THE CASHMERE INDUSTRY IN SOUTH AUSTRALIA

N.S.J. ELLIS
A. SINGH

DEPARTMENT OF AGRICULTURE
SOUTH AUSTRALIA
Technical Report No. 101
July 1986

THE CASHMERE INDUSTRY IN SOUTH AUSTRALIA

by

Simon Ellis
Livestock Officer
Mount Barker District Office

Albert Singh
Livestock Officer
Jamestown District Office

South Australian
Department of Agriculture
Box 1671 GPO Adelaide 5001

ISSN -0727-601X

SUMMARY

1. The cashmere industry looks to have a sound medium term future.
2. In the short term the biggest challenges will be:
   - keeping animal prices at a level commensurate with their ability to produce fibre and meat.
   - improving the meat marketing side of the industry.
   - getting a cashmere down pool selling system operating effectively.
3. Goats are different to either sheep or cattle. In particular, internal parasites and stress require special attention.
   Stocking rates for fibre goats should be based on the same dry sheep equivalents used for spring lambing merinos.
4. Footscald and footrot appearing in goats coming from eastern states should be carefully monitored.
5. Breeding programmes for cashmere goats should be based on objective measurement and, hopefully, a group breeding scheme.
6. The accuracy of down yield tests must be improved as a matter of high priority.
7. Goats have a special role to play in the control of pest plants.
8. There should be no goat production in pastoral areas of S.A.
9. Goats require better fencing than sheep or cattle.
10. Trees may require protection from heavily stocked goats.

CONTENTS

1. WHAT IS CASHMERE?

Cashmere down is the fine fibre produced by certain goats. The fibre is generally defined as being less than 19 microns in diameter. It is grown along with a much coarser (over 50 micron) guard hair.

Once harvested from the goat, the guard hair is removed and the cashmere down is used to make luxury clothing for the "affluent end" of the fashion market.

2. THE CASHMERE MARKET

The traditional suppliers of raw fibre to the world market are Iran, Afganistan, and China. China is the world's largest cashmere producer and recently started to process a percentage of her own product. The percentage is expected to increase. Political unrest has made supply from Iran and Afganistan uncertain.

Processors from western countries are trying to make up for these uncertain markets. They claim that, even including the Chinese clip, there is an enormous, world under-supply of cashmere. World prices for cashmere down are currently bouyant.

Inevitably, if Australia and New Zealand put a significant quantity of cashmere onto the world market, prices will fall. The question is when and by how much.

Given current low fleeceweights and animal numbers it should be safe to plan on stable prices for the next 10 years.

Table 1 gives 1985 prices for cashmere down.

Dawson's International (Scotland) and Agesco (Italy) are the major purchasers of the Australian clip at the present time. Japanese and U.S. companies are beginning to show interest.

The U.S. market uses around 1 million kg. of greasy cashmere/year, and has recently started buying Australian cashmere. The majority is coloured and at the coarser end of the range. The fibre is bleached to produce low priced cashmere garments. It is a very price sensitive market.

TABLE 1

Published 1985 prices for Australian Cashmere (dollars/clean kg)

FIBRE DIAMETER (micron)	WHITE English *	WHITE Italian *	WHITE US *	GREY English	GREY Italian	GREY US	BROWN English	BROWN Italian	BROWN US
< 15.9	110			82			60		
< 16.0		110			80			55	
16.0-16.9	105		90	73		76	58		68
16.1-17.5		100			68			50	
17.0-17.9	95			60			40		
17.0-18.5			71			65			61
17.6-19.0		78			45			30	
18.0-19.0	60			35			23		
18.6-20.0			47			41			31

* English buyer = Kinross Cashmere Company, a subsidiary of Dawson's International
Italian buyer = Filati Biagioli Modesto
US buyer = Forte Cashmere Company

3. CASHMERE PRODUCTION

Table 2 gives the current and anticipated production of cashmere in Australia and New Zealand.

TABLE 2

Australia and New Zealand cashmere production

STATE	1984/85 WEIGHT (tonnes)	% TOTAL OF AUST. & N.Z.	ANTICIPATED WEIGHT (T) 1985/86
N.S.W.	7.9	38	10
VICTORIA	2.0	10	2.8
QUEENSLAND	0.5	3	0.6
W.A.	0.5	3	0.6
S.A.	0.4	2	0.6
TAS.	0.25	1	0.4
A.C.T.	0.01	1	-
TOTAL AUST.	11.6	57	15
TOTAL N.Z.	9	43	20

It is interesting to note that New Zealand is now out-producing Australia.

Compare the anticipated 1985/86 yield of 35 Tonnes with processor claims that 1000 tonnes/year could be marketed without promotion.

