CONTRACT REVIEW

SPECIALIST FIBRE PRODUCTION AND MARKETING

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SUMMARY

Developments, advances and prospects for the Australian speciality fibre producing mohair and carpet wool industries and prospective angora (rabbit) and alpaca fibre industries are described.

The uses of mohair, new product development and developments within the Australian industry including improvements in mohair marketing and uses of objective mohair testing are discussed. The increase in knowledge, since 1980, of grazing and nutritional requirements, methods of improving mohair quality and the availability and use of new genetic material are reviewed.

The origin of carpet wool sheep and their management requirements are reviewed. The uses and processing of carpet wool, and the complexity of carpet production and design are discussed. Improvements in carpet wool specification and marketing are reviewed. Breeding requirements for speciality carpet wool are defined. Origin, uses, world production and prospects of angora (rabbit) and alpaca fibre production are briefly reviewed.

Keywords: mohair, carpet wool, angora, alpaca, marketing, processing, product development, fibre quality, industry development, grazing management, genetic improvement.

INTRODUCTION

Speciality natural fibres have received increased attention in the agricultural community since the wool price crisis of the early 1970s. Speciality fibres are most commonly blended with wool and increase the range of processing capabilities of the wool textile industry. Smith (1988) recently reviewed the world production of speciality fibres but excluded speciality carpet wool. This review will discuss advances in 2 newly established Australian speciality fibre industries, mohair and carpet wool and briefly mention the prospects for 2 other industries currently receiving significant rural press coverage, rabbit hair (angora) and alpaca.

The population of Angora goats rose rapidly from 1000 in 1970 to 3 19 000 by 1988 producing 530 850 kg of greasy mohair, representing 89% of the raw goat fibre produced in Australia (ABS 1988). Most of this raw fibre is exported. Between July 1988 and June 1991 Australia imported about 300 tonne of raw, combed or carded fine animal hair, including mohair and an unknown quantity of finished mohair yarns, cloths and finished products. For a review of the price of mohair and the effects of fashion, government policies etc., in major producing areas see Evans (1985). The distribution of fibre goats in Australia and a description of the evolution and technical developments is given by Holst and McGregor (1992).

Sheep growing speciality carpet wool have increased from 1000 in 1974 to 128 000 in 1986, producing about 2.5% of Australia's raw wool. Currently Australia imports 22 million kg of carpet wool (value $A100 million), 25% of which is speciality carpet wool (Calver *et al.* 1988; Belfield 1991). Calver *et al*. 1988 estimated the shortfall between Australian consumption of carpet wool and Australian production of carpet wool could support another 562000 speciality carpet wool sheep and 2.77 million sheep producing basic carpet wool (228 μm).

Cashmere production and quality was reviewed in the 1990 conference (Holst 1990) while the mohair industry was last discussed during its formative years (Stapleton 1980). Cashgora production is another goat fibre 'type' currently produced as a by-product of the mohair and cashmere industries and its properties, origins, uses and prospects have been recently reviewed (Moylan and McGregor 199 1; McGregor 1991).

ADVANCES IN THE PRODUCTION OF HIGH QUALITY AUSTRALIAN MOHAIR

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This review briefly discusses improvements, since 1980, in the assessment of superior mohair goats and measurement of mohair, in our understanding of nutrition and grazing requirements, and developments in genotypes and performance recording. The effect of mohair quality on mohair price was reviewed by McGregor (1990).

ASSESSMENT AND MEASUREMENT OF MOHAIR GOATS AND MOHAIR QUALITY

Traditionally, mohair was sold after quality had been assessed, visually. Following developmental research in Australia (Stapleton 1978), the air-flow technique for estimating mohair fineness was introduced by the Australian Wool Testing Authority (AWTA) in 1982. This provides a substantial cost savings over the use of projection microscopy. Measurement of impurity fibres (medullated short kemps and long gare fibres) is still undertaken by projection microscopy (current cost approx. $A15 per sample), but considerable controversy exists within the industry over the reliability of such measurements. The Australian Mohair Research Foundation (1989) and the South African Wool and Textile Research Institute (SAWTRI) have attempted to develop more reliable objective measurement techniques. There is now a range of commercial fleece testing services using a range of testing procedures.

