	52.2	34.0	4.5
Reguengoa	20.0	58.2	20.	1.9

Source: Morais, 1938

Due to the existence of specialised technicians within the sector, the Ministry of Agriculture created a structure named "Wool Production and Marketing" in 1940, which was crucial to the qualitative and quantitative improvement of wool. The activities of those services has been developed in several ways:

- close connection with farmers among whom training was undertaken;
- setting up regional courses in sheep shearing;
- training of wool classifiers;
- organisation of all wool marketing through concentration, classification, storage and auctioning at a regional level;
- diffusion of scientific studies;
- farmer's aid in order to acquire selected animals;

As a consequence of this activity, the farmer's interest in the production of fine wool increased. The genetic improvement of flocks was widely accepted, leading to an increase in fine wool production.
Since 1974, the restructuration of the Ministry of Agriculture has resulted in a reduction in importance of the wool production sector. From 1974 till now, very few studies on wool fineness have been done and the technicians from the Ministry of Agriculture, responsible for grading wool, have lost the laboratory references for fineness. However, wool grading has continued to be undertaken, based on the considerable experience of the technicians.
During the last two decades, there has been little progress in this sector and there is a risk of losing all the knowledge when these few technicians retire. This will lead to a loss of all the work done throughout the last decades. Efforts must be made in order to reset the priorities of the wool sector, making good use of the existent knowledge and giving it a solid scientific basis.

3-Collected Wool:

In Portugal, the collection of the wool is done by farmers' associations in three different places in the south and centre border areas (Beja, Evora and Castelo Branco). It is predicted that only 15 to 20% of the total production is delivered to the collection points. In Table 2, the percentage distribution of classified wool between 1990 and 1997 can be seen. In the southern regions of the country (Evora and Beja), the percentage of AA wool (19-22 μm) lay between 35 to 45%. In the Castelo Branco region, the percentage of AA wool has decreased since 1990 (46.4%), reaching a minimum in 1995 (12.9%). This situation results from the crossbreeding between autochthonous and exotic breeds (Friesian, Manchego, Awassi and Assaf), which have been introduced to increase milk production.

Table 2- Changes in fineness of wool in the 1990's in the three places of collection (expressed as percentages)

	Evora			Beja			Castelo Branco		
Years	AA	A	B	AA	A	B	AA	A	B
1990	35.4	34.9	15.4	51.4	27.0	12.2	46.4	22.7	17.3
1991	44.9	20.3	20.8	42.8	24.9	15.1	34.2	29.6	14.4
1992	37.0	26.7	14.6	50.1	23.3	15.8	39.5	27.9	19.8
1993	40.5	29.1	15.5	54.8	17.6	8.40	29.0	28.6	25.0
1994	41.5	19.0	25.6	45.3	29.1	15.2	24.7	27.5	30.7
1995	47.7	25.1	19.0	49.0	26.5	9.20	12.9	32.5	31.1
1996	29.0	30.3	17.4	39.4	31.4	18.8	18.6	25.9	29.3
1997	34.3	35.9	18.9	41.6	31.6	15.3	28.3	24.5	24.4

AA-(19-22 μm); A-(>22-25 μm) and B-(>25-36 μm)
Source : Chabert, personal communication, 1997

In Table 3, the consolidated data shows a tendency for a percentage decrease in AA wool produced (44.4% in 1990 vs. 29.0% in 1996), which correspond to an increase in the production of A wool (>22-25 μm); B and D classes suffer slight changes. This tendency ought to be changed.

Table 3- Changes in the fineness of wool in the 1990's in Portugal (expressed as percentages).

Years	AA (19-22 μm)	A (>22-25 μm)	B (>25-36 μm)	D (Defective)
90	44.4	28.2	14.9	12.4
91	40.6	24.9	16.7	17.4
92	42.2	25.9	16.7	15.1
93	41.4	25.1	16.3	17.1
94	37.1	25.2	23.8	13.8
95	36.5	28.0	19.7	15.6
96	29.0	29.2	21.8	19.7
97	34.7	30.6	19.5	15.1

Source : Chabert, personal communication (1997)

4-Development Project

We are proposing a project "**Evaluation of fine wool production in Portugal**" that has been submitted to the framework **INTERREG II** to be implemented in the south and centre border areas of Portugal.

The goals are to:
-Evaluate the possibility to increase wool quality produced, associated with the preservation of biodiversity and autochthonous breeds;
-Identify the quality and quantity of fine wool produced in Portugal on the basis of data obtained on the three places of wool storage (Beja, Evora and Castelo Branco) and according to the official system of classification.

To achieve these goals, it is necessary to:
-Identify the local areas with higher percentages of fine wool and the producers that have, in their flocks, the highest percentage of these, according to the official system of classification;
-Characterise fine wool produced on the basis of diameter and length, from samples of wool obtained in the three places of wool storage and the identification of the animals producing fine wool in the flocks that have a high percentage of AA wool;
-Increase the economic yield of sheep producers and decrease the subsidy dependence through the production of high quality fine wool.

Projects to be implemented:
-The setting up of laboratory facilities (OFDA)
-Quantification of the fine wool production in the collection places;
-Evaluation of wool quality (standardisation of classification methods) by laboratory techniques according to IWTO;
-Correlation of AA class wool classified according to the official system of classification and according to the laboratory evaluated parameters;
-Identification of the flocks and animals producing extra AA wool;
-Setting up a Portuguese White Merino purebreed flock.