In the short term, at least, there is an undersupply of cashmere. Some parts of the industry feel this problem can be helped in the short term by using fine angora bucks over selected feral does to produce a higher fleece weight, coarser (19-22 micron) "cashgora". At present this product is worth $15-18/greasy kg (including guard hair) (see Section 20.). Cashgora is marketed as a separate product from cashmere on the European Market. This is to avoid damaging the luxury image of fine cashmere garments.

4. FIBRE MARKETING BODY

The Australian Cashmere Goat Association (A.C.G.A.) have formed a marketing body which pools, tests and sells virtually all cashmere produced. To date the pool has received over 4 tonnes of fleece. A similar system has been operating in New Zealand for 3 years.

The body has the support of processors as it should improve product consistency and volume.

5. STOCK FIRM INVOLVEMENT

To date there has been very little involvement by stock firms in the cashmere industry. By contrast, Wrightson's and Dalgety's in N.Z. have actively promoted and fostered the industry in that country (not necessarily in the short term interest of the industry - see section 7).

Recently, however, Elders Pastoral have started a more active involvement with the industry. The company will arrange the delivery of feral goats to properties. Producers sort through and retain any animals showing good down production. Unwanted stock have to be sold for local slaughter at this stage. In addition, Elders have started running goat sales for meat stock (see section 9.4).

6. FARM ECONOMICS

The following production figures in Table 3 have been provided by the A.C.G.A. They are averages from three large commercial herds in 1984 and indicate that cashmere production, initially, has low returns.

TABLE 3
Down Production and Value

	AVERAGE DOWN WGT. (g) PER YEAR	$/HEAD IF WHITE	$/HEAD IF COLOURED
1. FERAL DOES			
First year	45	$4.50	$2.25
Subsequent years	85	$9.50	$4.25
2. FIRST GENERATION *			
Does	120	$13.00	$6.50
3. SECOND GENERATION **			
Weaner Does	140	$14.00	$7.00

* Progeny from feral does mated to selected bucks
** Progeny from first generation does mated to selected bucks.

Compare these figures to a merino ewe growing 5.5 kg of $3.00/kg wool ($16.50/head), and an angora doe growing 2.5 kg of $10.00/kg mohair ($25.00/head).

In the long term, as fleeceweights rise and white, fine down is the "norm", profitability will improve.

Cashmere fibre is not a get rich quick industry. Stud sales are a different story (see next section).

There is an urgent need for reliable production and economic information for growing cashmere fibre to enable sensible comparison with other livestock enterprises.

7. PURCHASING CASHMERE GOATS

7.1 General

As with any new livestock industry, quality stock are in short supply and prices have become unrelated to productive ability.

The current predominance of "hobby farmers" in the industry has also pushed prices above commercial levels (These people do not rely on farm income for their livelihoods). There is some opinion this hobby farmer influence is reducing in the Eastern States.

The extremely strong New Zealand demand has recently pushed prices even higher.

The low price of feral does is helping to limit doe prices.

Keeping buck and doe prices at a level related to their productive ability is essential to the industry's healthy growth. It is one of the biggest challenges facing the industry at present.

7.2 Bucks

Production tested bucks have commonly reached $500 - $1,000 at recent auctions. Some larger growers offer reasonable quality bucks at prices ranging from $180 - $500.

Some studs cull as few as 20% of their buck kids, resulting in poor quality stock entering the market.

7.3 Does

Feral does can be landed on a S.A. property for $10-35/head at present. Bred-on does are much more expensive and seldom available for sale in any case. Local stock agents or the A.C.G.A. can be contacted for details of feral goat suppliers.

7.4 Wethers

Limited data from first generation, unselected wethers (Qld. DPI), has shown down production of 130-150 g/head at a value of $9-14. Where a short term weed or scrub control programme is contemplated wethers MAY be an alternative. Low meat prices for

wethers must be taken into account (see section 8.3)

7.5 Transporting Ferals

Feral goats suffer stress very easily when they are mustered and trucked quickly and/or roughly. There have been several cases where over 50% of the goats have died during and soon after delivery.

The causes are a combination of stress, poor body condition, lack of feed and coccidiosis infection.

Goats should be quietened, well-fed and accustomed to humans before trucking. As an added precaution a coccidiostat could be added to feed before moving. Goats should not be transported during the cold winter months. Upon arrival at property they should have good feed, water, fencing and shelter.

8. GOAT MEAT

8.1 Meat Market

The Caribbean and Taiwan are regular buyers of Australian goat meat. Potential markets exist in the Middle East, some European countries and local ethnic communities. This last market has hitherto only been tapped in a small way under the name of "Chevon".

Goat meat markets are usually specialised and require care and attention to prepare the product according to market demands.