The current overall low level of kemp in Texan mohair and 'pure bred' South African mohair is a result of selection based on visual assessment. With no exceptions, reported heritability for kemp has been based on visual kemp scores (Lupton *et al.* 199 1). Gifford *et al.* (1990) concluded that genetic progress towards reducing medullated fibres in Australian goats could be expected by direct selection of individual animals at ages >1 year. Economic means of undertaking these procedures need to be developed. Comprehensive visual assessment techniques have been developed to improve mohair quality and have been applied on Australian farms (Stapleton 1984).

Mohair fineness is the major determinant of mohair price and is used by spinners to specify their required mohair tops (see Clarke 1990 for a survey of international broker attitudes to mohair attributes). However, the development of cheap and readily available core testing facilities for mohair bales (Douglas 1988) has resulted in only about 30% of Australia's mohair being tested by brokers prior to sale. This reflects the resistance that mohair buyers, many of who have come from a traditional 'craft' industry, have shown to buying mohair on AWTA certificates, some buyers have even questioned the validity of certificates (Anon. 1988). While the National Mohair Pools test all bale lines before sale, the Australian Mohair Marketing Organisation test only some lines before sale and traditional 'wool' brokers have yet to use core tests in mohair auction room transactions despite their reliance on such tests in wool trading.

NUTRITION AND GRAZING MANAGEMENT

Mohair goats fed below maintenance (i.e. goats lose weight), grow less and finer mohair than goats fed at maintenance (McGregor and Hodge 1989). Feeding above maintenance (i.e. goats gain liveweight) increased mohair growth and fibre diameter compared to feeding at maintenance (McGregor 1984). Increasing stocking rate, of mohair goats on annual temperate pastures, reduces mohair fibre diameter by up to 5 μm in some years. Mixed grazing of goats with sheep, at stocking rates above the recommended levels for sheep, can significantly reduce mohair fineness although at near recommended stocking rates fibre diameter maybe increased. The major correlated production trait with mohair fibre diameter is the liveweight of the goat. Under conditions of good nutrition liveweight and age of goat are equally well correlated to mohair fineness but under conditions of poor nutrition or where large fluctuations occur liveweight is the best predictor whilst age is poor and unreliable. In Australian goats, for every 10 kg increase in mean liveweight fibre diameter increased 3.48 ± 0.28 μm (McGregor 1990).

There is disagreement in the literature about the effects of nutrition on medullation of mohair (Lupton *et al.* 1991). In Texan goats, any effects observed are small and of little commercial significance (Lupton *et al.* 1991) but in the relatively poorer quality Australian goats, both nutrition and grazing management have altered the incidence of these fibres. Improved nutrition has generally resulted in a lower incidence of medullated fibres (McGregor 1990) in Australian goats. It would appear that Australian mohair producers can reduce the incidence of kemp by improved nutrition but only at the expense of increased fibre diameter. The proportion of finer mohair in the mohair clip can be increased by altering the structure of breeding flocks, increasing kid weaning percentage and increasing kid fleece production (McGregor 1990).

GENOTYPES AND PERFORMANCE TESTING

In an attempt to increase mohair production, significantly reduce the incidence of medullated fibres, and improve fleece style and character, Australian investors have imported Texan (1984) and South African (1990) strains of mohair goats. Progeny of Texan and Texan x Australian goats were released from quarantine in 1992. Guidelines about use of imported goat genotypes have been developed (Ponzoni and Gifford 1988). The new strains may have undesirable traits including greater fibre diameter and high incidence of non-infectious abortion (Ponzoni and Gifford 1988). Greater

susceptibility to grass seed contamination and blow fly strike, increased feed requirements and the possibility of being more seasonal breeders may also be undesirable traits. These may be offset by increased kid birthweights, reduced neonatal kid deaths and easier shearing.

