1. Profile of the Australian Sheep Industry

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Learning objectives

On completion of this topic you should be able to:

- articulate your understanding of the Australian environments in which wool production is undertaken, specifically rainfall patterns and how these influence pasture growth and composition
- describe the range of Australian wool-producing enterprises, including the difference between specialist woolgrowers and mixed enterprises, the determinants of farm income from wool, the major production costs and the variation that exists in farm productivity and profitability between individual farms within a district
- use your understanding of the productivity of the Australian wool-growing industry in terms of product quantity and quality, including state and regional differences as well as features of the national sheep population (genotypes, spatial distribution and age structure) to analyse information and justify informed decisions

Key terms and concepts

Australian sheep industry; sheep production zones; specialist wool enterprises; mixed enterprises; determinants of profitability; production differences between states and regions.

Introduction to the topic

This topic will introduce the key factors that characterise the Australian sheep industry including the environments in which wool is produced, the different enterprises responsible for wool production and their relative contributions to the industry, historical and current trends in sheep population and wool production and state and regional differences in sheep and wool production.

1.1 Wool production environments in Australia

There are many environments in which sheep production is undertaken (Figure 1.1). The major factor influencing these environmental differences relates to rainfall pattern, in terms of the average annual rainfall, when this rainfall is predominantly received (i.e. within-year seasonality) and the variation in rainfall from year to year. These patterns influence the pasture base used for wool production, influencing both wool productivity per unit area of grazing land and wool quality issues. Rainfall patterns also impact on sheep productivity via aspects of sheep health and disease, especially in relation to parasitic infection (incidence and type of parasite).

Figure 1.1 Agricultural Land Use in Australia. Source: Australian and Natural Resource Management 2002 Database available at http://audit.ea.gov.au/ANRA/people/docs/national/anrm_report/anrm_contents.cfm. Retrieval date October 20th, (2006).

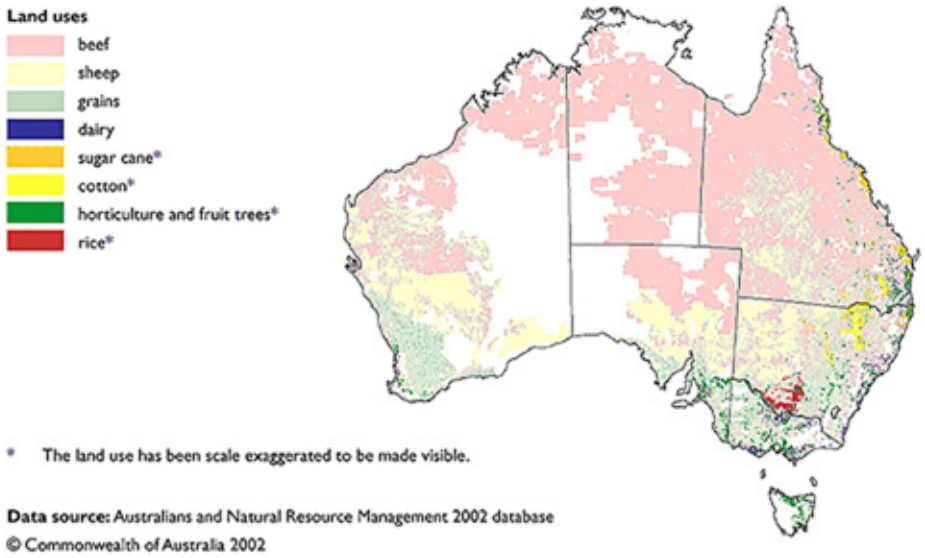
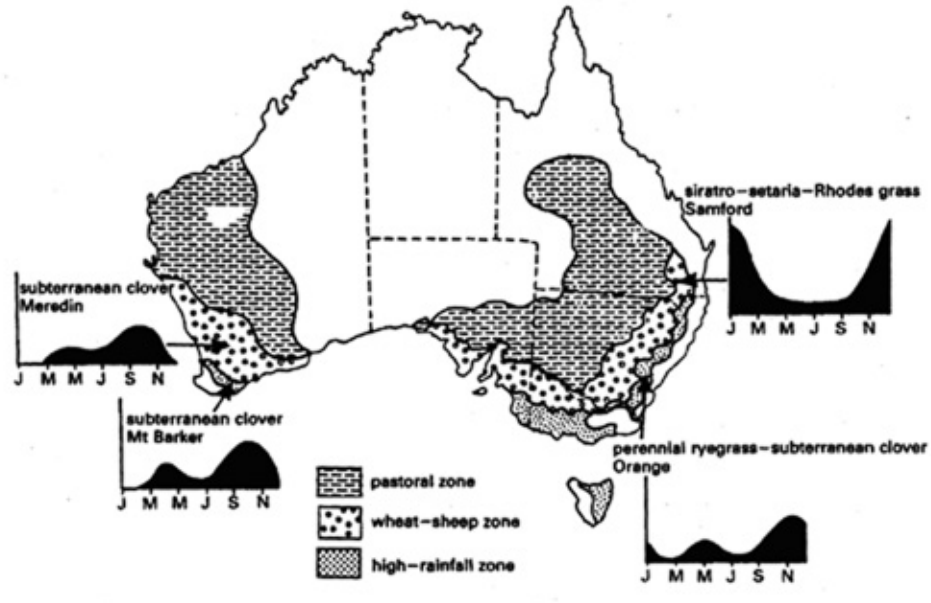