8.2 Carcase qualities

Goat carcasses are much leaner than sheep carcasses. Fat tends to be deposited around the kidneys and stomach rather than on the "meat" parts of the animal.

This characteristic may well be a distinct marketing advantage as lean meat becomes more popular in Australia.

Goat carcasses are considerably smaller than those of sheep of the same age, eg. a 4 month old kid (weaning) has a liveweight of around 15-20 kg. A prime lamb of the same age will have a liveweight of 30-40 kg. Kid carcasses may be smaller than local market requirements.

8.3 Meat Value of Goats

The cashmere, angora and milk goat industries all recognise the problems facing marketing of surplus goats for meat.

Irregular quantities, inadequate carcase classifications, a lack of market co-ordination and difficulty getting stock killed are the main problems.

Because of the high demand for young goats for breeding and cashmere production, the prime kid market is unable to generate enough volume to form the basis of a viable local market.

Further difficulties arise because feral and domestic stock are sold together. This downgrades the price of the domestics to feral prices.

The first "centralised" sale for meat goats was held at Strathalbyn in May this year. Prices averaged $5 per head. Most were wethers in poor-fair condition. Top price for young stock was $9.50 per head. Elders Pastoral plan to hold this type of sale every 3 months.

To be successful the sales will require co-operation from the three goat industries and advance notice of numbers and type of goats to be sold.

9. COMPLEMENTARITY OF GOATS AND SHEEP

Work from the Victorian Department of Agriculture has shown an overall increase in production from running sheep and angoras together on improved pasture at a moderate stocking rate. Additional benefits accrued from increased clover content of the pastures - goats don't like green clovers. The work concluded that the combined stocking rate for goats and sheep together cannot be increased over the straight sheep rate. In high weed content situations 10 - 20% extra goats can usually be added to the system "free".

Care must be taken not to overstock as goats and sheep do compete for grass pastures. Goats suffer at high stocking rates more than sheep when pasture availability is the limiting factor.

Wool contamination with coloured and hairy fibres is a potential problem when running sheep and goats together. Yarding together and using the same shearing shed are the major sources of cross contamination.

10. D.S.E. RATINGS

The dry sheep equivalent (D.S.E.) ratings of fibre goats are uncertain. Given that they are spring kidders, that they are smaller but more fertile than sheep and cannot graze as heavily, it would seem appropriate to use sheep spring lambing ratings viz:

does	1.5 DSE
bucks	2.0 DSE
wethers	1.0 DSE
weaners	1.5 DSE

Where plants are present which are eaten by goats but not by sheep or cattle, then it is possible, at least in the short term, to add goats at a low rating.

11. MATING

Bucks stimulate does to ovulate when introduced. Bucks rut December-June and can be used safely at a rate of 1.5%.

As with sheep, the heavier the doe body weight at mating, the higher the conception rate. A herd with 20% maidens should average at least 32 kg.

12. KIDDING

Kidding is usually started in September (mating early April). To go earlier interferes with the does' cashmere production. Some growers have effectively mated in December, although this does pose management problems with respect to shearing time.

Kidding rates of 140-160% are common, however weaning percentages are usually a lot lower. South Australian results put weaning percentages between 90-140%.

Because of weather stress, kidding areas should be provided with a lot of shelter. High density kidding can cause as much as 20% kid stealing. In studs this may cause history inaccuracies.

Health problems often arise in high density kidding areas.

The behavioural pattern of a kidding doe is to plant new born kids and leave them while she feeds. The kids are consequently at risk from fox predation. In fox prone areas, losses may warrant fox proofing kidding paddocks.

13. WEANING

The recommended weaning age is 12 weeks. Kids that don't reach 15 kg by weaning don't grow out well.

Leaving buck kids unweaned longer than 3-4 months often results in them mating with their mothers.

14. NUTRITION

General nutritional needs for goats are similar to sheep. Contrary to popular belief goats are not browsers, they are selective, mixed feeders.

The proportion of the diet which is pasture/browse varies with the season and vegetation. Around 60% of the diet, by preference, comes from grazing. Goats will avoid grazing green clovers but readily eat dry clover as pasture or hay.

Goats are better able to utilize poor quality feeds than sheep. Under S.A.'s improved pasture conditions this isn't often likely to be important. Certainly goats are not able to live and produce well on poor quality feed.

14.1 Handfeeding

Because of the high value of down it may be profitable to handfeed for increased down production. Research is underway to clarify what down growth responses result from improved feeding.

14.2 Cashmere Follicle Growth

The development of the secondary cashmere bearing follicles occurs after birth with the process complete after 15 weeks. (c.f. sheep where secondary follicles develop largely in utero.) The effect

of supplementing kids in this period to increase follicle development is being researched.