To date the mohair industry has invested >$16 million on pedigree recording in an effort to ensure purity of 'pure bred' Angora goats. Increasing dissatisfaction among members has led the breed society to modify registration requirements. Performance recording computer packages are being developed. The Australian Mohair Research Foundation has commissioned reports on the requirements of a performance recording system (Stapleton 1988) and held a national conference on performance recording in 1990. Development of 'Mohair Magic' at the ABRI Armidale is proceeding. Discussions on a national performance recording scheme have been held but implementation of such a scheme is not yet practical. Clark (1990) has provided a detailed account of a practical approach for breeding Angora goats.

IMPROVEMENTS IN MARKETING OF AUSTRALIAN MOHAIR

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Mohair is a natural fibre with some real benefits to offer to the world textile business and consumers. Attributes such as natural resistance to shrinkage, warmth without weight, brilliant colouring and lustre are not as well known as they should be despite the fact that mohair has been in use for at least 2000 years. The industry will need to address this problem with some good product development, promotion and above all innovative marketing.

Marketing of any product is not just confined to the selling process which, after all, is just a transfer of ownership. There will probably always be an opportunity to make improvements and efficiencies to the selling process but undoubtedly the best change that can be made would be an increased demand to selling centres; as it is demand that ultimately sets price levels. We cannot just leave our marketing to chance in the hope that the world will purchase our product (mohair), consumers and textile processors have to be convinced that they need mohair.

Mohair is traditionally used in 2 main areas, in a knitting yarn, (both machine and hand) and in fine worsted cloth. The machine knitting yarn is a coarser type yarn, 32-38 μm, commonly blended 50–50 with acrylic fibre. The yarn is usually brushed and knitted into the traditional brushed jumper or cardigan or woven into rugs, scarves and blankets. These latter products are frequently woven from an unbrushed loop type yarn and brushed after manufacture to produce the traditional fluffy look. The fine worsted cloth is woven from select fine kid mohair (24-30 μm) and blended with superfine merino wool. The fibre is sold for a premium price and traditionally used for men's suiting.

PRODUCT DEVELOPMENT

While mohair is suited to these uses, it limits the range of products and is always vulnerable to sudden fashion changes. This in fact happened from 1988 when, following a real boom in demand for particularly handknit yarns, fashion changed and demand fell rapidly. Demand is only now starting to return. The mohair industry must be prepared to undertake product development to ensure that mohair can be adapted to different fashions as they arrive. To achieve this, a close watch must be kept on trends in fabrics and colours. The industry needs to develop close business liaison with spinners and manufacturers to make certain that mohair can be accommodated in these fashion changes.

The traditional centre for early stage processing of mohair is centred in West Yorkshire, England. Towns like Bradford and Huddersfield have a long history with the textile industry and have developed skills in handling many specialty fibres such as mohair, cashmere, alpaca, camel hair and vicuna. Products from West Yorkshire, particularly the finer end of the mohair clip, are exported to countries such as Italy and Japan.

Australia is ranked third in the world in production of fine 24-27 μm mohair (7.5% of total world fine mohair). For over 20 years the leading mohair processors have complimented us on the fineness of our mohair. Potentially there is great scope for an expansion of processing in Australia. At least one company has set up to manufacture top from Australian mohair and the product produced is right up to world standard. The aim is to export top over and above local requirements. This company also has the ability to spin mohair in a pure form or blended with wool.

Some of the yarns produced, from fine mohair in an unbrushed form, are gaining good market acceptance as they highlight the softness and lustre of the mohair fibre. Traditional knitting yarn, in

coarser mohair fibre, can be unpleasant against the skin. The so called 'prickle effect' which is common in wool with a mean fibre diameter (mfd) >24 μm which have a high % of fibre >30 μm also seems to occur with mohair with a mfd >30 μm. It is interesting to note that cashmere processors also discriminate against fibres >30 μm. Development of these fine mohair yarns is to be encouraged, the next stage is obviously to put these yarns into well designed fashion garments.

