Chapter 1
Introduction

> If we actually read each other's work and let it affect our own, then we are well and truly following the economic model of free trade. If we do what most academics do - never crack a book outside their subdisciplines - then we are following the economic model of Albania, specializing in ox carts and moldy wheat. Modern academic life has whole fields specialized in ox carts and moldly [sic] wheat.
> (McCloskey 1990, p. 1128)

1.1 Modelling farmer decision making

Variability of product prices and the effect this has on farmer decisions and efficiency has long been recognised (e.g., Campbell 1958; Tomek 1969; Robinson 1975). Much less emphasis has been placed on the impact of seasonal variability on their decisions, although in Australia it could be argued this is equally important.

Many studies assessing the consequences of variability on decision making by farmers have assumed farmers follow some process of utility maximisation. Most commonly the subjective expected utility (SEU) approach has been used where an elicited (or assumed) probability distribution is presumed to capture all belief about an uncertain parameter.

Price stabilisation effects in Australia have generally been modelled by hypothesising changes in the shape of the probability distributions (e.g., Martin and Urban 1984; Hinchy 1987; Fraser 1988), although in practice the formulations have often been reduced to the mean and variance of standard normal distributions. These studies and many others have been based on theoretical concepts of farmer expectations (mainly of prices) and their relationship to farmer behaviour. Limited survey evidence is available on the dispersion of farmer expectations and how these are used by farmers in their decision making (if, indeed, they are used at all). Less work has been

undertaken which examines the decision making processes used by farmers and the relative influence of other factors in these processes.

A considerable body of economic and psychological literature (e.g., Simon 1979; Schoemaker 1982; Anand 1985; Einhorn and Hogarth 1985; Herrnstein 1991; Luce 1992) raises doubts about the use of elicited probability distributions to capture the effects on decision-making of uncertain parameters and, in addition, questions the underlying axioms of expected utility (EU) theory. This raises considerable doubt about the ability of the theory to predict farmer behaviour. The notion of uncertainty about uncertainty (or 'ambiguity') is one problem raised. Indeed the idea that it might be possible to measure farmers' probability distributions accurately in a practical setting has also been questioned by several authors (Bogess 1987; Flacker and King 1987; Pope 1987). In their decision making processes it appears that many people either do not form probability distributions or their distributions are poorly structured, difficult to elicit, and are not used in any consistent way.

Various theories have been developed both within and outside the utility framework (e.g., Gladwin 1977; Machina 1982; Quiggin 1982; Ford 1987; Hogarth and Einhorn 1988; Gul 1991; Karni 1992; Neilsen 1992) which either attempt to overcome problems with the EU model, or use entirely different assumptions. The advantages and disadvantages of many of these as descriptive or predictive models of farmer behaviour will be discussed later in this thesis.

1.2 Research problem

A great deal of time and effort is expended each year in Australia on attempts to predict the supply of various commodities. Most of the models used to make the predictions are based in some way on the twin assumptions that, when making decisions, farmers are utility maximisers who form and use expectations about probability distributions of uncertain variables. A major difficulty for the models is the appropriate specification for the formation and updating of these expectations. In addition, since economic theory provides minimal help in deciding which factors to include in the models and the form they should take, incorrect specification is also a

major problem (Just 1992). The result depends to a large degree on guesswork by the model builder and the results of 'data mining'.

Despite these limitations the models generally give a satisfactory result when used to predict changes that might result from marginal variations in key variables. The problems arise when they are used to assess the effect of major changes in these variables. Unfortunately, this is the time when the results of an accurate prediction would be most useful. A good illustration of this occurred with the 1992 forecasts by the Australian Bureau of Agricultural and Resource Economics (ABARE) of sheep numbers and shorn wool production for the 1992-93 season. The 1992 projections for sheep numbers were nearly 5 percent less than the revised forecasts for 1993, while projections for shorn wool production were nearly 11 per cent less than the 1993 figures (Australian Bureau of Agricultural and Resource Economics 1992, 1993). Such a discrepancy could have been an important factor in the significantly optimistic wool price forecasts for the 1992-93 season.

A general aim of this research was to advance some explanations for the differences in forecasting performance between situations of major and minor changes in key variables. A further aim was to suggest directions for future research that might lead to solutions to the problem of forecasting when large changes occur in key variables. These aims are consistent with the call by Just (1992, p. 33) for 'a new generation of models . . . at the micro level to support aggregate model specification and related forecasting, market and policy analysis.' While the research was conducted on wool producers in the New England region of Australia, the broad principles of the findings may have wider application.

1.3 Research objectives

From 1972 through to early 1991 wool marketing in Australia was controlled by the Australian Wool Corporation (AWC). Their main instruments for control of prices and quantities of wool sold were the Flexible Reserve Price Scheme and the Minimum Reserve Price Scheme. Funding for these activities came from the Market Support Fund derived from a levy on the sale of wool.

There is general agreement that while it was in operation the Reserve Price Scheme (RPS) significantly reduced the variation in auction prices (Campbell, Gardiner and Haszler 1980; Fraser and Murrell 1990). Whether the reduced variation in prices led to a reduction in variation in producer revenue is not clear (Quiggin and Fisher 1989). With the demise of the Reserve Price Scheme in 1991 and their exposure to the full effect of market forces at the beginning of the 1991-92 wool selling season, wool producers have faced a more uncertain environment.

In this context the study explored the framework in which Australian wool producers made major production and marketing decisions (e.g., whether to change from prime lamb production to merino ewe breeding, whether to mate some merino ewes to prime-lamb rams, and when to sell their wool). The overall objective was to identify and evaluate, at the farm level, major stimuli determining the production and marketing decisions of wool producers, including price and seasonal conditions.

Emanating from this were the following specific objectives for the research.

(1) To evaluate the various theories of decision making in order to derive a theoretical model and associated empirical techniques that could be used to describe the decision-making processes of wool producers and predict their production and marketing decisions. In particular, to develop models that could describe and predict choices between the various options for wool production and between wool production and competing enterprises.

(2) To determine the relative importance of the various stimuli that influenced wool producers' production and marketing decisions. Assess the impact of the Reserve Price Scheme on the decision-making processes.

(3) To develop generalisations of the models that could be used to predict the changes in aggregate supply that occurs as groups of wool producers respond to changes in the stimuli influencing their decision-making environment.

Given the aims of the study were essentially exploratory and descriptive - specific, testable hypotheses were not advanced. Instead, development of the theoretical model and the associated empirical techniques was guided by the following beliefs:

(1) To develop an understanding of the reasons for the choices made by wool producers, information would need to be collected on specific decisions they had made;

(2) as far as possible the approach used to collect the information should avoid introducing theoretical bias (e.g., by collecting probability distributions where apparently they were not used in the decisions).

It was also felt that often wool producers would be insensitive to minor variations in price and seasonal conditions. Their sensitivity to these changes was also expected to vary with the type of decision being made.

1.4 Outline of thesis

In Chapter 2 some background is presented on the characteristics of the Australian wool industry and the changes that have occurred in the marketing environment faced by wool producers over the last decade. A review of the strengths and weaknesses of subjective expected utility and its extensions as descriptive and predictive models of behaviour, can be found in Chapters 3 and 4. This review forms the basis for the development of an alternative model of behaviour presented in Chapters 5 and 6. In Chapter 7 the design and conduct of the empirical study are outlined. The results of the study are presented and discussed in Chapters 8 and 9. Conclusions and implications of the research are given in Chapter 10. Details of the models used in the study can be found in Appendix 3.