15.3 Weaners

Weaners have been generally reported as growing poorly from May-July. Hormone changes associated with daylength are suspected to be involved by depressing appetite. Further growth studies show that at times of body growth, down growth is low and visa versa. This may hold the key to the negative down weight/body weight genetic correlation (see Breeding section).

15. EXTERNAL PARASITES

The major external parasite of cashmere goats is the biting louse. Only chemicals registered to control this louse in goats should be used. The pour on dip Clout S® has been submitted for registration for use in both newly shorn and full fleece goats.

Cattle spot ons and pours ons are not effective in controlling biting lice.

Severe lice infestations are best controlled using spray or plunge dips. Some of these dips also control mange.

Recent research has demonstrated (experimentally at least) that sheep lice can live and reproduce on goats. This may cause control problems where sheep and goats are run together, but shorn at different times.

16. INTERNAL PARASITES

Goats are more susceptible to worms than sheep. They are affected by the same worms that affect sheep and also share some worms with cattle.

Research has shown that:

- goats develop only weak worm immunity with age (unlike sheep),
- anthelmintics are broken down and excreted more quickly in goats than sheep. This may result in higher dose rates being recommended for goats than sheep in the future,
- high stocking rates and/or poor nutrition make worm problems worse. This includes high stocking rate/high handfeeding situations,
- goats carry and hatch more worms than sheep on the same pasture,
- the higher the rainfall the higher the worm levels (for sheep, cattle or goats)
- overdrenching (frequency) of goats has been common, resulting in a number of instances of serious worm resistance to drenches. Goats should receive no more than 4 drenches/year, including 2 summer drenches.

Control must be a combination of strategic drenching, moderate stocking rates, correct dose rates and use of least "infected" pastures for young stock.

In summary, goats run in high rainfall (over 500 mm) areas will suffer from worms unless a careful management programme is used. Drenching more often is not the solution.

17. SCALD/FOOTROT

It is routine procedure on many Victorian and N.S.W. goat properties to trim hooves and footbath twice/year. The reason is to control what is locally called "benign footrot" - a strain of *Bacteroides nodosus* which may not progress past the scald stage in goats.

The implications of this procedure on stock subsequently transported to S.A. are uncertain. Concern exists that this treatment for the "benign strain" may remove the clinical signs of other virulent footrot strains, whilst allowing the bacteria to survive in deepsented infections.

Given the significant number of goats coming to S.A. from the eastern states further work is urgently needed on this matter.

Footrot in sheep and goats is a notifiable disease in S.A. Suspected cases should be immediately reported to the Department of Agriculture.

All goats introduced onto a property should be trimmed (if necessary) footbathed in a 5% formalin solution to protect against introducing footrot. Inspect feet before purchasing animals.

18. BREEDING

Research is underway to determine the genetics of breeding for cashmere.

Results from the N.S.W. Department of Agriculture have shown a strong, negative, genetic correlation (-0.6 $\pm$ 0.2) between down weight and bodyweight. This will make genetic progress slow. Group breeding schemes will be vital to help. The traditional stud approach would be very much slower.

18.1 Phenotype/genotype

In the early stages of an industry the illusion of a rapid genetic progress can be given. In fact, it is only phenotypic (measured production) progress which has been made. This is from heavy selection and culling and better management.

Researchers believe very little genetic gain has been made in the cashmere industry to date.

18.2 Down weight/length

There is a strong, positive, phenotypic correlation between down weight and down length (+ 0.9). The average of three length measurements (neck, mid-side and rump) have be used to predict down weight quite accurately.

Longer fibre length as fleece weights rise may mean twice a year shearing to maintain the processors required fibre length (see 22.1).

A graph is being prepared to allow yield estimates to be made from down/guard hair length ratios.

19. COLOUR

White is dominant in the inheritance of down and guard hair colour.

Because of the premium price paid for white most breeders move quickly toward white. This may slow down genetic progress toward higher down weights by culling coloured animals with heavy down weights.

20. THE G-4 ROUTE

The use of fine, white angora G-4 (1st cross angora x feral) stock to boost down weights rapidly has been controversial.

The general opinion seems to be that used carefully and with knowledge of potential problems, the route can be worthwhile in the development of a cashmere goat breed.

In the short term processors have indicated difficulties in removing fine guard hair when processing "cashgora" fleeces.

Both the purebred and the G-4 approaches should be developed (carefully) to see which yields better long term results.

In the long term there could be a demand for a continuum of goat fibres as developed with fine, medium and strong wools in the sheep industry.

21. DOWN HANDLE

The "handle" of Australian cashmere down is excellent. One processor, (Dawson's), believes there is no point in breeding below 16 microns. They believe 16 micron down is quite adequate to give the desired "feel" to cashmere garments.