DEVELOPMENTS IN THE AUSTRALIAN MOHAIR INDUSTRY

In 1985, Australia became a full member of the International Mohair Association (IMA). The IMA primarily services the processing trade and, we believe, does not do enough for product development of mohair textiles. From 1990 the IMA will reduce its budget by 70% and only promote the mohair logo. The Australian mohair industry has recognised the crucial importance of improving mohair marketing by recently appointing a new executive officer whose tasks include significant commitments to product development.

The industry has also made mohair marketing and product development the highest priority areas for research. This has led to 2 new research projects (funded by RIRDC) being undertaken by the Textile and Fibre Research Institute, Melbourne (TFRI). Both will be of benefit to the development of the local processing industry. The first project, a comprehensive literature search of all published mohair research, is currently being assessed and collated. Compared to our knowledge of wool there is a lack of scientific information on properties of the mohair fibre. Surely to develop a product its properties should be well known to producers, processors and consumers. The second project, funded jointly with the Victorian Employment Federation, is a product development project, to look at what can be done with mohair yarns and mohair wool blend yarns. Particular emphasis will be placed on fabric durability and shrinkage testing.

While research and product development are necessary areas to work towards the benefit of Australian producers, it is also necessary for producers to lift the quality of mohair. Australian mohair has a reputation for high kemp content. While kemp levels have been gradually lowering there is still too much mohair offered for sale with high kemp levels. Mohair with kemp is restricted in the uses to which it can be put and is more expensive to process. From 1992, Australia will gain access to imported genes firstly from Texan and 2-3 years later of South African origin. These mohair goats have very low kemp levels. The mohair quality is superior and trials, already undertaken by an Australian processor, have demonstrated Texan type fibre will produce a better quality top and yarn than Australian mohair.

To capitalise on mohair's qualities, producers need to ensure that the preparation and presentation of their clip is as good as possible and prepared to standards with which processors are content. For that reason the Australian mohair industry established AMMAC (Australian Mohair Marketing Advisory Committee) in 1984 with representatives of producers, buyers and processors. AMMAC has developed a uniform system of mohair preparation and labelling and a co-ordinated selling roster. AMMAC will need to revise its classing system to include mohair from imported genotypes. Lot sizes need to be increased substantially.

Australian mohair offers a good alternative source of income and diversification for Australian farmers, however to capitalise on the potential we must be prepared to work at developing the uses of mohair and promote use. Australia has a proven record in developing fibre producing animals and given the incentive, I am convinced that Australian Mohair can take a prominent part in the world textile trade.

BREEDING AND MANAGEMENT FOR SPECIALTY CARPET WOOL PRODUCTION

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Breeding sheep in Australia for specialty carpet wool began in 1967 when a hairy ram with a carpet wool gene was test mated to some Romney ewes in Tasmania. In the sumrner of 1975–76 Carpetmaster, Drysdale and Tukidale sheep were imported from New Zealand. In 1976 progeny from the research project in Tasmania were released as Elliottdales. The 4 carpet wool breeds (Tukidale, Drysdale, Elliottdale and Carpetmaster) are all based on Romney Marsh stock and have an advantage over other specialty carpet wool breeds which have coloured fibres or are of poorer quality. The Australian carpet wool industry now supplies about 10% of Australian carpet manufacturers' needs (Wickham 1984).

Apparel wool has a secondary/primary follicle (S/P) ratio of 6: 1 or greater, has crimp, is soft and lustrous, few fibres are medullated and fibre diameter is usually <28 μm. Specialty carpet wool has an S/P ratio of about 4: 1, is straight, harsh and chalky white and has many medullated fibres (typically 35–60%), resulting in a mean fibre diameter of about 38–50 μm (Sides 1988).

MANAGEMENT

Carpet wool sheep are 'green grass sheep', suited to areas with greater than 500 mm of rainfall p.a. Whiist generally their management and breeding are similar to apparel wool breeds, the shearing needs differ considerably. Young sheep may need more than 2 shearings a year to keep the fibre length within acceptable limits (<15 cm). Generally sheep over 2 years old need only be shorn twice a year. The sheep are dual purpose and, while they will not grow as rapidly as lambs from terminal sires, surplus lambs are still suitable for the prime lamb market. Other details of flock management and preparation of carpet wool for sale are given by Sides (1988).