Figure 1.2 shows the three broad sheep production zones: high rainfall zone; wheat-sheep zone; pastoral zone. The major factor differentiating between the zones is average annual rainfall, ranging from 500-1000mm for the high rainfall zone, 400-700 for the wheat-sheep zone and 150-400 for the pastoral zone. These differences in annual rainfall generate differences between zones in patterns of pasture growth and the opportunities for other enterprises such as cropping.

Figure 1.2 The three sheep production zones of Australia, showing pasture growth curves for improved pastures in selected locations. Source: Chapman et al. (1973).



Within any one of the three production zones, there are also differences between regions in terms of the predominant season in which rainfall is received (summer, winter, uniform or non-seasonal) and the level of between-year variation in annual rainfall. This exerts a strong influence on the dynamics of the pasture base (Figure 1.2), particularly in terms:

- start and duration of the pasture growing season
- species composition (e.g. grasses, legumes, broad-leaved weeds, shrubs)
- pasture stability (e.g. annuals or perennials)
- pasture quality and palatability
- scope for pasture improvement and sustainability (refer to topic 16 for more detail).

The climatic profile of a specific production environment also has implications for sheep health and disease, given that moisture and temperature are key factors influencing the prevalence of many sheep diseases.

1.2 Profile of Australian wool-producing enterprises

Enterprise types

Wool industry farms can be categorised as being either specialist wool producing enterprises or mixed enterprises. Specialist wool producers derive the majority of farm income from wool, whereas for mixed enterprises, wool constitutes a secondary source of income. On this basis, it implies that the priority given to wool production, and the potential to consider and implement change, will differ between the two (Table 1.1).

Table 1.1 summarises the major differences evident between specialist woolgrowers and mixed enterprises, based on a survey of Australian wool producers in 2001-02. The distribution of the two types of enterprise differs across the 3 main sheep production zones. Specialist wool producers predominate in the high rainfall zone, whereas mixed enterprises are predominantly located in the cereal-sheep zone. This will represent an additional source of difference in the priorities of the two, given the impact of the environment on the constraints and opportunities available to the woolgrower.

This survey also highlighted that levels of profitability differ between enterprise types, with an average profit of $1,910 for specialist producers compared to $62,474 for mixed enterprise producers. In fact, this survey demonstrated that since 1990, the average specialist woolgrower had operated at a loss. Mixed enterprises, in comparison, had profited in approximately 50% of years over this time. These results clearly show the contribution of diversification of enterprise to whole farm profit and imply that the priorities for change will inevitably differ between the two enterprise types.

Table 1.1 A summary of major differences between specialist wool enterprises and mixed enterprises in 2001-02. Source: Barrett et al. (2003).

Total Number of Sheep Farms = 39156	Enterprise Type	
	Specialist Wool	Mixed Enterprise
% of wool-producing farms	30	70
% contribution to wool production	38	62
Contribution to farm income (%):		
Wool	47	16
Stock sales – sheep	30	16
Stock sales - beef	9	11
Crops	9	51
Other	5	7
Location (%):		
Pastoral zone	12	4
Wheat-sheep zone	39	70
High rainfall zone	50	26
Average farm business profit ($)	1910	62474

Determinants of wool enterprise profitability

The major factor contributing to differences in farm income across enterprises relates to the amount of clean wool produced per unit area of grazing land. This production variable accounts for 40-60% of variation in farm income. The other determinants of variation in farm income derived from the wool production enterprise are:

- value of the wool per kg (10-20%)
- number of surplus sheep sold (20-30%)
- sale price of surplus sheep (5-10%).