22. SHEARING

22.1 Shearing Technique

Cashmere down and the guard hair are both removed during shearing. Currently the easiest method of shearing is using the "Go-Down" technique. This involves shearing the animals in a standing position. They are restrained by the head. Full details are available in the Goat Notes set. Using this technique, relatively inexperienced operators can quickly reach daily tallies of 100-150 goats.

As fleeceweights rise over 1 kg this system may have to be modified.

22.2 Grading goats pre-shearing

Goats should be graded according to the colour of down and guard hair before shearing. The STRICT order through the shed should be pure white through to darkest colour. White down, coloured guard hair precedes coloured down, white guard hair. Even low levels of colour contamination can result in price dropping to that of the contaminant.

The number of groupings will depend on the number of goats. Very small lines (less than 1kg) should be avoided.

22.3 Classing the clip

Fleeces should be classed as they come off the board - based on colour of both down and guard hair.

Full details of standards and lot sizes submitted for sale can be obtained from the A.C.G.A. Fleece Pool C/- Richard Levinge, Box 20, Naracoorte, 5271.

22.4 Required Down Length

At present most down is processed via the woollen system. The ideal down length is 40-45 mm (range 10-70 mm).

Worsted processing requires longer down, average 60-65 mm (50-100 mm). As down length grown in a year increases with improved breeding more fibre is likely to go into the worsted process.

At present there is no price differential for fibre length.

22.5 Down Growth

Some goats grow down over a full 12 months, others grow it for only 2 months. Generally down growth starts in December and finishes July/August.

22.6 Time of Shearing

Shearing should be done as soon as possible after the down stops growing to avoid losses from shedding in the paddock.

The difficulty is that growth can stop at the end of July one year and the end of August the next.

General opinion seems to be that a July shearing is most economic, since some 30% of down is shed in August most years.

Shearing must be done at least a month before kidding is due to commence.

For some animals two shearings per year is economic. The second shearing, where appropriate, is usually in late January-early February in South Australia. Goats can be visually assessed at this time and those with good down cover drafted off for shearing.

23. DOWN TESTING

23.1 Testing Responsibility

The AWTA has been appointed (by processors and growers) as the authorised testing house for down yield and micron measurements. AWTA results will be the basis for the processor payments to producers.

Tests on individual animals form the basis (together with fleece weights) of objective selection programmes.

The cost of testing at AWTA is $10.25 per sample for yield, fibre diameter and fibre diameter distribution.

The Marleston School of Wool and Textiles provide a fibre diameter and distribution test at a cost of $4 per sample.

23.2 Down Diameter

The fibre diameter is measured by the AWTA using a Fibre Fineness Distribution Analyser (FFDA). This machine also provides the distribution of fibre diameters.

Down diameter increases with age - perhaps by 2.5 microns from 9 months to 2.5 years.

23.3 Down and Guard Hair Colour

As with wool, white is the highest priced colour. AWTA do a whiteness test (but not brightness). It is the same technique as is used for wool.

23.4 Down Yield Testing

There are serious inaccuracies with the measurement of down yield. This issue requires rapid resolution. Given the high per kg value of cashmere, errors can involve large sums of money in over or under payments to producers.

The AWTA believes the problem lies in the sampling technique. This is made worse by the large variation of yields between fleeces in the same bale/bag. They have a "mini-core sampler" about to come into operation, which they hope will overcome the inaccuracies.

To put some actual figures on this problem. One grower received a yield result of 17%. He felt this was wrong and a retest gave 39%. This represented a change in bale "value" from $4000 to $12000. Even 4-5% errors in yield mean $1000/bale.

24. OBJECTIVE/VISUAL CLASSING

It is vital that growers and studs base breeding and selection on objective measurements. Visual assessment of stock can be used to screen larger numbers of animals before testing of the best say 30% - provided classers have been properly trained.

25. GUARD HAIR

Current processor thinking supports long, coarse guard hair (3-6 cm longer than down). This has two advantages to the processors:

- it is said to protect the down from physical and UV damage
- it makes separation of down and hair easier (ideal guard hair 4 x diameter of down).

There is a negative correlation between the difference in hair-down diameters and yield and down weight. This has implications on breeding criteria. Further work is required to clarify this issue as some breeders have already moved to selection of short guard hair.

Unfortunately no market has been found for guard hair.

26. WEED CONTROL

Goats have a definite role to play in the control of many weeds, especially in hilly and inaccessible country. In many instances the savings in costly and difficult to apply herbicides alone, have made running goats profitable.

In South Australia, there are (relative to eastern states) few areas where this management consideration will be pertinent.