5-Participant institutions

The partner institutions in this project are the Ministry of Agriculture and the School of Agriculture of Castelo Branco. The following farmers associations also participate in the project: Ovinos do Sul da Beira (OVIBEIRA) and the Cooparativa Ovina de Evora (COE/UNICADE).
Broadly, these institutions are responsible for:

- evaluating the quality of the wool according to the methodology defined by the IWTO;
- classifying wool according to the official system;
- setting up regional databases in the national Merino breeds and herds;
- weighing, identifying and storing the fleeces;
- keeping computer data (classification/grading and weight) of the fleeces;
- selling the wool;
- setting up regional courses in sheep shearing.

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Note on the selection scheme for the Merino d'Arles breed

by Damien Theurkauff
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1-Priority : the index of milking value

The selection scheme for the Merino d'Arles is focused principally on improving milk yield and quality of ewes during their first month of lactation. The estimation of milk yield and quality is done indirectly by measuring lamb growth rate between 10 and 30 days. The ewes are then scored according to an index of milking value after considering other parameters. The highly scored ewes, say for example those with the best milking value after two lactations, are mated with rams descended from the best milking ewes.
The two other important criteria in the scheme are the growth of the lambs between 30 and 70 days, and the lack of seasonality (ability to reproduce from April to June).

2-The role of wool in the selection scheme:

Since the creation of the Unite de selection et de Promotion d'une Race Animale (UPRA) in 1977, breeders have been concerned with conserving the quality of the fleece and especially the fineness of the wool.
All the fleeces were scrutinised by a wool expert (C. Destouches) and labelled as either Merino d'Arles or not. This practice was contradictory to the priority of the selection scheme, since some hoggs could be refused because of the quality of their fleece although being daughters of good milking ewes. Also, some studies showed the limits of the reliability of the method based on human eye, whatever the expert (on a same animal, the scoring on fineness could be different from one day to the other, and very often, the results disagreed with the laboratory measurements).
Therefore, in order to maintain the good quality of the fleece, the UPRA started 4 or 5 years ago to send samples of wool to be analysed. The samples came from the sides of rams from the breeding centre that were potentially to be used by the Artificial Insemination Centre (58 analyses in 1996, mean of 20.6 microns, max 24.5, min 16.9). Rams with too coarse fleece were not used in AI, but were allowed to stay in the selection scheme.

3-In the future

The index of milking value remains the priority, the improvement in this criteria does not seem to affect the quality of wool. However, since this year, the board of directors of UPRA (with the influence of Dr Allain, INRA Toulouse, France) has decided to analyse wool fineness on all the future rams in the breeding centre. Rams which seem to affect badly the wool fineness will be withdrawn from the selection programme and sold to breeders who do commercial crossing.

Breeders who wish to work on the improvement of the fibre fineness will be able to choose rams with improved fineness of fibre and with average milking value. This approach will be continued, and it is emphasised, will be limited to rams selected for AI.

In the actual conditions of the market in the south east of France, cradle of the Merino d'Arles breed, investment in equipment and genetic improvement will not show a quick improvement in fleece value.

This work will only find its value if in the next few years, breeders support improving the breed. Some people have already done so. We thank them for it. We hope they will carry on to support them and that others will soon join them.

Scottish Fine Wool Producers

by Fergus Wood
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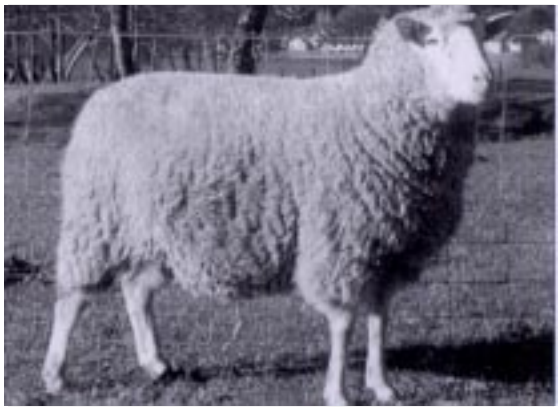
For too long British sheep farmers have seen little or no value in their wool cheque. There was a time when the wool cheque traditionally paid the farm rent—those days are long gone and wool sales contribute only some 3% to a farmer's income from his sheep.

However, an exciting Scottish initiative has now put high value wool grown in Scotland back in the market place with the introduction of new Scottish crossbred ewe, the **Lomond Halfbred**. This ewe fulfils the traditional role of the Mule and Scottish Halfbred, the production of prime lamb, and, in addition, also produces a high-value fleece worth up to £12 per annum.

For 6 years, the Scottish Fine Wool Project - now renamed Scottish Fine Wool Producers - experimented with a variety of Merino sires crossed on to Shetland and North Country Cheviot ewes. This initial work resulted in the development of the Lomond ram, which has both the fine wool bloodlines of the Australian Merino and the conformation and prolificacy of the Northern European Merino. By using the Lomond over Shetland or North Country Cheviot ewes - the two finest-woolled native breeds in Scotland - the resultant Lomond Haldbred ewe is produced. This ewe is then crossed with a suitable terminal sire to produce finished lambs.

The extra profit comes not only from the Lomond Halfbred's valuable fleece. The Halfbred wether lambs are shorn before slaughter (giving a fleece worth £5), the ewes are winter-shorn as hoggs and again before going to the ram (the combined value averaging £12) and the twin lambs from the Lomond Halfbred are also worth shearing before slaughter (bringing a further £8).