Each of these determinants is related to factors that need to be manipulated if farm income is to be changed. These are summarised in Table 1.2.

Table 1.2 Determinants of wool enterprise income and the major factors that relate to them. Source: Cottle, (2005).

Determinant of farm income	Related factors
Clean wool production per hectare	Wool cut per head, Yield, Stocking rate
Sale price of wool	Fibre diameter, Staple length and strength, Vegetable matter content; Greasy wool colour; Style; Wool type; Wool faults; Marketing factors
Number of surplus sheep sold	Lambing rates; Flock structure; Mortality rates
Sale price of surplus sheep	Liveweight; Condition; Wool growth; Age

From a wool product point of view, average fibre diameter is the major determinant of clean wool value. From 50-70% of clean price variation can be attributed to differences in fibre diameter. Staple strength, staple length, vegetable matter, wool colour and style are secondary wool quality characteristics based on their influence on wool value. It should be noted that marketing factors, such as additional measurement, can influence wool value to a larger extent than can some of these wool quality traits for wool sold at auction.

The other driver of farm profitability relates to the costs of producing the wool product. Sheep nutrition and health requirements therefore constitute major production costs. The major cost factors associated with wool production and their relative contribution to total production costs are as follows:

- wool harvesting (shearing and crutching) costs – 25-30%
- sheep and wool marketing costs – 22-33%
- feed costs (including pasture improvement and supplementary feeds) – 10-30%
- animal health costs – 10-18%
- labour costs – 5-10%.

Benchmarking exercises such as the South West Victorian Monitor Farm Project (SWVMFP) indicate that amongst producers within the same district, there are obviously different strategies being employed that ultimately influence the level of profitability of the enterprise (Table 1.3). For example, in 1996-97 the top 20% of SWVMFP farms (based on profit indicators) achieved higher wool cuts per head and maintained higher stocking rates compared to the average farm in the project, resulting in markedly higher wool production per hectare. This effectively reduced the total cost of wool production per kilogram for the top-performing farms, increasing their opportunity for returning a profit. Note that the average farm returned a slight loss, implying that a large number of farms were returning substantial losses. Those strategies working to the benefit of the top 20% appear to be associated with pasture and grazing management, breeding and genetics and reducing the costs of production (e.g. feed and animal health regimes; efficiency of labour usage).

Table 1.3 A comparison of average performance in a range of enterprise parameters for all farms and the top 20% of farms (based on profitability) in the South West Victorian Monitor Farm Project, 1996-97. Source: Patterson and Beattie (1997).

	All farms	Top 20%
Wool production:		
kg per head	4.9	5.2
kg per hectare	46.0	55.5
Stocking rate (DSE per ha)	11.5	13.2
Net wool price ($ per kg clean)	4.50	4.52
Sheep sale price ($ per head)	18.64	20.21
Total cost of production ($ per kg wool)	5.91	4.31
Profit ($) per kg wool sold	-0.05	1.97

Sackett and McEachern (2003) when comparing bottom, middle and top flocks use the following key performance indicators (KPIs):

- Cost production/kg clean wool
- Price received/kg clean wool
- Price as % of micron indicator
- Kg clean/adult shorn
- Average adult FD(μm)
- % income from wool
- Kg clean wool/ha
- Kg clean wool/ha/100mm rain
- % DSEs as wethers
- Mid-winter stocking rate (DSE/ha)
- % of potential stocking rate
- DSE/labour unit
- Enterprise size (annual average DSEs).

Top 20% flocks had 40% of the cost of production of bottom 20% flocks, 3.5 times the kg wool/ha and twice the mid-winter stocking rate.

For an individual farm enterprise, annual variations in profitability are a reflection of annual variations in productivity, product value and production costs. A number of studies have shown that of the three, annual variation in product value is by far the largest (possibly up to 38% either side of the enterprise average) followed by variation in productivity (±15%) and production costs (±10%). It is important to understand how the production system responds to seasonal changes, to enable long-term production and marketing strategies to be implemented.