In the short term, some of the steep areas of the Adelaide Hills affected by fires may benefit from goat grazing.

Goats can also be effectively used to control some types of scrub regrowth.

Cashmere-type goats are safer than angoras in prickly weed control, as the latter can get caught in the thickets when fleeces have over 3 months growth.

Interestingly, many weeds provide goats with valuable summer green pick (e.g. gorse, blackberries) and also provide shelter.

Goats do not eradicate weeds, they control and limit further spread.

Goats have a habit of not eating some weeds until the weeds mature. Others they eat continuously, whilst still others they never eat.

27. PASTORAL AREAS

The ecology in the South Australian pastoral areas differs from western N.S.W. where goats have been used to control woody pest plants. Goat production in S.A. pastoral areas should be discouraged.

Because of the cashmere producers' demand for down bearing feral does, pastoralists should be encouraged to tap the market while it exists. Returning selected cashmere bearing bucks to feral flocks is both illegal and of little value genetically, as breeding can't be controlled.

28. FENCING

Goats require better fencing than most sheep. External fences of 7-strand cyclone plus two plain wires are satisfactory. For lesser fences an electric "outrigger" wire is helpful. Internally, 3 live - 3 earth electric fences are adequate.

Goats usually try to go under rather than over fences. The bottom wire should therefore be 50mm or less above the ground. Any goat which regularly goes through fences should be culled quickly - before it teaches others the same habit.

End assemblies should be of the box design since goats soon learn to walk up the angle variety.

On the brighter side, goats usually come home at night, coming back into the paddock the same way they went out. This is often ensured by having molasses blocks in their home paddock as "lollies".

29. TREE DAMAGE

Goats eat tree bark (often at certain times of the year) and so can kill trees. High stocking rates and lack of alternative browse encourage goats to eat bark. Young stock either cutting their teeth or bored will often "attack" trees. Various systems have been successfully used to control this habit:

- chicken wire fixed vertically up 30-50% of the trunks. This protects enough bark to keep the tree alive.
- wash the trunks with a water mixture of fresh cattle manure,
- provide fallen branches (note: sugar and mannah gums are poisonous).
- individual tree guards,
- fence off tree'd areas.

30. SHELTER

As has been mentioned earlier, goats are susceptible to stress from emotional and physical sources.

To avoid stress from bad weather plenty of shelter must be provided - either natural or man made. This is vital in high rainfall conditions. A number of cases of heavy losses have been recorded where shelter was not provided.

31. FURTHER INFORMATION

The Australian Cashmere Growers Association has produced a collection of "Goat Notes" on most aspects of the industry. They cover marketing, processor requirements, fleece preparations, breeding and management. The full set of Goat Notes is available from the Association (C/-Lucinda Bell, 61 Read Street, Howlong, N.S.W., 2643, Ph (060) 265770 at a cost of $55. In addition to these notes the Proceedings of the First International Cashmere Seminar 1985 are also available from the Association.

The Victorian Department of Agriculture has a set of Agnotes covering fibre goat management at a cost of $13.

32. BIBLIOGRAPHY

1. Proceedings of the First International Cashmere Seminar, Glenormiston 1983.
2. Proceedings of the First International Cashmere Seminar, A.N.U., Canberra, March 1985.
3. Cashmere Goat Notes - published by the Australian Cashmere Goat Society. (see section 8 of report).
4. A report on the Australian Cashmere Industry - Simon Ellis, S.A. Dept. of Agriculture, 1982.
5. Western Australia Cashmere Seminar, 1984. Edited by L.J.E. Karlsson, W.A. Department of Agriculture.
6. Goat Kit of Agnotes produced by the Victorian Department of Agriculture.