Scottish Fine Wool Producers currently have some 24 farmers members throughout Scotland. Members are provided with rams free of charge and a free wool diagnostic service, using the fibre laboratory at the Macaulay Land Use Research Institute in Aberdeen. An exclusive contract for the wool, which is sold through the British Wool Marketing Board, has been signed with two Scottish Textile manufacturers for five years, through the auspices of the British Wool Marketing Board, guaranteeing a premium price for the wool.



Fine wool producers of Europe

At the recent meeting of the European Fine Fibre Network in Villaviciosa, Spain (10-11 October 1997) it was decided that the various interests of European producers of fine and speciality wools would be best served by the formation of a new group - Fine Wool Producers of Europe

The aims of this Association will be to:

- assure standardisation of quality specifications for fine wools produced in Europe
- provide a focus for efforts to secure support for the development of the wool filière for fine and speciality wools
- to provide information on the use of EU and national funding for wool filière related projects
- establish a database of the European fine wool flock
- promote awareness of quality fine wool production in EU
- develop co-ordinated marketing strategies and links with processors of European wools

It is intended that Fine Wool Producers of Europe will play a complementary role within the more general campaign to promote improved marketing of all European wools.

The founder members of the association are located in Scotland, France, Spain, Portugal, Germany, Italy and Finland.

MOHAIR FIBRE

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A genetic database for performance recording in Danish Angora goats

by Annette Holmenlund, Marie E. Kielsgaard and Jørn Perdersen
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Summary

The Danish Goat Registration System is a database storing data on pedigree, reproduction, growth rates, mohair yields, mohair quality and health.

The database is based on an unambiguous identification system for individuals and on the farmers' own recordings of breeding and production data. The data stored in the database is used as documentation of pedigree, to estimate indexes and to produce management information for farmers.

The Goat Registration System has been developed since 1992 and today 227 Angora herds are in the system, including 25 Swedish and 7 Norwegians herds. The Nordic Angora goat population consists of many small herds (a total of 4,277 Angoras). This is one of the reasons why we have developed a genetic indexation system over the past 2 years, enabling us to compare animals from different herds and to find the best bucks and does in the Nordic countries. This will ensure the best possible basis for breeding progress and thus a profitable mohair production.

How then can we incorporate more figures about mohair quality into the goat registration system? This is one of the main questions to be dealt with in the next two years. We have defined two pre-conditions. Firstly, we would rather accept many quality figures and thus a higher degree of unreliability on the figures than vice versa and secondly, the method should be cheap, simple and user-friendly in order to get full breeder support.

Introduction

Since 1991, the Danish Angora goat breeders have reported their pedigree, breeding and production data to the computer-based goat registration program which also stores all pedigree data on live animals and embryos imported since 1987.

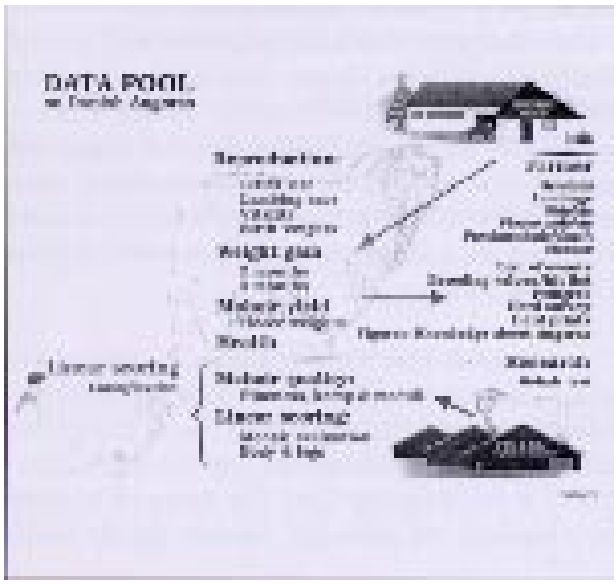
The purpose of the goat registration programme is to develop profitable mohair production, both through breeding and production through the development of breeding values and management information for farmers.

Two hundreds and twenty seven Angora herds, together with twenty five Swedish and Norwegian herds, are using the goat registration programme. The Danish, Swedish and Norwegian Angora goat population total 4,277 live Angora goats (2,777 does) and is thus characterised by many small herds. Eighty-six per cent had between 0-9 kiddings per herd (1995). The Angora goat population consists mainly of Angoras of the Australasian type imported from New Zealand and they are at present being upgraded using Angoras of the Texas and South African types imported in 1992 and 1993 from Australian and New Zealand, respectively.

The goat registration programme is being currently developed and the latest initiatives are the development of linear classification, breeding values (Pedersen, 1994) and "Herd Prints".

Figure 1 shows the inputs and outputs in the goat registration system.

Figure 1. Database on Danish Angoras



2-Input

The goat registration system is based on an unambiguous nine-digit eartag number which follows the animal from birth to death. It also includes the goat owners' own records of matings (inclusive of the buck's ID), kiddings (kidding ease, mortality, birth weight and ID of the kid), the kid's weights at 2 and 4 months, all fleece weights, disease records, purchase, sale and deaths. Furthermore classification results and mohair test results are recorded.
All records are always linked to the unambiguous eartag number of the animal and to the date of the event, e.g. date of kidding and date of shearing.