CARPET WOOL GENES

The production of medullated fibre is controlled by a single dominant or partially dominant gene pair in all 4 Australian breeds although the gene causing medullation is different in each case. The degree of dominance also varies between breeds.

The genes causing medullated fibres in the Tukidale *(Nt* gene) and Drysdale *(Nd* gene) sheep are allelic, but in the Elliottdale the gene *(El)* is at a different locus (Sides and Banks 1987). The N series genes are closely coupled to the genes causing horns in both rams and ewes whereas the *El* gene is not associated with horns. (Some Elliottdale rams have horns or scurs, but all ewes are poll). Most Australian Carpetmasters have the *Nd* allele, but others (particularly in New Zealand) may have the *Nt* allele or a separate allele (Nj), which behaves like *Nt.* The *Nd* and *El* genes are partially dominant over the normal Romney wool gene and heterozygous animals can be identified. The *Nt* and Nj genes are fully dominant over the recessive Romney wool gene and therefore require a different selection procedure for breeding up a homozygous flock.

BREEDING STRATEGY Franklin (1984)

Drysdale, Elliottdale and Carpetmaster (Nd)

Heterozygous ewes are produced from homozygous carpet wool rams and base Romney or Perendale ewes and then mated back to homozygous rams. Fifty percent of the offspring will be homozygous and 50% heterozygous. The homozygotes can be identified at lamb marking by observation of the birthcoat and coverage of halo hairs over the body of the lamb. This varies from breed to breed, but the breed societies have shoulder patch scoring systems to aid identification. As the genes for carpet wool are only semi-dominant, medullated wool cover on the shoulders of heterozygous animals differs from that of homozygous animals.

The final stage is to breed homozygous ewes with homozygous rams. At this stage all progeny will breed true, so selection can then be concentrated on production traits. The breed societies now insist on using only registered homozygous rams in all stages of an up-grading program.

Tukidale and Carpetmaster (Nj)

The *Nt* and Nj carpet wool genes are fully dominant over the ordinary Romney wool gene and there is no phenotypic difference between homozygous and heterozygous animals. If only confirmed homozygous rams are used for breeding in the carpet wool flock, then all progeny from any ewes will have full carpet wool cover, although the actual genotype of the progeny will be uncertain. This delays use of the rams by 1 year until identification of homozygous rams is made, but because heterozygous ewes produce carpet wool the commercial flock is more consistent in the early stages.

GENETIC IMPROVEMENT

Income from carpet wool sheep depends on sale of good quality carpet wool from ewes, lambs and hoggets and the sale of lambs and/or hoggets for meat. Therefore, desirable traits are good quality carpet wool, high fleece weight, good reproductive performance and high growth rate for lambs and hoggets. Horton (1991) showed that Elliottdales have satisfactory he&abilities (0.3–0.5) in all of these traits except reproduction. Other Romney based carpet wool breeds probably have similar genetic values. However, there is a negative correlation between carpet wool quality and body size, so a selection index combining these traits is essential. For maximum performance of the flock, subjective assessment should be kept to a minimum. Fleece grade and objective measurement should be used as far as possible for improving production traits.

MARKETING OF AUSTRALIAN CARPET WOOL

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While many wools are used for carpet, there is no such thing as the perfect carpet wool. A carpet demands many things from the yarn used in its manufacture: resilience, wearability, appearance retention, bulk, fire retardancy, stain resistance, easy cleanability, and of course in today's world, long term environmental friendliness. The contribution made by medullated, or speciality, fibres is mainly in the first 3 of these requirements. The chalky whiteness of the medullated carpet wool fibre means that light pastel shades can be achieved, where its alternatives, U.K. Blackface or Pakistan wools, being contaminated with black, coloured or stained fibres, are unsuitable.