Chapter 2
Recent changes in the production and marketing environment for Australian wool

> We sail within a vast sphere, ever drifting in uncertainty, driven from end to end.
> (Pascal, ca. 1670)

2.1 Introduction

In recent years Australian wool producers have faced some dramatic changes in their production and marketing environments. Since the beginning of the eighties many have faced at least two periods of drought, wool prices have gone from levels that were barely profitable, to extremely profitable and back to disastrous. Perhaps most significantly, the 20 year-old buffer-stock scheme collapsed. In this chapter a brief outline is provided of some of these changes. It is a background to some issues faced by the wool producers interviewed for this study when they made their production and marketing decisions.

2.2 Size of the Australian wool industry

Traditionally the Australian wool industry has been an important sector of the Australian economy and of the international wool industry. While it is now a small sector in terms of contribution to gross domestic product, it remains a major contributor to export earnings. Wool and sheepskin exports made up around 10 per cent of total exports of goods and services during the 1980s (Australian Bureau of Agricultural and Resource Economics 1991). A dramatic decline occurred at the end of the decade when a large proportion of output was purchased by the Australian Wool Corporation.

In international terms Australia provided between one-quarter and one-third of world wool production during the 1980s (Australian Bureau of Agricultural and Resource

Economics 1991), with USSR and New Zealand the other major sources. For the finer wool types (less than or equal to 24 micron diameter), which are mainly used in apparels, Australia has a dominant role providing around 60 percent of total world production in 1989-90 (Vines, Davis and Miller 1991). Conversely, Australia produces almost no strong wool. Because a large proportion of the clip is sold on the world market, Australia is by far the most important exporter of raw wool, contributing around 50 per cent of total exports in the early 1980s, rising to around 60 per cent in 1988-9.

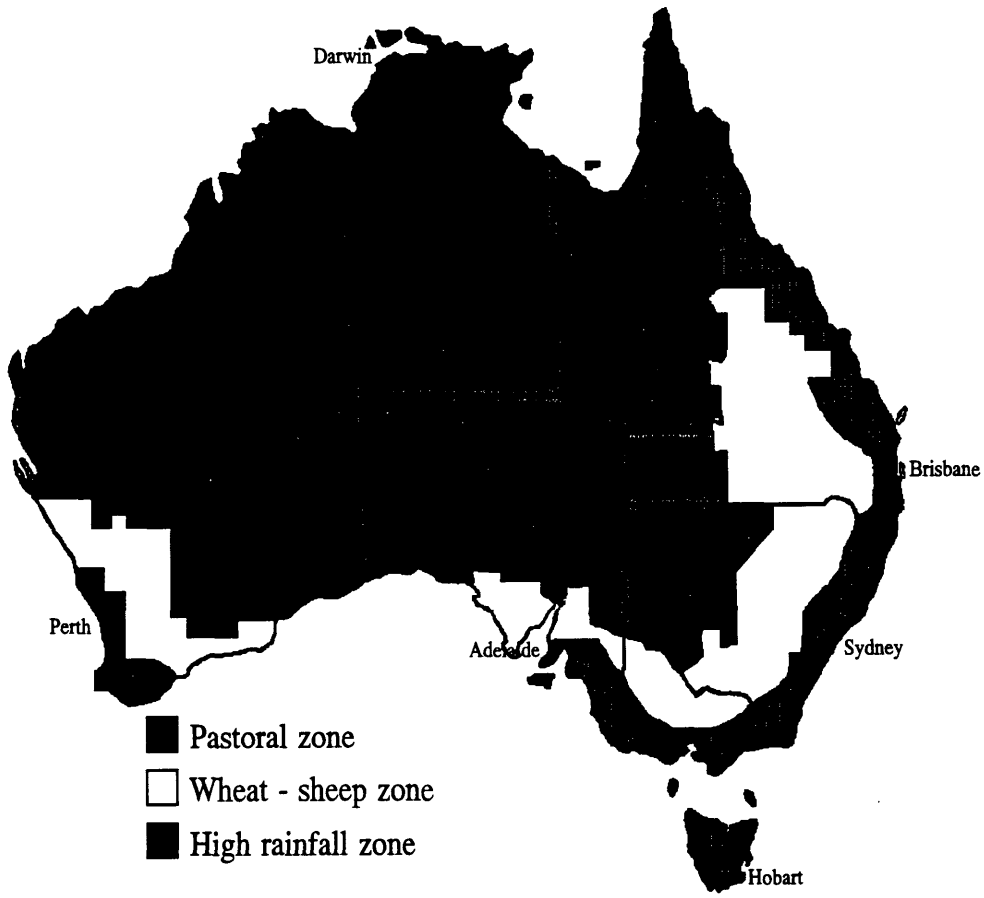
2.3 Physical environment for wool production in Australia

Wool production is important in all the states of Australia across a broad range of climatic, topographical and soil environments. These environments constrain the types of sheep run and the alternative agricultural enterprises to wool growing, in the areas where wool sheep are run commercially. A useful method for classifying the areas of wool production is the zones used by the Australian Bureau of Agricultural and Resource Economics for their surveys: the Pastoral, Wheat-Sheep and High Rainfall Zones (see locations of these areas in Figure 2.1). A detailed description of the zones can be found in Bureau of Agricultural Economics (1985, p. 88).

The Pastoral Zone is generally limited to grazing of native pastures because of inadequate rainfall. The Wheat-Sheep Zone, in the main, has suitable topography, rainfall and soils for cereal cropping, 'improved' pastures and grazing. On the other hand, the High Rainfall Zone is generally too hilly and humid for cereal cropping, but is more suited to intensive livestock production on 'improved' pastures.

The Wheat-Sheep Zone contains over one-half of the Australian sheep flock and commercial wool growers, while the High Rainfall Zone contains about one-third (Table 2.1). Although the Pastoral Zone contains only a few commercial wool growers, it has around 15 per cent of the sheep flock, indicating a larger average flock size.

Figure 2.1
ABARE broad-acre grazing zones



Source: BAE 1985, *Farm Surveys Report 1985*, Bureau of Agricultural Economics, Canberra.

Producers in each of the broad-acre zones have tended to specialise in particular types of sheep operations because these operations are suited to the distinctive conditions of the zone. The Pastoral Zone contains almost exclusively merinos, while the other two have a mix of merinos and other sheep types (Table 2.2). Merinos in the Pastoral Zone are large, with strong wool, high cuts per head, and are adapted to the harsh conditions. Cattle are the other main enterprise.

High Rainfall Zone producers have tended to specialise in fine and superfine merinos, comeback types (especially in Tasmania) and prime lamb production. Cattle are the other main enterprise. Because of their pastures, High Rainfall Zone producers can grow clean, bright, low-vegetable-matter wool, which generally commands a premium price. In the Wheat-Sheep Zone, with its dustier, seedy pastures, medium type merinos are the norm, with some prime, or first-cross lamb production, and cattle.

2.4 Marketing environment for wool production

Since World War II the Australian wool market has been influenced by three major factors: a decline in wool's share of the world fibre-market; instability caused by local and world economic and political factors; and the operations of marketing authorities in the major producing countries.