1.3 Production profile of Australian wool-growing industry

The national sheep population

Since the collapse of the Reserve Price Scheme in 1990-91 and the subsequent decline in wool prices, the size of the national sheep population has been declining (Figure 1.3). This has arisen mainly from a decline in Merino sheep numbers in the cereal-sheep zone (Figure 1.4). As alternative enterprises become relatively more profitable, the priority given to wool production, and therefore sheep numbers, diminishes. This trend reinforces the variation that exists in the priority given to wool across production zones and enterprise types.

Figure 1.3 Changes in national sheep population numbers from 1979-80 to 2002-03. Source: Barrett et al. (2003).

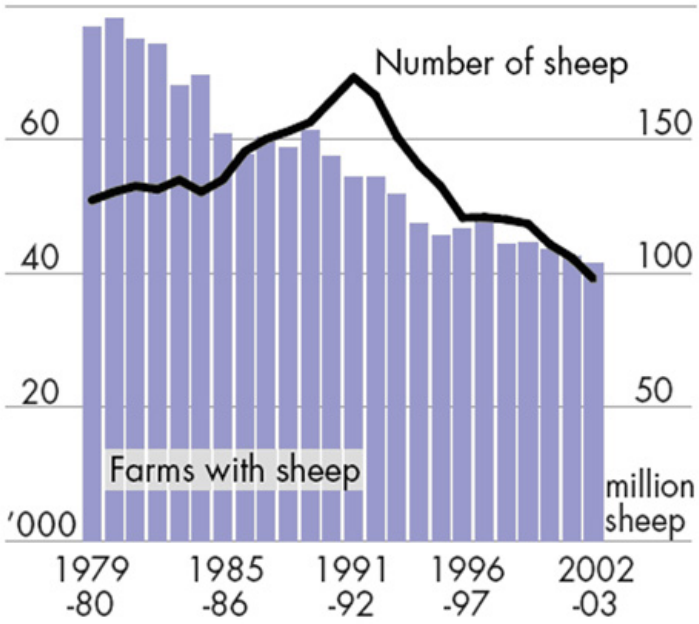
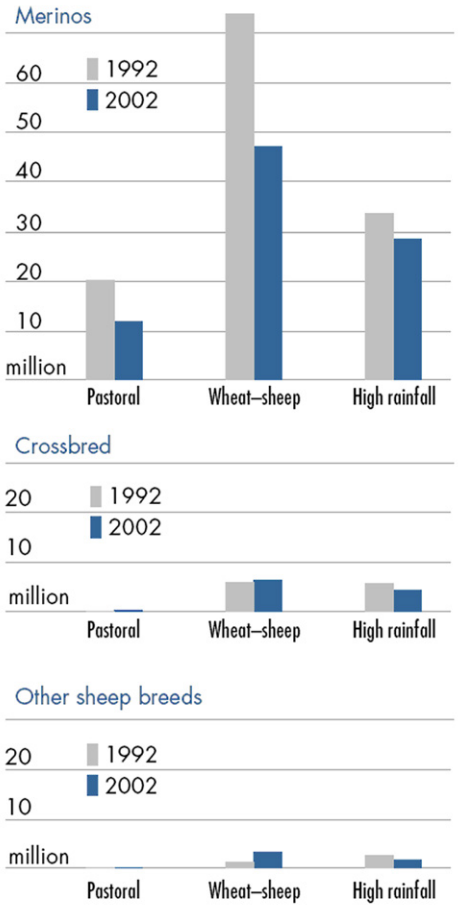
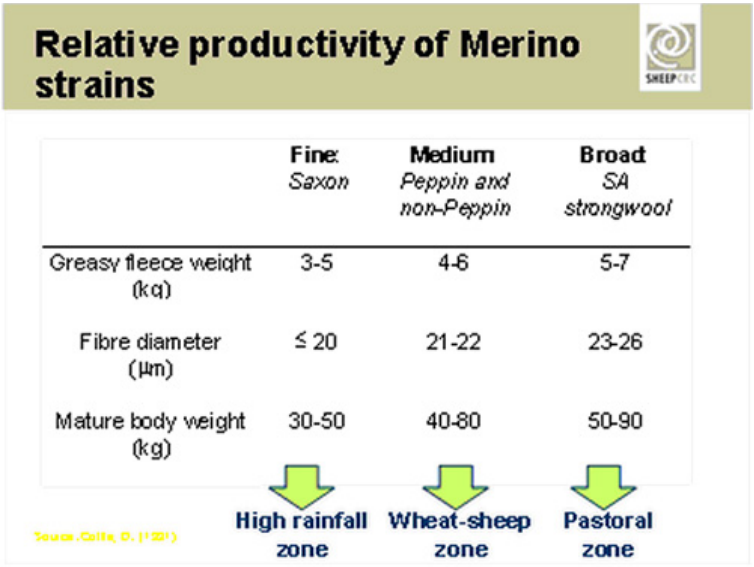


Figure 1.4 Changes in the distribution of merinos, crossbreds and other breeds of sheep within the pastoral, wheat-sheep and high rainfall zones. Source: Barrett et al. (2003).