3-Output

From the goat registration system, the herd owner gets:

- pedigrees, among other things containing a 4-generation pedigree, classification results, mohair test, breeding values, etc.
- estimated breeding values for all animals so that they can be compared with other Danish Angoras.
- hit lists of the best bucks and does in Denmark
- Herd Prints where the lists to be printed can be designed according to the wishes of the herd owner, lists of, for instance, pedigrees, surveys, lambings, services, mohair test, classification, etc.
- know-how about Angoras in Denmark.

The purpose of Herd Prints is that the lists can be adapted to the day-to-day needs of the individual farmer and they can replace some paper work.

4-Mohair yield and quality

Mohair production consists of two parameters, yield (quantity) and quality. The Angora herds report the fleece weights of every shearing which takes place twice a year - the first one at the age of 5-7 months. A total of 3,136 fleece weights was reported in the period from 1 September 1994 to 31 August 1995.
The quality of the mohair is measured objectively through a mohair test and subjectively through a classification scheme. The mohair test is analysed at the National Research Centre, Foulum and includes fibre diameter, standard deviation of the fibre diameter, percentage kemp and medullation and per cent roundness. A total of 375 mohair samples has been analysed since it started.
The linear classification results are divided into a figure for body and legs and a figure evaluating the mohair quality: fibre fineness, kemp and medullation, lustre, lanolin, style, character and cover. One hundred and fifty seven animals were recorded in 21 herds in 1995 when linear classification was introduced.

As both mohair yield and fibre fineness are two important economic production parameters, it is important that as many data as possible are collected on these two parameters. It would be a major progress if more data on mohair quality was available in the database.
At the beginning of 1996, our knowledge on Angoras will be further extended as data on three different types of Angoras and their crossbreeds will be analysed.

5-Indexes in Angora breeding

Figure 2 shows a survey of the measurements included in the calculations and the indices estimated and published on each individual goat. The traits are divided into 5 main categories:

Female traits:

- Litter size, total number of kids born, number of stillborn
- Mortality or number of stillborn kids
- Kidding ease

The animal's own traits:

- Kid mortality
- Kidding ease
- Weight at 4 months

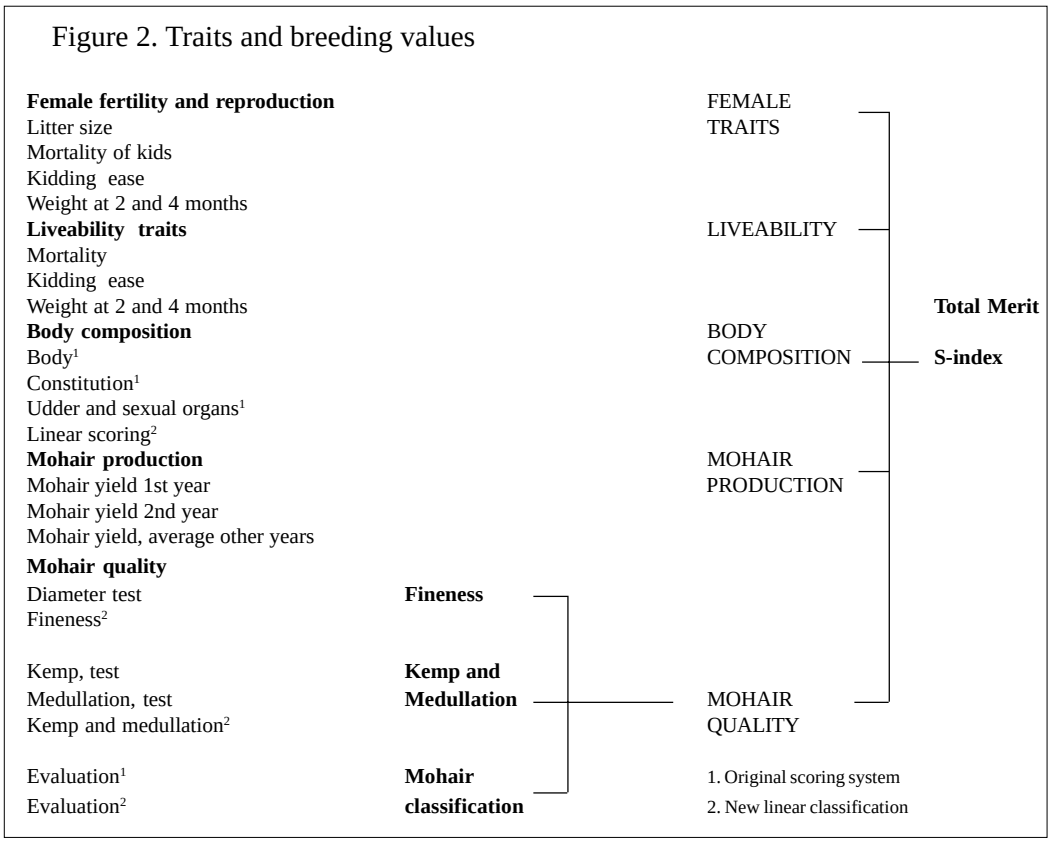
Conformation of body etc.

- Score for body, original classification system
- Score for constitution, original classification system
- Score for udder and sexual organs, original classification system
- Linear classification of body and legs

Mohair production

- First-year mohair production
- Second-year mohair production
- Average of all following years

Figure 2. Traits and breeding values



Mohair quality

- Fineness, original scoring system
- Measured fibre diameter
- Linear classification of fineness

Kemp and medullation

- Measured percentage of kemp
- Measured percentage of medullation
- Linear classification of kemp and medullation

Mohair evaluation

- Mohair evaluation from original classification system
- Linear classification of other mohair characters (lustre, lanolin, style and character).