Wool's share of the world fibre market has declined over the last 25 years from 7.7 per cent in 1960-62 to 3.9 per cent in 1985-87 (Stoeckel, Borrell and Quirke 1990), although total wool production increased about one-third during that time. This decline has stabilised in recent times with wool production in 1990 being 5.1 per cent of total world fibre production (Australian Wool Corporation 1991). Fibre demand has increased and been met mostly by synthetics. While some increase has been in products for which wool is unsuitable (Vines et al. 1991), wool is facing increased competition from synthetics and cotton in its traditional apparel markets. A factor that compounded this problem in the latter half of the 1980s was the rapid increase in the price of wool relative to cotton and synthetic fibres. It caused a switch to these fibres.

Table 2.1
Per cent of Australian wool growers and sheep in ABARE broad-acre zones 1990-91

Zone	Commercial wool growers	Sheep
	%	%
Pastoral	6	15
Wheat-sheep	62	55
High rainfall	32	30

Source: Adapted from Topp, V., Gleeson, P.A. and Morris, P.C. 1992, 'Impact of alternative wool prices in 1992-93 on regional incomes', *Agriculture and Resources Quarterly*, 4(2), 209-221.

Table 2.2
Breed composition of Australian flock in ABARE broad-acre zones 30 June 1984

Zone	Merinos	Cross-breds	Other breeds
	%	%	%
Pastoral	99.9	0.1	0.0
Wheat-sheep	80.4	18.0	1.6
High rainfall	60.9	24.4	14.7
Australia	76.2	18.0	5.8

Source: Moir, B. and Meppem, T. (1985), 'Age structure and breed composition of the sheep flock', *Quarterly Review of the Rural Economy* 7(Surveys Issue), June, p. 69.

The demand for wool has altered since World War II, sometimes quite dramatically, because of a series of worldwide and localised economic and political disturbances. These factors were important because almost all of the Australian wool clip was traded on the international market. Some international influences that had a major impact included: the Korean war in the early 1950s that led to a boom in the wool industry; the oil price hike in the 1970s that resulted in world recession; the internal disturbances and economic problems in China combined with economic decline in the USSR in the late 1980s; and the world recession in the early 1990s.

In recent years the Australian wool industry has also had to take account of changes in government policies, such as financial deregulation, which have introduced further instability. These unpredictable factors have occurred on top of the more 'predictable' fluctuations in demand arising from fashion and business cycles.

2.4.1 From 'free market' to 'orderly market'

Until the 1970s the wool industry had seen very little government intervention in the market except two brief periods after the first and second world wars. During these periods a Joint Organisation was formed by the United Kingdom and the major exporting countries of Australia, New Zealand and South Africa to dispose of wool stocks accumulated during the wars. These were disbanded when this had been completed and the industry in Australia returned to the auction system as the method for deciding market prices.

Although there had been pressure at times for various types of 'orderly marketing' in the wool industry, their use had been resisted. Watson (1980), in his presidential address to the 24th annual conference of the Australian Agricultural Economics Society, provides an informative but concise discussion of key aspects of the debates that occurred. In the main, pressure for 'orderly marketing' came from smaller wool producers and wheat-sheep growers, while larger producers and the graziers' organisations resisted.

Following the period without intervention in the 1950s and 1960s, the Australian Wool Marketing Corporation was established in 1970. Although its initial purpose

was mainly to aggregate and provide price averaging for small lots, the rapid decline in prices that occurred at this time led to pressure for further intervention. The Australian Wool Commission took over the activities of the Corporation and began to operate a system of flexible reserve prices in November 1970 (Australian Wool Corporation 1992a). The aim of this was to prevent short-term fluctuations in prices by using a system of flexible prices that varied from day to day.

When prices continued to decline and stocks of wool increased under the flexible reserve scheme, the flexible reserve price became more like a fixed (or floor) price scheme. The Commission maintained the floor by purchasing all bales that failed to pass the reserve price in the auction (Parton 1979). Stocks of wool continued to accumulate throughout 1971, reaching approximately one million bales. With rising prices in the 1972-3 selling season, these stocks were rapidly disposed of, providing a boost for the Commission and its supporters and silencing its critics (Watson 1980). The Wool Industry Act 1972 formed the Australian Wool Corporation (AWC). It took over the functions of the Australian Wool Board and the Australian Wool Commission and began its operations in January 1973.

2.4.2 Operation of the Reserve Price Scheme

In September 1974 the 'floor price' operations were formalised when the Minimum Reserve Price Scheme was begun (Australian Wool Corporation 1992a). Under the Minimum Reserve Price Scheme a floor price was set that was to remain firm for a whole wool-selling season. In addition, the Flexible Reserve Price Scheme maintained a system of 'flexible reserves' that were set above the Minimum Reserve Price for brief periods with the aim of steadying short term downward fluctuations or 'potholes' in the market. Most of the time 'flexible reserve' prices were not used, and the main source of intervention by the AWC was the minimum reserve price (Connolly 1987).

The twin aims of the two schemes were to 'protect growers against "disastrously low" prices and to provide them with some protection against short-term falls in the market' (Vines et al. 1991, p. 16). Wool that did not attract bids from the trade at or above the minimum reserve price (or the flexible reserve price when this was in

operation) was purchased by the AWC at the floor price, thus assuring wool growers that they would receive at least this price for their wool. The wool was stored until the market improved, when it was sold. Such sales of stocks were often used to steady a rising market.

A Market Support Fund was established in 1974 to support the Reserve Price Scheme (Australian Bureau of Agricultural and Resource Economics 1988). Until 1986-87 it was funded from a 5 per cent levy on gross revenue from wool (beyond the 3 per cent already levied for wool promotion and research). The Market Support Fund provided equity for loans used to finance purchases of stocks, besides covering losses incurred by the AWC with its stock-holding operations. A policy existed to repay growers' contributions when the credit balance of the Fund reached a sufficient level for the fund to be considered self-financing. This occurred first in 1981-2 and in several seasons after this.

Before each wool-selling season, following consultations between the Federal government, the AWC and the Wool Council of Australia, representing woolgrowers, the minimum reserve price for the market indicator was set and announced. A schedule of minimum prices for all the main types of wool - in effect a disaggregation of the announced reserve - was subsequently announced by the AWC. Further disaggregation of the indices occurred so that the reserve prices could be applied to individual lots (Richardson 1981). After 1976-7 there was a guarantee that the minimum reserve price for the market indicator would not be lower in nominal Australian dollars than the previous season's price. Although the minimum reserve prices for some micron categories were lowered from one year to the next, the market indicator was not.

While the initial aims of the Minimum Reserve Price Scheme were to protect against disasters, in the 1980s its emphasis changed to include obtaining a maximum sustainable price in the long term and to take account of the costs of stock-holding (Australian Wool Corporation 1985, 1990). Responsibility for setting the reserve price also changed following wool marketing legislation in 1987. This transferred the responsibility from the Minister for Primary Industry to the AWC and the Wool

Council of Australia (Australian Wool Corporation 1992a), with the government overseeing their deliberations.

O'Connor (1993) notes this transfer of responsibility was not accompanied by any clarification of the purpose of the RPS. He suggests growers began to view the RPS as a price setter rather than stabiliser, and currency fluctuations to justify upward movements of prices, but not the reverse. Munro and Fisher (1982) expressed concern about this problem earlier when they found evidence that some producers believed the floor price was based on cost of production estimates. Political influences within grower organisations also began to affect price setting.