TECHNICAL REPORTS INDEX

No.	Subject	Author/s
1	Agriculture in South Australia — A submission to the working group preparing a policy discussion paper on agriculture	Department of Agriculture
2	The Northfield Pig Research Unit — Annual Report to pig producers 1982	Department of Agriculture
3	Australian Merino Society tour of South America, 1981	B.C. Jefferies
4	Study Tour Report — Computer use in the Ministry of Agriculture and Fisheries (NZ)	J.H. Richardson Chief, Extension Services Division
5	Control of *Heliothis punctiger* on field crops — Preliminary trials of fenvalerate as a substitute for DDT on field peas	P.T. Bailey G. Caon P.I. McCloud R. Britton
6	Agronomic Evaluation Report — Irrigated sugar beet in the South East of South Australia	T.D. Potter D.C. Lewis
7	Glasshouse vegetable production in Western Europe — Overseas study tour report	Barry Philp
8	Report of the Vegetable Research Conference, New Zealand	I.S. Rogers
9	An input-output model of the South Australian Dryland Farming System (1) Model development	G.J. Ryland
10	Selenium in barley and grain legumes from Kangaroo Island	R.L. Davies
11	Research priorities in the Economics Division	Working Party to the Research Policy Advisory Committee
12	Study tour of agricultural waste management practices in Southern New South Wales and Victoria	C.M. Klingberg G. Schrale P.D. Harvey P. Deinum
13	River Murray Horticultural Crop Survey 1981 — Regional summaries and statistics	G.N. Thomas B.A. Smith
14	A report on the Australian Cashmere Industry	S. Ellis
15	Gross margins South East	N. Ward
16	The role of SAGRIC in marketing — Working Party Report	Department of Agriculture
17	Agriculture aspects of water management in Western Europe and Israel	M.R. Till
18	Progress report on the River Murray irrigation and salinity investigation programme	M.R. Till D.J. Plowman
19	Impact of videotex on agricultural extension — Report of a study tour to France, England, Canada and the U.S.A.	J.H. Richardson
20	Report on Pig Industry tour in Europe	P. Heap
21	Seed and pasture developments in New South Wales — Report of a study tour	R.S. Martyn
22	Proceedings of the Ovine Footrot In-service Training Course	M.J. Riley
23	Report on workshop — Research priorities for the cereal/sheep zone — A farmer's point of view	R.B. Wickes for Research Policy Advisory Committee
24	Damage to livestock caused by domestic dogs in Adelaide's urban fringe	Vertebrate Pests Control Authority
25	Agriculture in the South Australian economy	Economics Division
26	A study tour in Europe with emphasis on nutrition of horticultural and ornamental crops	J.B. Robinson
27	Report of a six-month simulation of a prestel-standard videotex data storage and retrieval system	M. Allison I. Graham
28	Report on a visit to the Federal Republic of Germany for the XXIst International Horticultural Congress, Hamburg	R.L. Wishart
29	Biological Sciences Group — 1981-82 report	Plant Industry Division
30	Proceedings of a fertilizer and salinity workshop for potato growers	C.M.J. Williams
31	Wind erosion on Eyre Peninsula, 1975-1979	K.G. Wetherby W.J. Davies W.E. Matheson
32	Review of research centres Report to the Research Policy Advisory Committee	Department of Agriculture
33	The water and salt balance of the Lower Murray swamps for the 1980-81 year	R.E. Desmier G. Schrale
34	Testing of onion cultivars for dehydration	I.S. Rogers R.D. Henderson
35	Cereal diseases in Victoria — Report on a visit to Victorian Crops Research Institute, Department of Agriculture, Horsham	J.A. Davidson
36	Future directions in extension	J.H. Richardson
37	Use of radio and press by farmers on Yorke Peninsula — A survey among members of the Agricultural Bureau	J.E. Both
38	Biological Sciences Report 1982-83	P.E. Madge
39	Dairy Research Report 1982	Northfield Research Centre, Animal Industry Division
40	Review of bovine brucellosis and tuberculosis traceback methods in South Australia	M.A. Reid B.L. Wilson N.M. Kowalick R.C. Robinson R.C. Butler
41	Introduction of dung beetles into South Australia 1970-1983	K.R. Henry
42	A review of the brucellosis and tuberculosis campaign in pastoral areas of South Australia	G.B. Neumann G.C. Curran
43	Irrigation requirements for almonds on the Northern Adelaide Plains	G. Schrale
44	Redevelopment of fruit blocks in the Riverland Region: An intertemporal programming approach	B.R. Hansen G.T. Oborne
45	Evaluation of irrigation equipment 1. Small low-level sprinklers	K.A. Watson
46	Structural changes in agricultural co-operation in Britain	D. Crabb
47	The extent and significance of water repellent sands on Eyre Peninsula	K.E. Wetherby
48	A look at the Californian Pistachio Industry	I.P. Bond
49	A direction finding and telemetry system for sheep in arid zone paddocks	M.C. Willcocks K.W. Sarkies
50	Sheep husbandry in South Australia	B.C. Jefferies
51	The recognition and treatment of dryland salinity	Ed. W.F. Matheson
52	An input—output mode of the Southern Australian dryland farming system (2) Systems design and database	G.J. Ryland M.A. Petty R.I. Inglis
53	Biennial Report to pig producers 1984	Northfield Pig Research Unit
54	Report on apricot collecting expedition to Syria and Turkey	F.J. Gathercole
55	The commercialization of seeds of new cultivars of pastures and crops produced by publicly funded breeders in New Zealand	D.C. Ragless
56	A report on study tour of pea improvement work in USA and Europe, April—May, 1983	S.M. Ali
57	Gross margins for agricultural enterprises for Yorke Peninsula and the Mid North	R. Edwards
58	Merino strains in crossbred prime lamb production — Preliminary findings	D. Phillips A. W. Singh E. A. Dunstan
59	Ruminant Industry Research Review — Report to the Research Policy Advisory Committee	Working Party to the Research Policy Advisory Committee