Besides the 5 main indexes and the 3 sub-indexes describing the mohair quality, a total breeding index is estimated, the S-index, combining all the indexes. Like sheep and beef cattle breeding, Angora goat breeding is characterised by a very limited number of artificial inseminations. Therefore the breeding animals have only a small number of progeny, often born in one herd. Normally, this has the effect that it is very difficult to estimate breeding values which can be compared -from one herd to another and for animals born in different years. In connection with sale or exchange of breeding stock -and perhaps insemination - some relationships will however be established with other herds. It is thus possible to estimate fairly reliable breeding values.

The estimated breeding values make allowance for the heritabilities of the traits and the known relationships and at the same time a correction is made for systematic environmental impacts. These corrections have the effect that results collected in different environmental conditions (e.g. herds) and for different categories of animals (e.g. sex and age) can be compared.

Figure 2 showed the records for individuals. In order to combine these traits into indices, each individual trait is weighted. This weighting is as far as possible based on studies of the economic value of the traits. The economic values are listed in Table 1.

Table 1. Economic values used for index

Litter size	DKK 300.00/kid
Mortality at birth, mothering trait	DKK 400.00/kid
Kidding ease, mothering trait	DKK 200.00/kid
Weight at 2 months	DKK 2.50/kg
Mortality at birth, own trait	DKK 400.00/kid
Kidding ease, own trait	DKK 200.00/code unit
Weight at 4 months	DKK 2.50/kg
Body, original classification system	DKK 10.00/point
Constitution, original classification	DKK 2.50/point
Udder and sexual organs, original classification system	DKK 2.50/point
Body, linear classification	DKK 2.50/point
Mohair, first year	DKK 250.00/kg
Mohair, second year	DKK 125.00/kg
Mohair, average following years	DKK 62.50/kg
Diameter, measured	DKK -50/my
Fineness, linear classification	DKK 4.90/point
Kemp, measured	DKK -15.00/percent
Medullation, measured	DKK -15.00/percent
Kemp and medullation, linear classification	DKK 2.50/point
Mohair evaluation, original classification system	DKK 15.00/point
Mohair evaluation, linear classification	DKK 2.00/point

Table 2 shows the average indices of all Angora goats born during the past 6 years.
When comparing the results of the different years, we can estimate the breeding progress being achieved. According to Table 2, Angora breeding activities have been based on the evaluation of the mohair. Progress has also been achieved in the field of production and fineness because there is a positive correlation between the evaluation of mohair and the mohair quality.
The purpose of estimating the S-index is to increase the total breeding progress in the years to come. It should be possible to heavily improve production figures and fineness while, at the same time, maintaining or moderately improving mothering traits and liveability.

Table 2. Average of indices for birth year and breeding progress per year (1990-1995)

	1990	1992	1994	1996	1997	Average change per year *
Number of animals	651	1824	1584	1408	1387	-
S-index	98.7	99.5	104.9	108.9	111.5	2.1
Female traits	100.6	101.6	99.1	98.7	98.9	-0.2
Liveability	98.5	99.6	101.4	103.0	102.6	0.4
Body	100.0	99.3	101.0	101.8	101.2	0.3
Mohair production	99.6	100.5	102.4	104.5	107.0	1.2
Mohair quality	98.8	100.7	102.4	103.9	104.6	0.8
Fineness	99.5	99.3	100.0	99.8	99.6	0.0
Kemp & medullation	99.8	99.7	101.9	103.6	104.0	0.8
Evaluation	98.3	99.9	104.5	107.5	109.1	1.6
Reliability	12.4	12.8	9.9	8.3	7.4	-

* Calculated by means of regression analysis

Table 3 shows a list of the very best proven bucks as they are published. Similar lists are published for the young improved bucks and for the goats.

6-Future

The goat registration system has been developed since 1991 and the most important task in the two coming years will be **How do we incorporate more mohair quality figures into the system?**

Pre-conditions

It would be better to have many quality figures and accept a higher degree of unreliability than vice versa. The method must be cheap, simple and user friendly in order to get full breeder support.

Some of the questions we have to deal with are:

- How can we obtain more information on quality? We could use mohair test, classifications on live animal or on the shorn fleeces.
- At what age should quality be measured? How is the genetic and phenotypic relationship between quality measured at different ages? We would like to have the results on quality as early as possible in order to reduce the generation interval.
- Who is to collect the quality results? Are the selected persons going to make the quality evaluations or can the herd owner take samples for mohair tests and evaluate the quality subjectively?
- Development of a breeding plan for Danish Mohair with a systematic testing programme for young bucks.

Other questions to be considered:

- How do we include the coefficient of variation of the mohair test in the breeding values as an expression of the homogeneity of the fibres?
- Should we calculate breeding values for percent purity or lanolin content - or should we correct fleece weight for effect of purity and lanolin content?
- How is fibre roundness of the mohair test correlated to style and character?
- How large is the correlation between mohair test results, linear assessment of live animals and classification of the fleeces?
- Is it possible to get reliable estimates of breeding values for mohair quantity and quality by means of skin biopsies from very young animals?

Concerning the dissemination of information, we will produce advisory leaflets, slides, videos about the registration scheme, papers on the registration, breeding values, mohair sampling, shearing, treatment of fleeces after shearing, etc.