2.4.3 Effects of Reserve Price Scheme

A perceived benefit to woolgrowers of the Reserve Price Scheme (at least until 1990) was the knowledge that prices for their wool in a particular year would not fall below an assured minimum. They were also protected from temporary adverse price movements within a particular year. This would be expected to reduce their down-side risk, and the stabilisation of prices to stabilise their income.

Several studies have looked at the influence of the Reserve Price Scheme on price variability. The major difficulty in measuring this effect was to predict what the variation would have been without the scheme. Campbell et al. (1980) estimated the AWC to have reduced the coefficient of variation for auction prices by 44 per cent from the fourth quarter of 1970 to the second quarter of 1978. A similar reduction of 41 per cent was reported by Fraser and Murrell (1990) using data from the period July 1976 to December 1986. Both studies involved an attempt to estimate variation in prices with and without stabilisation. The latter authors contend this approach may have led to an underestimate, because the historical level of the coefficient of variation declined from approximately 30 per cent to around 6 per cent for the period they studied. They suggested a possible explanation for this could be an 'existence effect'. In other words, the existence of a Reserve Price Scheme may have stabilised the market if all buyers knew it would be used if needed. While the above two studies assess the effect of stabilisation on variability of the market indicator, work

by Connolly (1987) suggests the reduction in price variability will not be the same for different grades of wool.

The effect of the Reserve Price Scheme on variation in producer revenue proved more difficult to measure. As noted by Quiggin and Fisher (1989, p. 6), 'It is not at all clear ... that stabilisation schemes designed to affect industry aggregate variables have a positive effect on farmers' net incomes.' Campbell et al. (1980, p. 12) commented that the 'reduced price variability has been won at a net cost to revenues from wool sales'. Richardson (1982, p. 63) pointed out that their definition of revenue referred to 'gross sales revenue' not 'hidden gains and losses' to be made by wool growers. Haszler and Curran (1982, p. 66), in a reply to Richardson, agree their results '*should not* be used as a direct measure of the hidden transfers incurred directly by growers'.

Consideration of the welfare effects for producers of the Reserve Price Scheme has also proved difficult. However, the fact that for many years wool producers were prepared to pay a levy equivalent to 5 per cent of gross income to support the scheme - and in recent times considerably higher levels - suggests producers have a strong revealed preference for stabilisation.

Empirical estimates of the benefits of stabilisation have yielded a variety of results. An expected utility, mean-variance method used by Quiggin (1983) implied the Reserve Price Scheme transferred risk from wool producers to wool processors. On the other hand, a Newbery and Stiglitz approach used by Hinchy and Fisher (1988) suggested both producers and processors would be likely to gain from stabilisation if the elasticity of demand was within the range commonly estimated by econometric studies.

An extension of a Newbery and Stiglitz model by Fraser and Murrell (1990), which considered supply effects, suggested that both risk-neutral and risk-averse wool producers would be willing to pay for price stabilisation. However, the amounts calculated were less than one-half of a percent of income, without allowing for the 'existence effect' mentioned earlier. When the reduction in variability of prices from

the historical level was taken into account, the willingness-to-pay measures ranged from about one per cent of income for risk-neutral wool producers to around 4 per cent for producers with a relative risk aversion coefficient of 0.9. The apparent willingness of almost all producers to pay a levy to the Market Support Fund at much higher levels must raise some doubts about these results, not to mention the theoretical weaknesses of a model that assumes that production of wool in Australia depends on labour alone.

2.4.4 From 'orderly market' back to 'free market'

A significant devaluation of the Australian dollar in 1986 made wool cheap in overseas currencies since the reserve price was set in Australian dollars. Wool prices boomed. The floor price was increased by more than 70 per cent in response, from 508 c/kg in 1986-87 to 870 c/kg in 1988-89. In the latter half of the 1988-89 wool-selling season problems in the USSR and China caused them to withdraw from the market. The effect of this was compounded by an appreciation in the Australian dollar and an increase in wool supply (Vines et al. 1991). Prices declined and AWC stocks increased rapidly. In May 1990, with wool stocks at unprecedented levels and continuing to climb, the Minister for Primary Industries, John Kerin, directed the AWC to reduce the floor price from 870 to 700 c/kg. This occurred despite recommendations from the AWC and the Wool Council of Australia that the price of 870 cents be maintained.

The Minister followed this in July by establishing a Committee of Review into the wool industry to examine wool marketing arrangements. At that stage the Reserve Price Scheme was to be retained. Despite repeated assurances by the Minister that the 700 cents level would be maintained, an increase in the wool tax to 25 per cent on 4 October 1990, a removal of the limit on AWC borrowings, the introduction of a flock reduction scheme, a proposal to introduce tradeable wool quotas for 1991-92 to a maximum of 750 kilotons, and other measures, speculation against the floor price continued. The market remained unstable and wool stocks and the AWC debt continued to climb.

On 1 February 1991 the AWC suspended wool sales for three weeks to allow time for consideration of strategies for recovery of the industry. AWC stocks were 4.73 million bales (Australian Wool Corporation 1992a). On 11 February the Minister suspended the operation of the Reserve Price Scheme for the remainder of the wool-selling season, ushering in the 'free market' again after nearly twenty years. He also announced a supplementary payments scheme to compensate woolgrowers who sold their wool during that period, the abandonment of the proposed marketing quotas, and a review of the flock reduction scheme. The marketing arrangements after 30 June 1991 were to be decided after consideration of the recommendations of the Wool Industry Review Committee (the Vines Committee). When sales restarted the market indicator fell to 428 c/kg clean.

In April 1991, following presentation of the Vines Committee Report, the Government decided on new arrangements for the wool industry. The Reserve Price Scheme was abolished and the functions of the AWC were divided between three new bodies. Management of the stockpile and its debt was taken over by the Australian Wool Realisation Commission, research and development by the Australian Wool Research and Development Council. The AWC was left to oversee wool marketing, quality standards and wool promotion. An Australian Wool Industry Council, comprising all sections of the industry, was set up to be the coordinating body for the whole industry.

These changes came into operation on 1 July 1991. The 1991-92 wool-selling season opened with the wool tax set at 12 per cent and the stockpile at 4.6 million bales (Australian Wool Corporation 1992a). In the following year the (revised) market indicator averaged 557 c/kg clean and by the end of the year the stockpile was 4.1 million bales (Australian Wool Corporation 1992c).

2.5 Changes in wool and livestock prices and production over the last decade

The period since the end of the 1970s has been one in which wool producers have faced a range of environmental and economic challenges. The early 1980s was a

period of low prices, with drought conditions throughout much of Australia. This was followed in the middle of the decade by good seasons and a period of rising prices for most sheep and beef commodities. Finally, at the end of the decade, prices for wool and sheep-meats collapsed and the seasons turned dry in many wool-growing areas.