The majority of the national sheep population comprises Merino sheep, of which there are a number of strains differing genetically in performance for the key determinants of farm profitability (see topics 11-15). However, from the wool market's point of view, they are commonly distinguished on the basis of fibre diameter, giving rise to superfine (<18.6μm), fine (18.6-20.5μm), medium (20.6-22.5μm) and broad or strong (22.5-24.5μm) wool Merino types.

Figure 1.5 Merino Strains. Source: Cottle (2005).



Importantly, there is an association between Merino type and production environment, with fine and superfine wool types prevalent in the high rainfall zone, medium wool types in the mixed farming zone and broader wool types in the pastoral zone. Each production zone will therefore have different priorities for wool production on the basis of different production capacity and product type associated with the particular genotype prevalent in that environment.

It is also worth noting that approximately 75% of the national sheep flock comprises animals with high nutritional demand due to physiological state (Table 1.4). That is, breeding ewes which are subjected to the demands of pregnancy and lactation, and young sheep (lambs and hoggets), which are subjected to the demands for growth.

Table 1.4 Changes in the Australian Flock Profile between 1992 and 2002. Source: Compiled from Barrett et al. (2003), Rudwick and Turnbull (1993).

	Adult Ewes	Adult Wethers	Rams	Hoggets	Lambs
Pastoral					
1992 (%)	44.3	28.8	1.1	14.3	11.5
2002 (%)	48.7	15.7	1.3	16.9	17.4
Wheat Sheep					
1992 (%)	39.1	26.4	1.0	15.7	17.8
2002 (%)	50.6	13.1	1.1	13.5	21.7
High Rainfall					
1992 (%)	36.6	32.1	1.1	13	17.2
2002 (%)	37.5	23.2	1.0	17.4	20.9
Total (Millions)	50.0	35.9	1.3	18.8	21.2

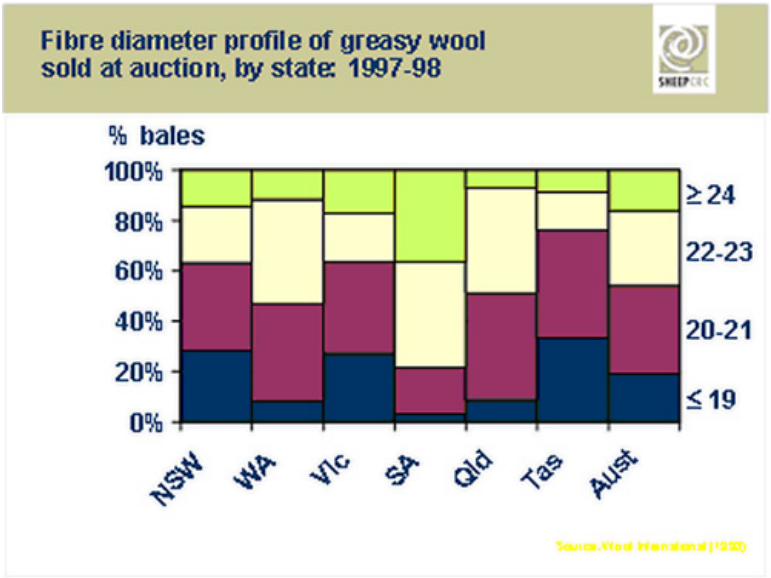
State and regional differences in production

Historically, around one third of the national clip has been produced in NSW and around one quarter in Western Australia (Table 1.5). Figures for wool cut per head (derived from total wool production and sheep closing numbers) reflect in part genetic differences. There is a predominance of the heavier-cutting broad wool type in South Australia, medium types in New South Wales, Queensland and Western Australia, and the lighter-cutting finer types in Victoria and Tasmania. Associated with this are clear differences between States in relation to the distribution of the clip across the fibre diameter categories (Figure 1.6), reflecting environmental differences as well as the influence of the prevalent type of Merino.