7-References

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Angora goat in France

by Daniel Allain [1] and Jean-Michel Roguet [2]
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1-General Presentation

The population of Angora goats in France is about 8000 pure bred animals, on 180 farms. The production of mohair is 30 tonnes per year. It is graded and processed centrally and the final product is sold directly to consumers.

The breeding objective is to have an 18-month angora goat producing a high clean fleece weight, with an average fibre diameter less than 30 microns, free of kemp and medulation.

A National Selection Scheme does exist in France. It involves an open nucleus population of 5000 pure breed animals, including 1500 breeding females, based on 50 farms. A performance recording system and a genetic database are in place, which allow a breeding value evaluation.

2-The production criteria

The mohair quantity (fleece weight) is the main determinant income. The mohair quality is the key factor for final textile use. The mohair quality is assessed through the fibre diameter (mean less than 26 microns up to 38 microns) and homogeneity, the pureness (yield of clean mohair and rate of undesirable fibres) and some other characteristics such as fibre length, lustre, softness and colour. The final textile use depends on the process used (woollen or combing, weaving or knitting), the fineness and solidity of the yarn, the spinning yield (content of ash,

fat and vegetable matter), the dying faults (medulated and pigmented fibres) and the specific textile use. The meat and skin bring an additional income.

3-The French Angora goat breeding scheme:

3-1-Performance recording system

On the farm, there is an individual registration, with a number tattooed on ears at weaning. The pedigree and reproduction information are collected via the recording of the date of mating and the sire identification, as well as the date of kidding and the litter size. The shearing is done at 6 month intervals, the date and greasy fleece weight are noted.

The fleece assessment is done by a scoring committee, at 15-18 months of age. There is first a visual judgement, concerning the lock type and its uniformity over the body, the body cover and the kemp score. The objective measurements concern the staple length on the shoulder, the yield of clean mohair and the fibre diameter distribution.

3-2-Fleece characteristics measurements

The objective measurements are, on the farm, the staple length at the shoulder and the greasy fleece weight. In the laboratory, the yield of clean mohair (ITF-INRA method) and the mean fibre diameter and fibre distribution (OFDA method) are measured.

For the fleece assessment, the lock type and its uniformity over 4 zones on the body are studied (flat, crimp or twisted). The kemp is scored from 1 to 5, on 5 zones over the body. The body cover is scored from 1 to 10.

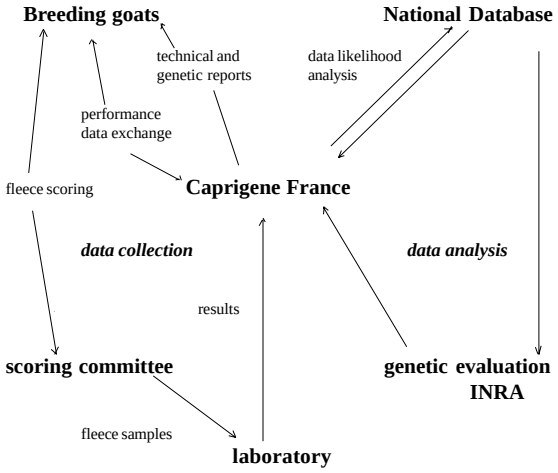
3-3-The genetic database structure

There are 10 independent files, concerning the pedigree, the fleece weight, the fleece assessment, the fleece measurement, reproductive performance, the farm identification, the animal identification, the animal location, the breeding buck and the animal's breeding value.

The database was created in 1988. The data collection allows a regular information exchange (paper listing, disk) between the database and the farm, the laboratory or the scoring committee. It is an aid to the farmers, via data analysis, annual technical reports and the breeding value estimation.

3-4-Performance data flow

The figure below gives a description of the flows of performance data.



3-5-New requirements:

Concerning the fibre measurements, the medulation (kemp and medulated fibre rate) needs to be measured. The homogeneity of the fleece should be assessed, with a mean fibre diameter, fibre distribution and medulation over the body, a fleece sampling ought to be done, but what would be the cost per animal? The animal age at the fibre measurement should be recorded.

Concerning the genetic database, it would be sensible to develop a relational database and to improve the data flow (automatisation of the data collection, use of modern telecommunication, such as videotex or Internet).

3-6-Buck testing station

It was created in 1995. Thirty bucks, aged 1 year, were admitted in February. They needed one month of adaptation. A testing period of 5 months from March to August was scheduled. The fleece assessment was done before and after the testing period. It included the recording of greasy and clean fleece weight, the mean fibre diameter distribution, the kemp score, fleece homogeneity, the style and character, body cover and staple length. The culling rate was 20%.

4-Improvement programme for angora goats

4-1-Selection goals:

To improve the fibre traits, both quantity and quality, via the fleece weight, fibre diameter and medulation content.

To improve the general productivity, in term of reproduction and body growth.

4-2-Selection decisions

To improve the fleece characteristic measurements, the selection pressure and culling.

4-3-Selection tools

Concerning the performance data management, the objectives are to improve the performance recording, the database and the breeding value estimation. For the reproductive programme, the idea is to increase the offspring number per selected animal.

OTHERS FIBRES

Prospects of camelid fibre production in the Andean regions of Bolivia

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The largest population of llamas, consisting of about 2 million heads, is located in the Andean regions of Bolivia at elevations of 3800 m above sea level and higher. In these regions, llamas contribute substantially to the economy of marginal production systems in a range of extreme environments that limit the development of other types of livestock.