2.5.1 Changes in wool prices

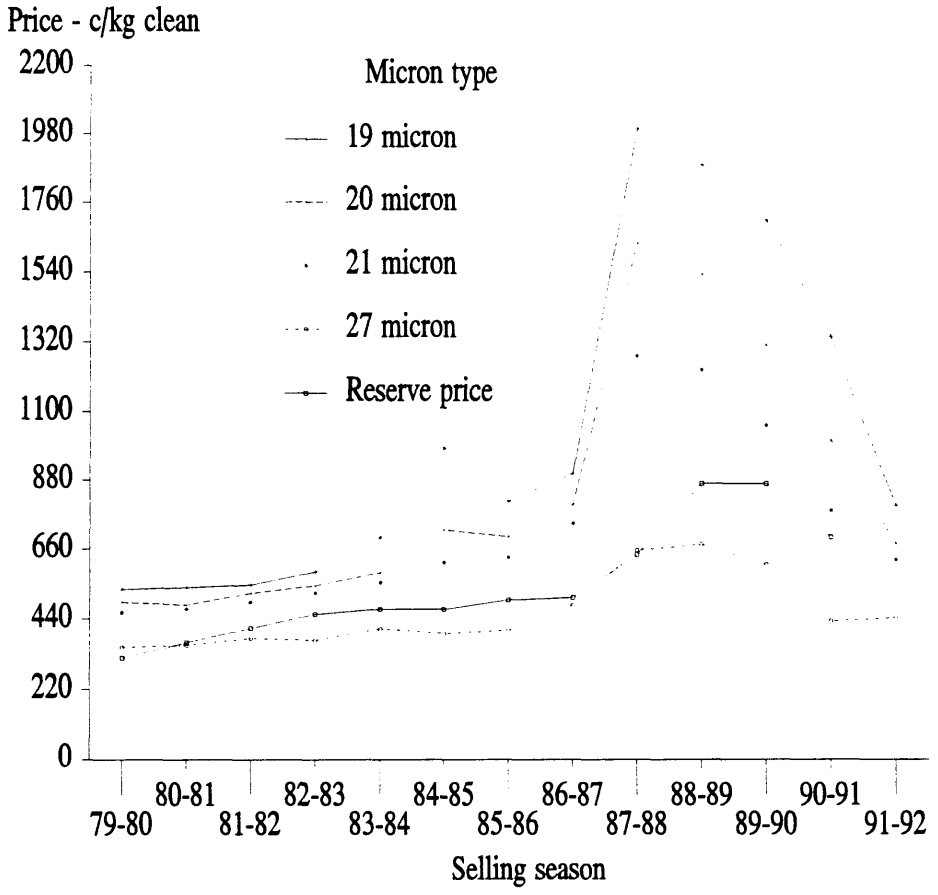
At the beginning of the 1980s the market indicator stood at 395 c/kg clean (average for the 1979-80 season) and was trending slowly up. At the end of the decade the indicator was at 870 c/kg clean (average for the 1989-90 season) and trending rapidly down. In between, the slow increase in prices at the beginning of the decade began to accelerate in the middle and 'exploded' in the 1987-88 wool selling season (Figure 2.2). The peak of the market was in May 1988 with an indicator price of 1269 c/kg clean (Australian Wool Corporation 1992b). While prices rose across the range of micron types, the lower the micron the higher the percentage increase. This increased the price differential for finer over broader wools (Figure 2.3).

Following the decline in prices discussed in 2.4.4 the market indicator for the 1991-92 season was less than one-half the peak level reached. As shown in Figure 2.3, the differential in prices across microns returned to historical levels. An increase in the supply of fine wool, much of which was 'hunger fine' wool, because of drought, was one factor in the larger percentage decline in price for the finer end of the clip. The average micron of the whole clip had also declined over the decade, adding to the supply of finer wool (Farrell 1993).

2.5.2 Changes in sheep-meat and beef prices

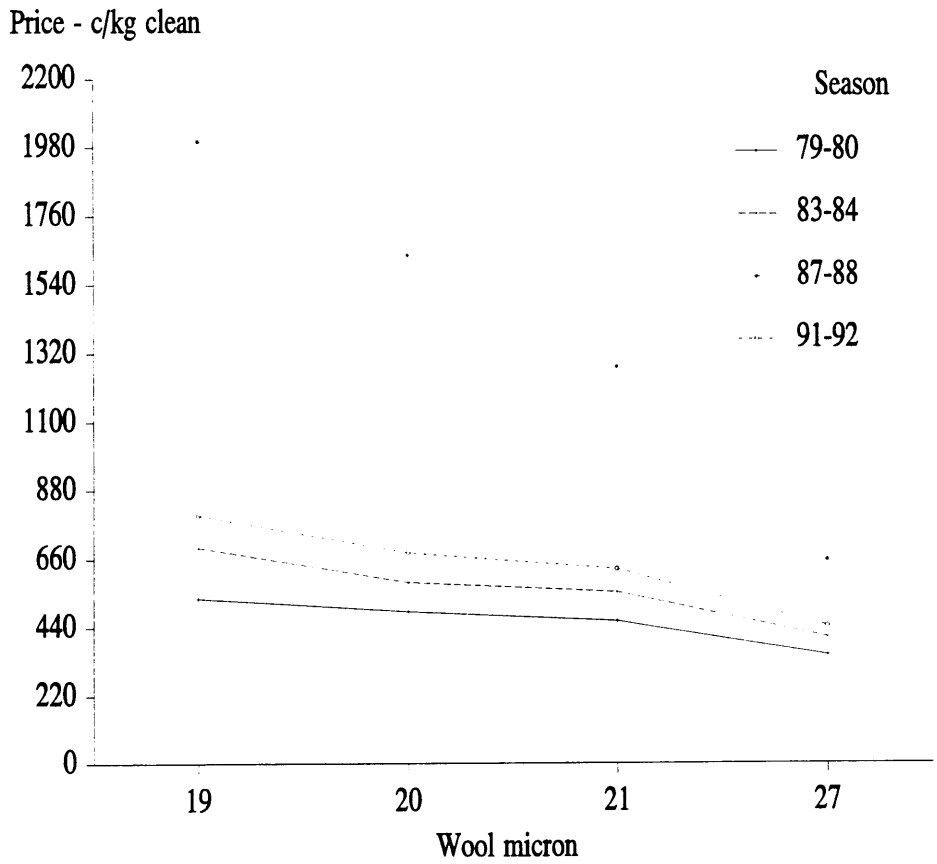
In all three broad-acre zones wool production is a competing enterprise with prime lamb and/or beef production. An indication of the changes that have occurred in saleyard prices for lamb, mutton and beef since the beginning of the 1980s is given by Figure 2.4. Beef prices have shown a general upward trend throughout the last decade, although the change has not been dramatic. Lamb prices, on the other hand, have shown a sinusoidal pattern with no visible upward trend, and are not much

Figure 2.2
Auction prices of selected wool types
1979-92



Source: Derived from Australian Wool Corporation (various issues 1980-92), *Wool Market News - Annual Price Summary*, Australian Wool Corporation, Melbourne.

Figure 2.3
Differential in prices of selected microns of wool 1979-92



Source: Derived from Australian Wool Corporation (various issues 1980-92), *Wool Market News - Annual Price Summary*, Australian Wool Corporation, Melbourne.

different at the beginning of the 1990s to what they were at the beginning of the 1980s.

Over the last 15 years, since the beginning of the live sheep trade, higher prices for mutton have helped increase the return from wool production. This has occurred because of the increased return from sale of cull and cast-for-age sheep. While mutton prices have undergone large fluctuations since the beginning of the 1980s, they were generally high until the collapse of the live sheep trade and the fall in wool prices in 1989-90. At this time Australian live sheep exports fell from seven million in 1989 to around 3.5 million in 1990 (Appendix Table A1.1), largely because of problems with the Saudi Arabian market and the invasion of Kuwait. In 1990-91 mutton was almost unsaleable, but showed some recovery in 1992 along with the recovery in live sheep exports.