QUALITY STANDARDS FOR AUSTRALIAN CARPET WOOL

Until recently Australian carpet manufacturers had been forced to import all their raw materials, except for a small quantity of Romney wool, which was used when it was cheap. No quality standards existed under the Australian Wool Corporation's 'Code of Practice' for this style of wool. Accordingly, in 1980 a meeting of representatives of all sectors of the industry, from the farm to the finished carpet, was called by the A.W.C. to establish fibre standards for Australia. Traditionally, Australian wool types had been classified by micron, with the best wool from a property in that micron being marked 'AAA', the next best 'AA' etc., despite the style of wool grown between different areas varying greatly. The meeting decided that this ambiguity should be removed from the new standards being laid down for Australian medullated carpet wool, with the various wool types being presented in the form of a quickly recognisable definition. The top fleece line was to be 'AAACW', the description being: fleeces in this line should be open, contain a high percentage of medullated fibres, sound in staple, free from vegetable matter, harsh in handle, high in bulk, with a minimum of kemp. While fibre diameter is the main classing criterion of fine wools, medullated carpet wool can have a variation in 1 staple from 20–150 μm, and hence fibre diameter is of little consequence. Fibre length is of the utmost importance.

PROCESSING CARPET WOOL

Carpet yarn is produced on 2 different spinning systems, the semi-worsted, and the woollen. The semi-worsted system demands fibres 100–150 mm and 75-125 mm long, while the woollen system cannot handle fibres greater than 75-125 mm long, but can utilise fibres of 50 mm. Hence the specification for the top fleece type to be produced on the semi-worsted system would be expressed as 'AAACW 100–150 mm'.

The fibre components in any yarn are determined by the construction of the carpet in which they are used, if woven e.g. Axminster or Wilton construction, the yarn count (thickness), the turns per centimetre of twist and the number of ends twisted together, height of pile, tufts per cm^2, and if Wilton, cut pile, loop pile or cut and loop pile. If the carpet is to be manufactured by tufting these criteria will contribute to the decision on what wools will be used, and in what percentage. Similarly, we must consider at what stage is the fibre to be dyed, in the raw wool, or hank or alternatively after the yarn has been spun, by winch or beck dyeing after the carpet has been tufted from white yarn, or indeed if the carpet is to be printed with a design after it has been manufactured as a white base. There are so many choices of carpet construction, all demanding a different performance from the fibre in production, and then on the floor, that each individual yarn must be engineered for its specific end use. A typical blend for use in a plush pile tufted carpet would be 20% medullated or specialty fibre with 80% of non-medullated fibre (being Border Leicester, Coopworth, Perendale, Romney etc. wools).

MARKETING

Traditionally, growers have sold their wool at auction, or by private treaty to wool merchants, who on-sell it to other merchants, or manufacturers. Those entering this new industry examined the selling systems and found them not to be cost effective. They decided to set up their own co-operative to market the wool in a scoured state, direct to the manufacturer, both at home and overseas, thus adding value to the fibre and giving employment in Australia. The product was new and needed strong marketing to prove its suitability as a carpet wool. Under the terms of the International Wool Secretariat, the AWC was not, and still is not permitted to promote Australian wool, and wool merchants only wished to sell the wool, not market it. Thus it was left to the co-operatives to promote and market the fibre. The largest co-operative, Carpet Wool Marketers Limited, worked closely with manufacturers to have the new product developed to a highly desirable and sought-after product.

Currently, demand far exceeds supply, with all local spinning companies preferring the Australian grown product, when available. Carpet Wool Marketers Limited has a policy of exporting 10% of its output, and has been successful in achieving this, winning the Austrade inaugural Award for Innovative Agricultural Marketing in 1990. This company has just completed, with financial support from Austrade, the Australian Carpet Wool Handbook, which compares carpets made from blends of 100% Australian grown fibre with those made from many of the recognized imported wools. In every case the Australian product proved equal to, or better than, its competition. These books are being distributed to Specifying Architects, Consultants, Federal and State Government Purchasing Offices and interested overseas clients.

Now we must consider marketing our product in North America, where currently only 3% of all carpets are made from wool, and to the Eastern Block countries. Add to all this that Australia currently has to import 90% of the wool it uses in carpet, and it can be easily seen that Australian Carpet Wool has a very bright future.