Table 1.5 Differences between States in contribution to national wool production and average wool cut per head. Source: Wool International (1998).

	Contribution to national wool production (%)	Av. wool cut per head (kg)
NSW	34	4.3
WA	24	4.0
Vic	18	4.0
SA	13	4.7
Qld	8	5.0
Tas	3	4.0
Australia	100	4.2

Figure 1.6 State fibre diameter profiles. Source: Cottle, (2005).



There are also clear differences between States in relation to the proportion of bales carrying discolouration and low staple strength (Table 1.6). The tendency for higher levels of discolouration arising from NSW (and QLD) relative to the other States suggests an effect of summer-dominant rainfall patterns on greasy wool colour. On the other hand, the higher incidence of bales classed as tender is higher in those States associated with a winter-dominant or Mediterranean climate. For the level of vegetable matter contamination, there are no clear State trends.

Table 1.6 Differences between States in the % of bales classed as having either unscourable colour (discoloured) or low staple strength (tender) and the average vegetable matter base (VMB%) of sale lots sold at auction in 1997-98. Source: Wool International (1998).

State	Selling Centre	% of bales classed as:		VMB%
		Discoloured	Tender	
SA	Adelaide	7	24	2.3
WA	Fremantle	13	31	1.6
NSW	Sydney	17	17	3.0
	Goulburn	12	18	1.7
	Newcastle	17	7	2.8
Victoria	Melbourne			
	Geelong	10	28	1.6
		10	33	1.0
Tasmania	Launceston	13	18	0.6
Average		13	24	2.1

Within any one State, there will also be differences between regions in terms of capacity for production per hectare, sheep genotype and wool quality, largely reflecting environmental and genetic (strain) differences. This is demonstrated in Table 1.7 for NSW.

Table 1.7 Between-region variability in wool production: average specialist wool farm, NSW, 2000-01. Source: Shafron, Martin and Ashton (2002).

	Tablelands	Central West	North West Slopes and Plains	Riverina	West
Wool cut per head (kg)	4.1	3.9	4.7	4.9	5.3
Wool cut per ha (kg)	13.4	14.4	4.3	11.2	0.8
Stocking rate (DSE per ha)	5.3	6.2	1.1	3.5	0.4
Fibre diameter of main fleece line (μm)	21.1	22.8	20.4	21.1	22.3
Greasy wool price (c/kg)	794	738	381	466	333

The amounts of wool grown in each wool statistical district of Australia from 1991 - 2003 are shown on the unit CDROM

1.4 The Australian wool industry – an heterogeneous industry

Given the preceding information, it is imperative that the Australian wool industry be viewed as a highly heterogeneous industry. That is, it is inherently variable in terms of:

- priority given to the wool production enterprise
- constraints and opportunities for wool production
- attributes of the wool product
- determinants of enterprise profitability
- sociological attributes of wool producers.

It is therefore critical that the needs of a heterogeneous industry be considered when identifying strategies for improving productivity, product quality and enterprise profitability. It is unlikely that there will be one solution that is appropriate to the needs of all wool producers.

Readings

The following readings are available on CD:

Current statistics for the Australian sheep industry can be found in the three key readings.

1. Ashton, D. and Berry, P., 2003, *The Australian Sheep Industry*, ABARE Report 2848 to the Sheep CRC Board.
2. Barrett, D. Ashton, D. and Shafron, W., 2003, *Australian Wool Industry 2003,* ABARE Research Report 03.5 Canberra.
3. Rowe, J. and Atkins, K.D., 2004, 'Strategies for lifting profitability in the sheep industry', *ABARE Outlook Conference* 2004, Canberra.

Activities	Available on WebCT
Multi-Choice Questions	Submit answers via WebCT
Useful Web Links	Available on WebCT
Assignment Questions	Choose ONE question from ONE of the topics as your assignment. Short answer questions appear on WebCT. Submit your answer via WebCT

Summary

Summary Slides are available on CD

There are three main sheep production zones in Australia, the high rainfall zone, the wheat-sheep zone and the pastoral zone, with each characterised by different climates and key production enterprises. Sheep are produced in either specialist wool enterprises or mixed farming enterprises with each differing in priority for management decisions and both labour and monetary investment. The national sheep population has experienced a decrease over the past 25 years driven mainly by a drop in sheep numbers in the wheat-sheep zone as other farming enterprises became more profitable.