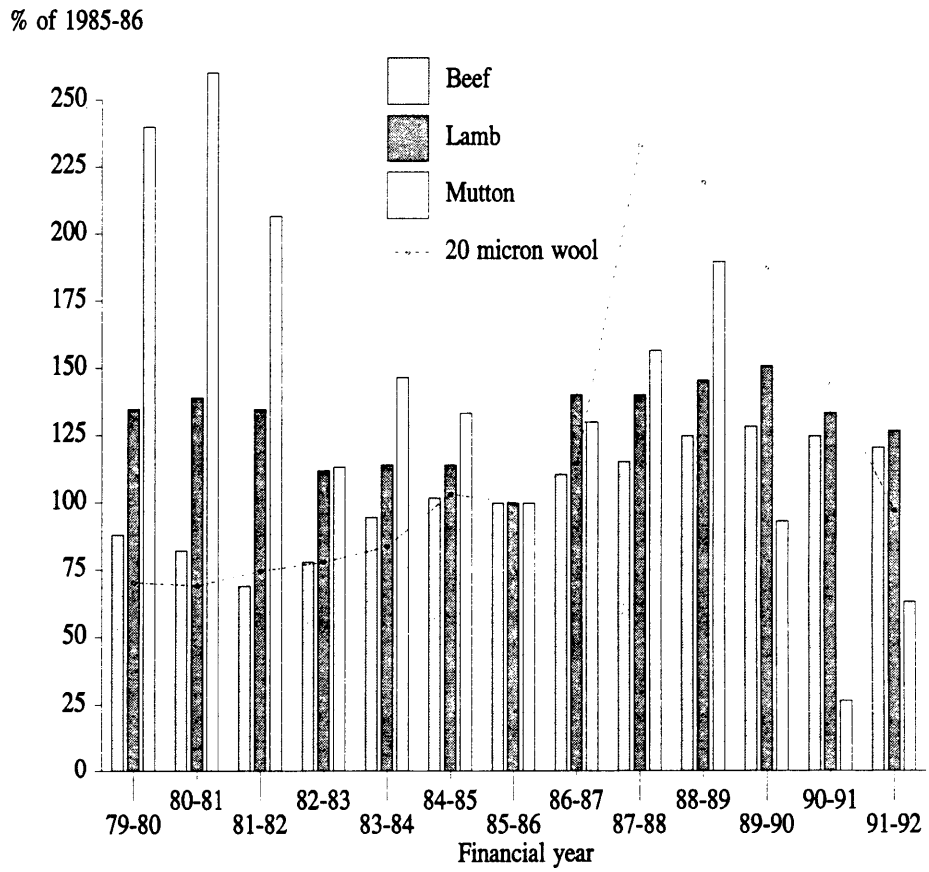
Until the end of the 1980s, therefore, prices for the main products of a wool enterprise, merino wool and mutton, were buoyant compared to the main products of a prime lamb enterprise, lamb and crossbred wool. While beef prices generally followed an upward trend, the change was not dramatic compared with the changes in wool prices.

2.5.3 Changes in livestock number

Despite the gradual increase in beef prices since the beginning of the eighties, beef cattle numbers have remained stable at around 20 million head, with a small dip at the beginning of the decade when most of Australia was in drought. The Australian sheep flock increased substantially after that drought (with good seasons and rapidly rising prices for wool), from 131 million in 1984 to 170 million in 1990 (Figure 2.5). It has since declined to around 150 million head in 1992 with the collapse of the wool and live sheep markets and the dry conditions, in some cases drought, in NSW and Queensland.

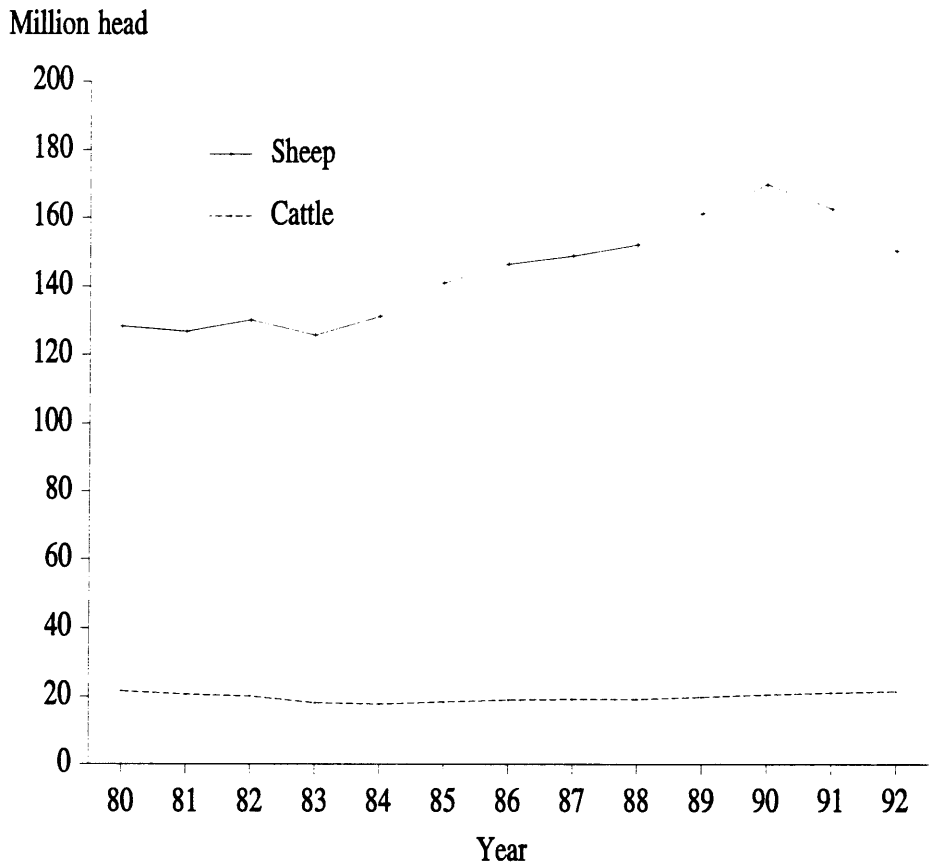
Wool production showed an even greater response to the good seasons and prices in the mid-eighties. Greasy wool production increased by over 50 per cent from the 1983-84 season to the 1989-90 season. This resulted from an increase in the average

Figure 2.4
Change in livestock and wool prices
1979-92



Sources: Meat prices - Derived from ABARE (various issues1980-92), 'Commodity outlook', *Agriculture and Resources Quarterly*, ABARE, Canberra.
Wool prices - Derived from AWC (various issues 1980-92), *Wool Market News: Annual Price Summary*, Australian Wool Corporation, Melbourne.

Figure 2.5
Sheep and beef cattle numbers in Australia
1980-92



Source: Derived from Australian Bureau of Statistics (various issues 1980-92), *Livestock and Livestock Products*, Cat. No. 7221.0, AGPS, Canberra. Adjusted for change in definition of farms undertaking agricultural activity.

cut per head and a substantial increase in the number of sheep shorn (Figure 2.6). Since 1991 the fall has been almost as dramatic with greasy wool production falling to 801 kt in 1991-92 and the numbers of sheep shorn to 181 million.