ANGORA AND ALPACA

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ANGORA

The Angora rabbit derives its name from the Turkish city of Ankara as does the Angora goat. However, the Angora *rabbit* grows angora whereas the Angora *goat* grows mohair. The fibre structure is significantly different. The rabbit produces approximately 700 gm of 10–15 μm white fibre p.a. There are 2 basic types of Angora, the German and English. The former has spike (guard) hairs which typify the fashion fibre, the latter tends to be a single fibre coat. There is a wide range of colours but white is the predominant and favoured colour (Couchman 1988).

China produces 90% of world trade and Chile and Eastern European countries are also significant producers. Fashion trends have big effects on the demand for angora and cause variation in world price. Demand has increased over the past decade and angora has always commanded 'high' prices as a speciality animal fibre (Dalton 1986). Currently, price is about $70/kg, depending on grade and fineness. Price is cyclical, plateauing or declining every 18 months and when prices overheat fibre substitution occurs. Long term investment is necessary to ride out the effects of these movements, changes of 25–30% in real terms are common. Returns to growers approximate 8.5% of the retail price, similar to that received in other fibre producing industries. Australia imports $A7 million of fibre which when blended 30:70 with wool generates an add-on-value totalling $A80–85 million.

ALPACA

The alpaca (*Lama pacos*) is one of the 4 llama species (South American camelids) and has 2 subspecies the Huacaya and Suri, the former comprising 85% of the population. The alpaca is regarded as a single coated animal with a total mature fleece weight of about 2.5-3 kg and a mean fibre diameter of 26-28 μm (range 17-44 μm). Fibres are elliptical and medullated with ellipticity and medullation increasing with fibre diameter. Fibre colour ranges from white to dark brown with fawn being the most favoured natural colour because of its likeness to vicuna (Couchman 1990).

Smith (1988) indicated that the world trade in alpaca and llama fibre amounted to only 4 000 tonnes in a trade in speciality animal fibres totalling 142,000 tonnes. He indicated production was increasing and price ranges from $A28–$35/kg. Peru is the major alpaca fibre producer with 2.5 million alpaca and 0.8 million llama (Wilkinson 1990) producing 90% of world trade. Peru, a low cost producer, regards the proportional value of the animal as *60%* fibre, 30% meat and 10% furs. Alpacas are now being raised in Chile, New Zealand, Australia and North America. The latter -mainly for aesthetic reasons.

THE CHALLENGE

Farming of rabbits in most States of Australia is illegal, despite significant indications that the Angora poses little threat to wild rabbit control measures. There is therefore little prospect for commercial angora production. For alpaca, the challenge is for breeders to produce marketable parcels of fibre. To maintain a sustainable industry a large breeding base of animals must be available. Maintenance of viability by the use of animal sales at high prices (currently $A15 000 each) results in PYRAMID selling and ultimately a lot of small people suffer financial loss. This warning is important, without a product to market you don't have an industry. Trading in animals by itself will not develop a stable industry.

CONCLUSIONS

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The Australian mohair and speciality carpet wool industries, while both rapidly increasing in numbers of livestock, have developed along different paths. To increase efficiency and productivity of mohair farms, efforts have been directed at improving on-farm management systems and importing new genotypes. In contrast, carpet wool producers have concentrated on developing close relationships with processors and utilizing known genetic parameters to breed quality carpet wool sheep.

It is encouraging that the mohair industry is now focusing on improved marketing and product development and together with the release of new genotypes should help consolidate the mohair industry. Efficient mohair marketing arrangements need to be urgently developed. Increased production of carpet wool will improve the efficiency of existing industry developed arrangements.

Production and processing of speciality carpet wool and mohair in Australia will employ creative designers, textile technologists and marketers of high value products. Growth of these industries will aid farm productivity in selected environments and reduce imports of these fibres.

Production of angora and alpaca fibre in Australia faces the challenge of establishing animal numbers and marketing infrastructure in the face of competition from very low cost producing countries. The experience of the mohair and carpet wool industries may help potential investors.