References

Barrett, D. Ashton, D. and Shafron W. 2003, 'Australian Sheep Flock – breed and composition', in *ABARE Australian Farm Surveys Report*, pp. 15-18.

Chapman, R.E., Williams, O.B. and Moule, G.R. 1973, in *Pastoral Industries of Australia*, eds. G. Alexander and O.B. Williams, Sydney University Press, Sydney, pp. 79-116.

Cottle, D.J. (ed) 1991. Australian Sheep and Wool Handbook, Inkata Press, Melbourne, Australia, 1991.

National Land and Water Resources Audit, Commonwealth of Australia. Australian and Natural Resource Management 2002, Agricultural Land use in Australia. Retrieved October 20th, 2006 from http://audit.ea.gov.au/ANRA/people/docs/national/anrm_report/

anrm_contents.cfm.

Patterson, A. and Beattie, L. 1997, *South West Victorian Monitor Farm Project: summary of results 1996-97,* Catchment and Agricultural Services, Natural Resources and Environment, Hamilton.

Rudwick, V. and Turnbull, D. 1993, *The Australian Sheep Flock: 1992 Demographics*, ABARE Research Report 93.3, Canberra.

Sackett, D. and McEachern, S. 2003, *AgInsights 2003*, Holmes Sackett and Associates Pty. Ltd.

Shafron, W., Martin, P. and Ashton, D. 2002, *Profile of Australian Wool Producers, 1997-98 to 2000-01*, ABARE Research Report 02.7, Canberra.

Wool International 1998, Australian Wool Compendium

Glossary of Terms

(from Australian Sheep and Wool Handbook, Cottle, D.J. (ed).

Aged	a sheep that is past the most economic period of its life – about 5 years old
Backs	wool skirted from the back section of a fleece
Broad	wools with a coarse fibre diameter for their quality number, or for their type
Cast for age	a reject old sheep that is past its prime for a particular set of conditions
Cast fleeces	inferior fleeces of a clip – tender, cotted, etc.
Cobbler	a rough, wrinkled or difficult shearing sheep
Comeback	fine crossbred wool usually produced by sheep with 75% Merino blood
Count	the numbers traditionally used to express the spinning capacity of wool such as 58s, which implies that under ideal processing conditions it is possible to spin 58 hanks of yarn, each 560 yards long, from one pound of combed top
Crossbred	sheep possessing the blood of two or more breeds, one of which is usually Merino
Fibre diameter	the thickness of individual wool fibres. Average fibre diameter of any sale lot is by far the most important characteristic in terms of processing value. It is expressed in micrometres (or microns) – one-millionth of a metre
Full mouth	a sheep that has all its permanent incisor teeth fully developed
Hogget	a young sheep of either sex from about 9 until 18 months of age (two-tooth). The hogget stage follows on the weaner stage
Kilotex	the unit of measurement for linear density (or thickness), in grams per metre. The thickness of staples is used in the calculation of staple strength. A staple of 100 mm in length with a clean weight of 0.1g has a pencil 'thickness' of 1 kilotex. Typical staples range from 1 to 5 ktex
Lamb	a young sheep still with its mother (sucker lamb) or up to 5 months

Maiden ewe	a ewe that has not been served by a ram. Commonly applied to ewes that have not had their first lamb
Oddments	lambs, locks, crutchings, stains, dead wool, black wool and so on. Oddments are usually displayed on a separate show floor and sold in a separate auction room
Store condition	a sheep in good condition but not fat
Strong	coarse or thick-fibred wool
Sucker lamb	a lamb that is sucking its mother and has grown sufficiently heavy for slaughtering
Summer lamb	a young sheep 5 to 8 months old, slaughtered out of the usual season
True to type	a sheep showing marked development of all the characteristics peculiar to that particular type of breed
Two tooth	a sheep of either sex from about 12 to 19 months old and showing two permanent incisor teeth: 2-tooth: 12-19 months old; 4-tooth: 18-24 months old; 6-tooth: 23-26 months old; 8-tooth: 28-48 months old
Weaner	a lamb that has been weaned from its mother, or has stopped sucking its mother (6 to 9 months old)
Wet ewe	a ewe that is rearing a lamb
Wether	a male sheep castrated when a lamb