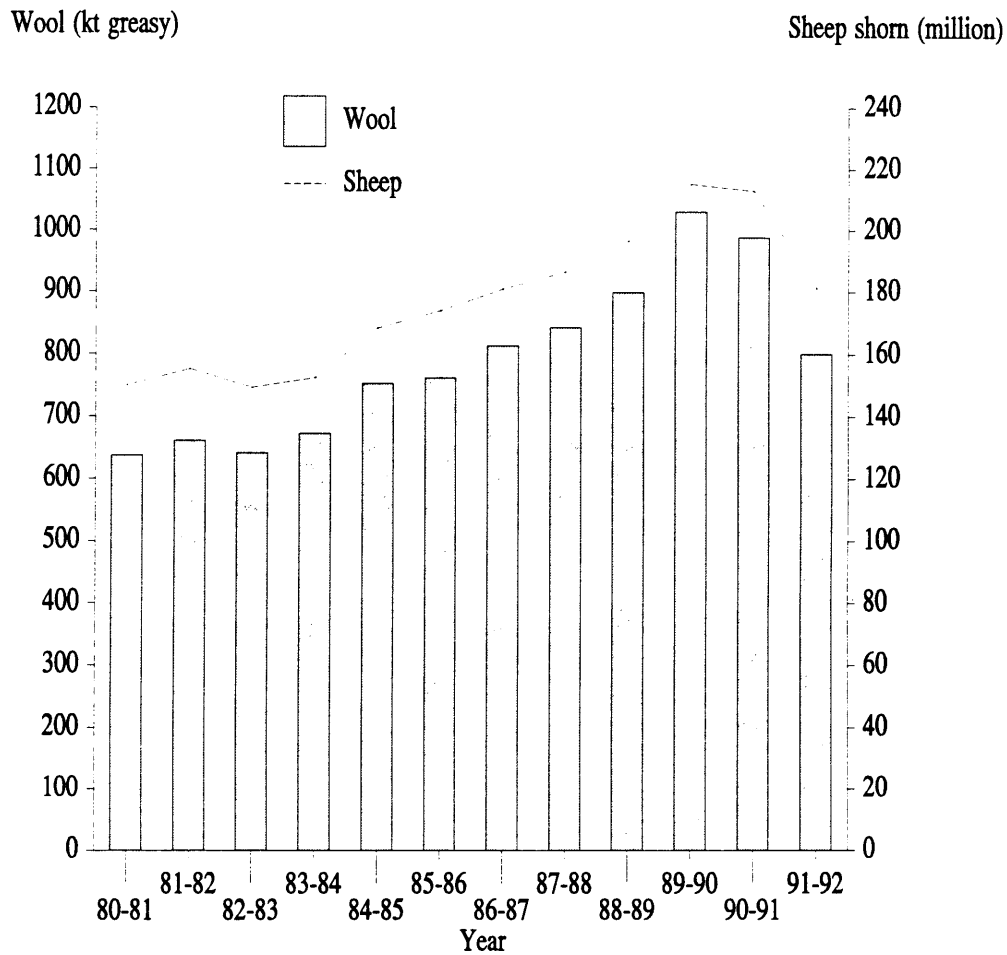
2.5.4 Changes in composition of the sheep flock

Following the end of the drought in 1983, and the changes in wool and meat prices discussed earlier, the numbers of crossbred and other breeds of sheep began to decline in real and proportional terms. In proportional terms they declined from 12 per cent and 10 per cent of the national flock in 1983, to 9 per cent and 6 per cent respectively in 1989 (Figure 2.7). Numbers of merino comeback types doubled between 1980 and 1986, from a very small base, but declined after that. The increase in the national sheep flock mentioned in 2.5.3 was, therefore, largely due to an increase in the merino sheep flock that expanded from 74 per cent of the national flock in 1983 to 82 per cent in 1989. During the same period numbers increased from 95 to 117 million.

An important reason for the changes in the composition and size of the total wool flock can be seen from the mating intentions data given in Figure 2.8. Figures for NSW are used because the breakdown of intentions is not collected in all states. The decline in intentions to mate ewes to longwool rams after 1983 is matched (after a lag) with a decline of intentions to mate to shortwool rams. Intentions to mate to Polwarth/Corriedale rams also declined after 1983. Conversely, intended matings to merino rams increased by around 50 per cent between 1984 and 1990, more than compensating for the decline in matings to all the other breeds.

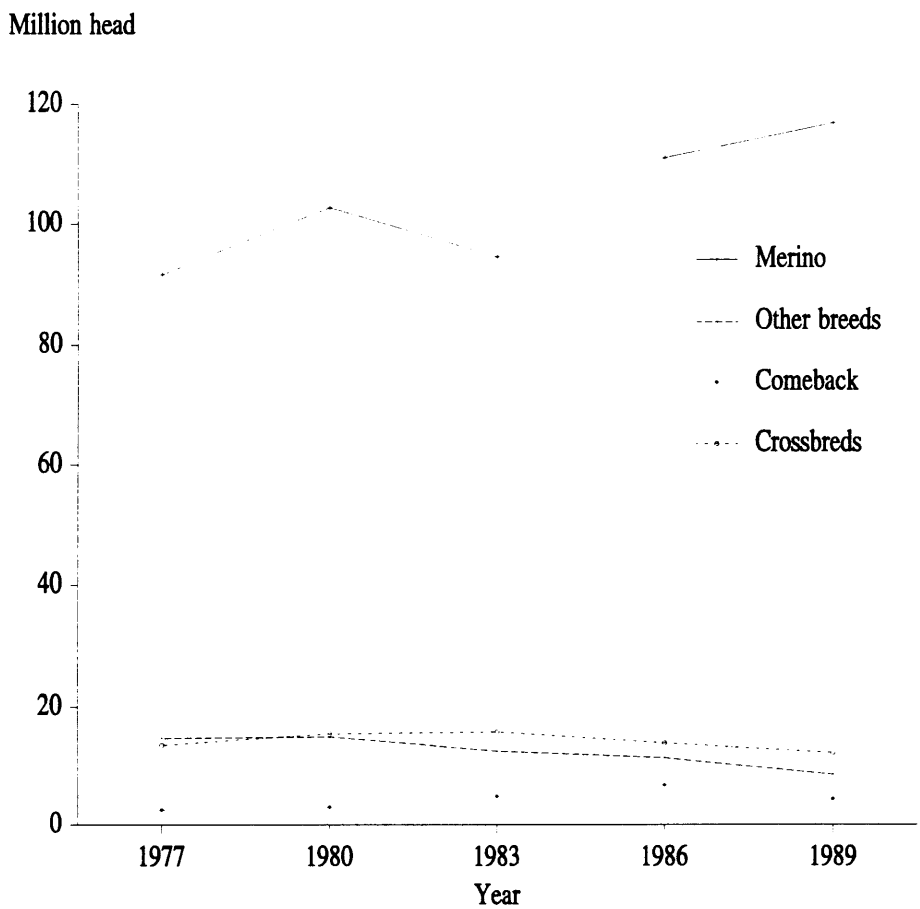
Figure 2.9 provides an interesting perspective on opportunities and constraints facing sheep producers when they adapt their flocks to changes in prices and climate. During the drought period of the early eighties, when prices were steadily increasing, breeding ewe numbers increased slightly, while other sheep numbers declined (mainly wethers), suggesting sheep producers maintained their breeding flock, but cut their non-breeding numbers to compensate.