The fleece of llamas, in contrast to that of alpacas, is lighter, double-coated, and its fibres coarser and more heterogeneous (Telleria, 1973). These characteristics have prevented wider utilisation of llama fibres by the textile industry. New industrialised machines that can dehair the llama fleece, have been developed, thus permitting direct inclusion of the finer fibres in textiles tops and offering promising prospects for llama producers.

This work will be conducted with the objective to identify prospects and strategies for the development of fine fibre production with llamas and the market will be surveyed in Europe, whose textile industry is the world's major user of camelid hair.

A-Definition and choice of selection criteria

- mean diameter and diameter distribution
- undercoat fleece yield and mean diameter (not greasy fleece weight and yield)

B-Measurement of fleece characteristics.

Objective measurement of fibre quality

- mean diameter and diameter distribution
- undercoat fleece yields
- undercoat length
- guard hair length
- crimp
- medullation
- thermoinsulation

Non-objective measurement of fibre quality

- lustre
- colour
- subjective appraisal of fleece type (style, character, handle)

C-Management of the collected data within a database

Fibre samples will be obtained from midsides of 200 llamas (50% Th'ampullis and 50% Kh'aras) because the samples from withers and midsides are more representative, because of their higher heterogeneity (lower coefficients of variation).

Sampling criteria: Age, sex and colour

Sampling age categories: at ages 1, 2, 3, 4 and older than 5 years

Database:

1-Pedigree information
2-Weight gain
3-Reproduction rate
4-Fibre traits:
4.1-Subjective appraisal of fleece type
style, handle, character
4.2-Fleece quantity
· greasy fleece weight and yield
· undercoat fleece yield
4.3-Fleece quality traits:
· mean diameter and diameter distribu tion
· mean diameter of undercoat fleece
· undercoat length
· guard hair length
· colour
· crimp
· medullation
· lustre
· thermoinsulation

Selection index for improvement of Mongolian cashmere goat performance

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Introduction

Mongolia produces about 25 per cent of the world's cashmere production. In the last five years, there has been a 66 per cent increase in the production of raw cashmere. Cashmere has quickly established itself as a major export product. The increase in cashmere is mainly conditioned by the increase in goat numbers which may effect negatively the balance of nature and ecology and herd composition of traditionally five kinds of animals. At present, goat breeders are attempting to improve the genetic potential of their goats but the lack of genetic and phenotypic parameters precludes the design of selection and breeding programmes.

There have been few reports published in the world on inheritance of cashmere production (Miller, 1986). Researchers have estimated the heritability of combed cashmere weight in Indian Changtang goat and of sheared weight in Australian feral ones (Pattie *et al*, 1989).

A research project which aims to determine the inheritance of production characteristics of Mongolian goats has been carried out since 1991 at the experimental farm "Zaamar", Mongolia. This paper presents genetic and phenotypic correlations and a selection index for estimating the breeding value of Mongolian goats.

Materials and methods

Records for production characteristics of 68 offspring in their first year, obtained from 4 sires, have been used in the study. Heritability, phenotypic and genetic correlations of production characteristics were estimated by paternal half-sib correlations. The economic value of down weight was calculated from current Mongolian market values. The eco-

nomic value of down diameter was calculated assuming a linear relationship between down diameter and average cashmere price across the 3 current payment bands and assuming average yield. The full index including the three traits was calculated using the matrix technique as described by Cunningham (1972).

Results and discussion

Heritability for productivity is classed as follows: high for down weight, moderate for down diameter and weak for down length and live weight (Table 1). There was strong positive genetic and phenotypic correlation between live weight and down weight. In contrast, there were weak positive genetic correlations between down diameter and both down diameter and down length, and finally, a negative weak correlation between down diameter and live weight. There is no estimate of heritabilities for production characteristics of Mongolian goats in the literature.

Heritabilities of traits, except down weight for Mongolian goats, are lower than those for Australian feral goats (Pattie *et al*, 1989), Australian cashmere goats and New Zealand cashmere goats. They used sheared and dehaired fibres for their estimates.

Table 1. Some phenotypic and genotypic parameters for production characteristics for one year old offspring.

Traits	Live weight (kg)	Down weight (g)	Down diameter (μm)	Down length (mm)
Mean	21.3±0.43*	223.8±6.5*	14.67±0.06*	52.7±0.65*
Live weight	0.07	0.08	-0.10	0.36
Down weight	0.24	0.76	0.02	0.54
Down diameter	-0.27	0.12	0.24	0.10
Down length	0.52	0.94	0.15	0.12

Heritability (on diagonal), phenotypic (above diagonal) and genotypic (below diagonal) correlations. * standard error.

The strong phenotypic and genetic correlations between down weight and length of down indicate that the latter may be used as an indirect indicator of down weight for preliminary selection. The selection of goats with above-average down length relative to its contemporaries will also result in the selection of an animal with above-average down weight. Our findings are in a good agreement with those of Pattie *et al* (1989) in this respect. It is possible to improve down production of Mongolian goats while maintaining or not decreasing live weight and fibre quality. In particular, there is a considerable scope to increase down weight by mass selection.

Table 2 shows a full selection index including three traits and the expected responses. Down weight had a high relative importance as compared to the other traits indicating that it makes the largest contribution to the genetic gain when selection is applied. Little is lost if diameter or live weight are omitted from the index.