Technical Report Index (continued)

No.	Subject	Author/s
60	Proceedings of a Financial Management Workshop for potato growers	G. S. Ronan C. M. J. Williams
61	Readership survey of SAGRIC Gazette	M. Allison A. A. Luks E. van Eyssen
62	Gross margins for the Southern Mallee of South Australia	H. Hannay M. A. Krause
63	Optimal location, number and size of grain handling facilities in South Australia: (1) Model development	P. D. Kerin
64	Redevelopment of fruit blocks in the River-land Region: An intertemporal programming approach (2) User guide	B. R. Hansen
65	Feasibility of ovine footrot eradication in SA	Working Party Report
66	Dairy Research Report 1984	Northfield Research Centre, Animal Industry Division
67	Lot feeding of sheep through the 1982 drought	B. L. Ashton J. N. Hannay
68	Optimal location, number and size of grain handling facilities in South Australia: (2) (2) Road and queueing costs at handling facilities: 1983-84 harvest survey	P. D. Kerin
69	The River Murray Irrigation and Salinity Investigation Programme — results and future directions	P.J. Cole
70	Redevelopment of fruit blocks in the River-land Region: An intertemporal programming approach (3) An application of the model	B.R. Hansen
71	The 5th International symposium on nitrogen fixation, Noordwijkerhout, The Netherlands 1983	P.R. Gibson
72	The Agricultural Chemicals Evaluation Scheme 1978-83	D.I. Murrie D.W. Stephenson
73	Designing cost efficient mains for irrigation systems	R.E. Desmier
74	Gross margin budget guide book for Lower Eyre Peninsula	A.J. Presser
75	Gross margins South East Region 1985	M. Milne P. Mowatt
76	Horticultural observations made in Israel in 1983	J.N. Steed
77	Sheep blowfly and flystrike in sheep: Report of a National symposium 1983	A.W. Singh C. Martin
78	A study of viral diseases affecting pigs and poultry in Singapore	P.B.D. Whyte
79	A soil conservation study tour — Darling Downs, Queensland and northern NSW	F.W. Armstrong D.J. Maschmedt
80	Optimal location, number and size of grain handling facilities in South Australia: (3) Estimation of short-run and long-run cost functions	P.D. Kerin
81	The feasibility of centralised marketing Murray Bridge glasshouse tomatoes and Continental cucumbers	J. L. King
82	Irrigated field crop gross margins for the Murray Lands area of South Australia	M.A. Krause J.N. Hannay D.L. Zimmerman
83	Vegetable production costs and returns Northern Adelaide Plains	B.W. Philp J.L. King G.S. Ronan
84	Citrus study tour 1984: 1984 International Citrus Congress and citrus producing areas of the USA	P.T. Gallasch
85	Alternative pasture legumes for southern Australia	R.W. Ellis A.D. Craig R.S. Martyn
86	A guide to sheep lice control	C.D. Tuckwell
87	Beef cattle production at Minnipa Research Centre 1969 to 1980	B.L. Ashton
88	Planning for growth in horticultural exports. Proceedings of a workshop held with the Horticultural Industry on 28 August 1985	I.R. Lewis
89	A literature review of grain handling systems.	P.D. Kerin
90	Gross margin budget guide book for Upper Eyre Peninsula.	A.J. Presser
91	Vegetable production costs and returns Adelaide Hills	G.S. Ronan J.L. King G.J. Lomman
92	Gross margins for agricultural enterprises for Yorke Peninsula and the Mid North	R.G. Edwards
93	Biennial report to pig producers 1986	The Northfield Pig Research Unit
94	Irrigated and dryland cropping margins for the Milang and Langhorne Creek area of South Australia	J.L. King
95	Livestock gross margins for Milang and Langhorne Creek, South Australia	J.L. King N.S.J. Ellis R.D. Williams
96	Development of techniques for screening barley for resistance to leaf scald disease *(Rhynchosporium secalis)*	J.A. Davidson
97	Herbicides and their fate in the environment — a review (1983)	K. Thoma R.E.R. Hartley
98	Report of the Central Veterinary Laboratories including the South East Regional Veterinary Laboratory July 1982 — 1985	Central Veterinary Laboratories, Department of Agriculture
99	A pilot study of a pig health scheme 1986	A. Pointon
100	Vine clonal selection trials 1958-85 Nuriootpa Research and Advisory Centre	M.G. McCarthy