REFERENCES

ABS (1988). Catalogue 7221. 0 (Aust. Bureau of Statistics, Canberra.)
AMRF (1989). Annual Report. Aust. Mohair Res. Foundation, Canberra.
ANON. (1988). Mohair production, classing, production. Pamphlet 16pp. Aust. Mohair Marketing Organisation Ltd, Wagga Wagga.
BELFIELD, A. (1991). Australian Poll Dorset Journal, Sept.
CALVER, R., FRANKLIN-BACKHOUSE, J., JACKSON, J and ROBINSON, G. (1988). Australia's Carpet Wools, Carpet Institute of Australia Ltd.
CLARK, R. A. (1990). Proc. 134, pp. 463-98. Post. Grad. Committee Vet. Sci., Uni. Sydney.
COUCHMAN, R. C. (1988). Angora — Specialty Animal Fibre. Animex Symposium, Mulgrave, Vic. November 1988.
COUCHMAN, R. A. (1990). Alpaca — Specialty Animal Fibre. Proc. 1st Aust. Alpaca Assn. Conf. Glenormiston, VCAH. November 1990.
DALTON, D. C. (1986). Angora Rabbits, 2nd Edn. (MAF Hamilton, NZ.)
DOUGLAS, S. A. S. (1988). Proc. workshop Non-Milch Goats in Aust., Information Series QI.89012 (QDPI.)
EVANS, J. V. (1985). The Angora Mohair Industry in Australia (ABRI, Armidale).
FRANKLIN, J. (1984). Proc. Seminar Carpet Wool Production, VCAH., McMillan.
GIFFORD, D. R., PONZONI, R. W., LAMPE, R. J. and BURR, J. (1991). *Small Rumin. Res. 4: 293-302.*
HOLST, P. J. (1990). *Proc. Aust. Soc. Anim. Prod.* 18: 7 1–80.
HOLST, P. J. and McGREGOR, B. A. (1992). Proc. V. International Conf. Goats, New Delhi (In press).
HORTON, B. J. (199 1). *Proc. Aust. Assoc. Animal Breeding Genetics 9: 392-5.*
LUPTON, C. J., PFEIFFER, F. A. and BLAKEMAN, N. E. (1991). *Small Rumin. Res. 5: 357-65.*
McGREGOR, B. A. (1984). *Proc. Aust. Soc. Anim. Prod.* 15: 7 16.
McGREGOR, B. A. (1990). Proc. 134, pp.347–75. Post. Grad. Committee Vet. Sci. Uni. Sydney.
McGREGOR, B. A. and HODGE, R. W. (1989). *Aust. J. Exp. Agric. 29:* 179-81.
McGREGOR, B. A. (1991). *Cashmere Australia* **12**(3)**:** 21-2.
MOYLAN, F. H. and McGREGOR, B. A. (199 1). *Proc. Aust. Assn. Anim. Breed Genetics 9:* 418-21.
PONZONI, R. W. and GIFFORD, D. R. (1988). Proc. Workshop Non-Milch Goats in Aust. Information Series QI. 890 12, (DPI Queensland.)
SIDES, R. H. (1988). Carpet Wool Production, Dept. Agriculture, Tas.
SIDES, R. H. and BANKS, R. G. (1987). *Proc. Aust. Assoc. Animal Breeding Genetics 6: 35-9.*
SMITH, G. A. (1988). Processing of Specialty Animal Fibres. Proc. 1 st Int. Symp. on Specialty Animal Fibres Aachen, (1987). Publ. DWI Proc. 103: 8-22.
STAPLETON, D. L. (1978). Ph.D. Thesis. Uni. New England, Armidale.
STAPLETON, D. L. (1980). *Proc. Aust. Soc. Anim. Prod.* 13: 182-95.
STAPLETON, D. L. (1984). *Proc. Aust. Assn. Anim. Breed Genetics 4:* 258-62.
STAPLETON, D. L. (1988). Report to Aust. Mohair Res. Foundation, Canberra.
WICKHAM, G. A. (1984). Proc. Seminar Carpet Wool Production, VCAH McMillan.
WILKINSON, B. R. (1990). Proc. 8th IWTRC Conf. Christchurch, NZ. 2: 352-63.