BREEDING FOR FIBRE AND FUR

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The objective of this workshop is to review recent information in the field of genetic improvement of different animal fibres and furs.

The topic is so wide and complex and includes so many different animal species and production systems that it is not possible to cover it comprehensively within the limits of the session.

In this introductory paper we describe some aspects of the world production and improvement of animal fibres, to provide a general framework as a contribution to a better understanding of the whole session. The excellent review by Dr Borsting on fur breeding excuses us from making any further comments on that field.

FIBRE PRODUCTION

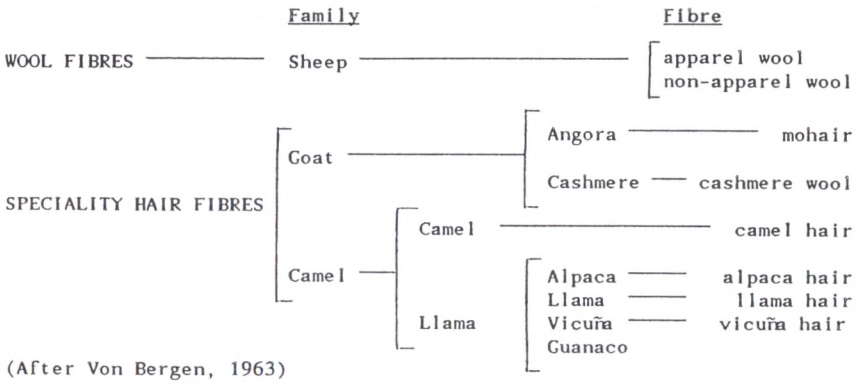
The total amount of fibre produced in the world in 1989 is estimated to be 37,500 million kg, of which approximately 50% corresponds to natural fibres (see Table 1).

Table 1 Global Fibre Production (million kg)

Natural Fibres	
Cotton	17.400
Wool	1.900
Mohair	18
Cashmere	4,5
Alpaca	2,5
Camel hair	2
Silk	65
Flax	715
Subtotal	20.107
Manmade Fibres	
Synthetic	14.500
Cellulosic	2.840
Subtotal	17.340
TOTAL	37.447

Fibres from animal origin represent approximately 5% of total world fibre production, wool being by far the most important animal fibre.

The chart below, adapted from Von Bergen (1963), shows animals yielding the different types of fibres: wool fibres and speciality hair fibres.



(After Von Bergen, 1963)

Wool

The paper by Ponzoni *et al.* in this workshop reviews and updates very thoroughly most of the information on the genetic improvement of wool production in the main producing countries of the southern hemisphere.

The genetic improvement of wool is, however, only a part of the breeding objective in sheep production systems where income derives from wool and meat. Thus, the formal definition of breeding objectives for wool producing systems normally also includes traits related to reproductive and growth traits (Morris *et al.*, 1982; Ponzoni, 1986; Cardellino and Ponzoni, 1986).

The improvement in the production of wool, which is a raw material for the textile industry in the manufacturing of different products, takes into account quantity and quality traits. The major changes that have occurred in the wool industry have led to an increased use of objective measurements of quality traits that affect processing performance for marketing purposes. In this context it is possible to establish more clearly the relative economic importance of different quality traits which is a necessary step in the definition of breeding objectives.

So far the market signals are clear with regard to fibre diameter which is the main determinant of the end use of wool, and is the only wool quality trait formally included in selection indices provided by national performance recording schemes for apparel wools such as Woolplan in Australia, Animal Plan in New Zealand and the Flock-Testing Service in Uruguay. However, as suggested in Ponzoni's paper, it is likely that the economic importance of more attributes will become clearer in the future, so it is reasonable to examine the possibility of genetically improving other raw wool quality traits.

In recent years there have been major developments in establishing a methodology for a formal definition of breeding objectives (Ponzoni, 1979) and also in the implementation of measurement techniques or genetic parameter estimates, but the substance of the recommended practical

breeding plans has remained much the same. A more general adoption of fleece measurements as a selection aid has been recognized in Australia (McGuirk, 1987) and Uruguay (Cardellino, 1989).

Cashmere and Mohair

The available genetic information for the development of cashmere and mohair breeding programs is reviewed in the paper by Pattie *et al.* The relative importance of the two main goat fibres is smaller than the production of wool and restricted to fewer countries.

Cashmere, one of the finest and softest animal fibre, is the down fibre of the goat *Capra hircus laniger*. Most of the commercial production comes from the mountainous regions and high plateaus of Asia (China, Mongolia, Iran) but available technical information on genetic aspects of cashmere production comes from Australia and New Zealand where production started in recent years. This information suggests the existence of considerable genetic variation among cashmere goats but also an unfavourable genetic relationship between down weight and fibre diameter.

The mohair is the full fleece produced by the Angora goat (*Capra hircus aegagrus*) and is the main speciality hair fibre. Commercial production comes mainly from South Africa, USA and Turkey. The review by Pattie *et al.* analyses the logical steps in the design of breeding programmes, that is: definition of breeding objectives, selection criteria and development of breeding plans.

Recommended fibre quality traits to be included in the breeding objectives are fibre diameter and percentage of medullated fibres. Heritability estimates for fleece traits are of moderate size but estimates of genetic correlations are scarce and not precise.

Camelids Hair

The Southern American Camelids comprise four main species: the alpaca (*Lama pacos*), llama (*Lama glama*), guanaco (*Lama guanicoe*) and vicuña (*Vicugna vicugna*). The llama and alpaca are domesticated while the latter two are wild, located in the Andean highlands of Perú, Bolivia, Argentina and Chile. The species with more specific importance to the textile industry is the alpaca, which produces a fleece of 26 microns and 10 to 15 cm of length on average. Alpaca fibre is normally medullated, with a great strength but very light and soft to touch (Marshall, 1988).

Genetic information on the inheritance of traits is very scarce, but preliminary estimates of the heritability of fleece weight in Perú indicate values of 0.35 (Novoa, 1989). The demand for white fibre greatly reduced colour variation, by simple breeding of white to white, and this seems to be the only breeding programme pursued by alpaca breeders. A combination of problems, in particular the low fertility levels, are a strong restriction to any selection programme.

Camel's hair wool is the short, soft down fleece of great fineness produced by two kinds of camels: the Dromedary (*Camelus dromedarius*) and the Bactrian camel (*Camel bactrianus*). The main suppliers are China, Mongolia, Iran and Afghanistan. There is no available technical information with regard to the genetics of production.

It is likely that the socieconomic environment in which fibre from camelids is produced in Asia or in South America imposes severe limitations to conventional breeding programmes that might be proposed.

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