Table 2. Selection index for Mongolian goats

Traits	live weight (kg)			down weight (g)			down diameter (mm)			$R_I H$
	b	v%	ER	b	v%	ER	b	v%	ER	
Full index	0.386	0.024	0.130	0.773	88.69	40.21	1.399	0.035	0.044	0.869

b- partial regression coefficients
v%- percentage reduction in rate of expected response for aggregate genotype when variate is dropped.
ER- expected response in each trait in actual units of measurement.

Use of this selection index would combine the simultaneous genetic improvement of above mentioned three traits in an optimum way.

Conclusions

Results arising from our study provide the necessary basis for the design of efficient selection programmes for experimental goat flocks. Some preliminary phenotypic and genetic parameters now available allow the estimation of breeding values for production characteristics and the construction of a selection index.

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Shahtoosh fibres

by Prof. Kenneth D. Langley
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Introduction

Very fine diameter fibres, known as *Shahtoosh*, are used in the production of Kashmiri shawls, including the famous *ring shawl*, so-called because the shawls can be pulled through a finger ring. However, the trade in *Shahtoosh* is illegal.

Survey of Literature

In early works describing the analysis of cashmere and other down producing animals, Young (1,2) mentioned *ring shawls*, and speculated that the fibre came from a goat. In that study, over 100 fibre samples were tested, one of which was described as Shah Tosa super fine cashmere. These had a mean fibre diameter (MFD) of 11.45 microns. The standard deviation (S) and coefficient of variation (CV) were 1.78 microns and 15.55%. This compares to MFD=13.10 microns, S=2.50 microns, CV=19.08% for the finest Chinese cashmere in that study. It also was noted that the fibres' scales has an appearance different from that of cashmere. However, at that time, the connection was not made between those very fine fibres and the *ring shawls*. Now it has been established that these shawls are made from fibres called *Shahtoosh*, the undercoat of the Tibetan Antelope.

The Tibetan Antelope is the common name for Pantholops hodgsonii, 1834, Order Artiodactyla/ Family Bovidae (3). It is also known as *Chiru and Orongo*. The animal lives in the Chang Tang plateau of northern Tibet at an altitude of over 5000 metres in herds numbering about 2000-8000 (4). The mean shoulder height and weights of adults were reported as 94 cm and 36 kg (5). The animal are killed for their fibre (approximately 150 g per animal) which reportedly has been shipped through Nepal and then to Kashmir for spinning and weaving (4). The commerce of this fibre is illegal under the Convention of International Trade in Endangered Species of Wild Fauna and Flora (CITES).

The World Conservation Monitoring Centre (6) maintains a Red List, which gives Pantholops hodgsonii Vulnerable status (http://www.wcmc.org.uk). This animal also has been placed on the World Wildlife Fund list of the nine most threatened species by illegal and unsustainable trade (7). The Pantholops are closely related to the Saiga Tatarica of which there are two subspecies, the saiga Antelope whose range is Mongolia and China, and the Russian saiga Antelope of Siberia. Examples of both Saiga subspecies are maintained by zoological societies (8).

Fibre analysis

We examined reference samples of *Shahtoosh* fibre, colour light brown. The diameter measurements of N=500 fibres, using projection microscopy, produced the following statistics which are close to those of Young (1952):

Mean fibre diameter	11.55 μm
Median diameter	11.25 μm
Standard deviation	1.99 μm
Coefficient of variation	17.21%
Minimum diameter	6.25 μm
Maximum diameter	16.25 μm
Skewness	-0.0963

It can be confirmed that the scale structure differs from that of cashmere: *Shahtoosh* has an irregular waved mosaic pattern, with a mean scale length of approximately 18.8 μm (5.3 scales/100 μm), S=2.36 μm, based on sample size N=100.

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Training courses/technical exchange visits

The EFFN has funds for the provision of a limited number of training visits by Network members -- or their staff and students -- for the purpose of measuring, to institutions in others EC countries. These visits or courses are in the use of OFDA technology in research institutes, extension services, producers organisations and manufacturers. The grants are therefore intended for organisations, who are using OFDA methodology, to run courses and for visits by staff from organisations setting up the new technology to those organisations.

Proposals for funding should include:

1-date of the visits and the outline of the activities that are planned,
2-the full address of the institute(s) to be visited and the contact name(s) there,
3-a description of the applicant's background and current interests and what he/she hopes to gain from the visit,
4-a budget showing all the expenses that will be claimed. The appropriate APEX air fare may be claimed for international travel. Within the destination country, reasonable travel expenses may be claimed. A subsistance allowance to cover hotels and meals may be charged at a rate of up to 75 ECU per day, and
5-an acknowledgment from the host institution that they have been consulted and agree with the proposal.

Following the visit, a short report should be sent to the Project Co-ordinator.

Applications should be sent to "Dr John Milne, EFFN Co-ordinator, MLURI, Craigiebuckler, Aberdeen, AB15 8QH, Scotland, UK". They should arrive not later than 6 weeks before the proposed departure date.

EFFN on the Web !

http://www.mluri.sari.ac.uk/~mi573/

EFFN 's site on the World Wide Web provides:

- Information about the project's activities and the partners involved
- Details and reports of the workshops to be held
- Details of the published newsletters
- Details of latest developments on *EFFN* 's ***What's new?*** page

Any suggestions for the design or content of this site are more than welcome, especially any addition to the ***Other Links on Fibre*** page!