Figure 2.6
Shorn wool production in Australia
1980-92



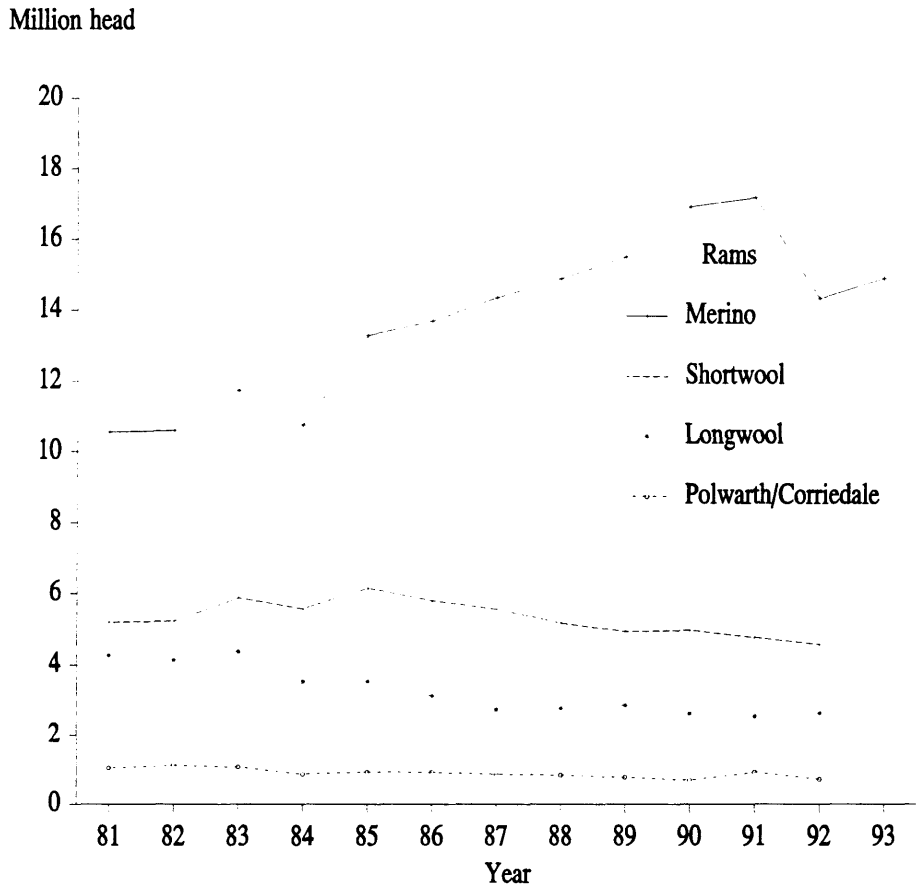
Source: Derived from Australian Bureau of Agricultural and Resource Economics (1986 & 1992), *Commodity Statistical Bulletin*, AGPS, Canberra.

Figure 2.7
Flock size of sheep breeds in Australia 1977-89



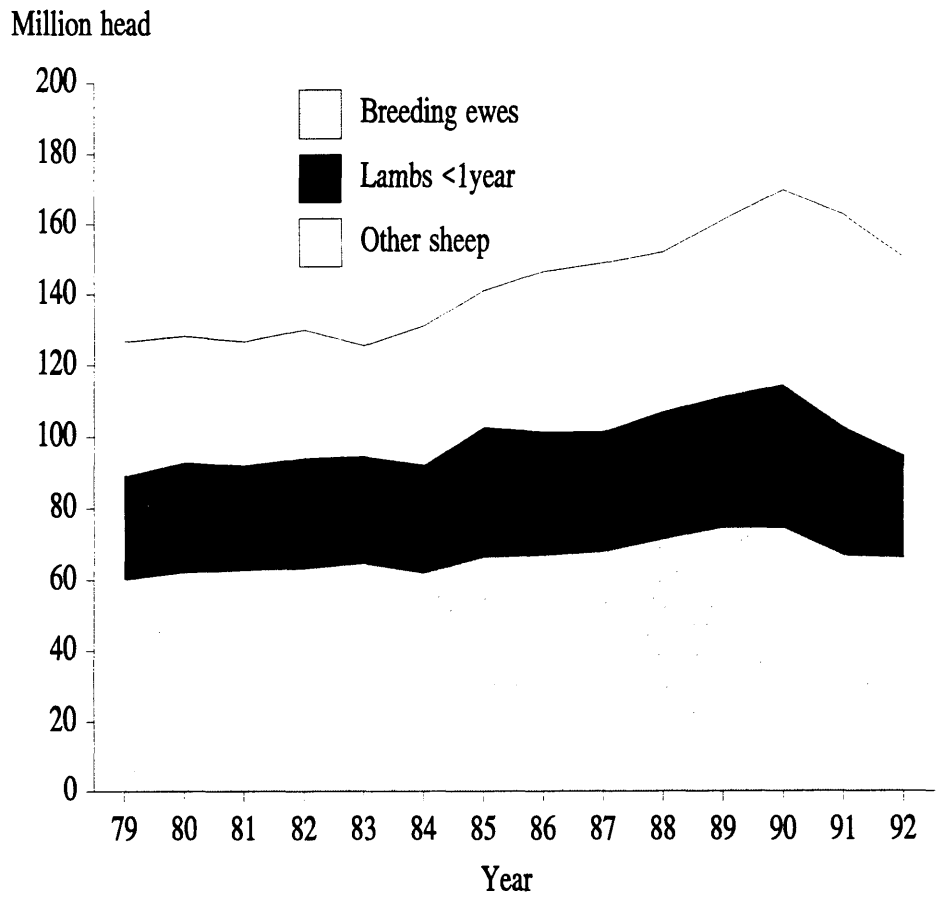
Source: Derived from Australian Bureau of Statistics (various issues 1977-92), *Livestock and Livestock Products*, Cat. No. 7221.0, AGPS, Canberra.

Figure 2.8
Numbers of ewes intended to be mated to breeds of ram
NSW 1981-93



Source: Derived from Australian Bureau of Statistics (various issues, 1981-93), *Livestock and Livestock Products*, Cat No. 7221.0, AGPS, Canberra.

Figure 2.9
Composition of Australian sheep flock
1979-92



Source: Derived from Australian Bureau of Statistics (various issues 1980-92), *Livestock and Livestock Products*, Cat. No. 7221.0, AGPS, Canberra.

In the early stages of the period from 1984 to 1990, when the national flock increased substantially, much of it was due to increased retention of non-breeding sheep. Another factor was that higher proportions of the breeding flock were mated, which, with better seasons, led to larger numbers of lambs. Substantial increases in the size of the breeding ewe flock lagged behind the other increases (for obvious reasons), consequently, between 1983 and 1990, breeding ewe numbers increased by 16 per cent while the total flock increased by 35 per cent. Similarly, the recent decline in sheep numbers is due more to declines in lambing percentages and wethers than to a decline in breeding ewes.

2.6 Summary

The past decade in the wool industry has been a classic case of the boom and bust nature of much of broad-acre Australian agriculture. Then the boom in prices coincided with good seasons and the bust with dry conditions. The production and marketing environment is now dramatically different from that faced in the early 1980s. Financial deregulation, the forced deregulation of wool marketing, and moves to change drought support, mean wool producers are faced with a more uncertain future than they did 10 years ago.

This chapter provides a background to the environment faced by wool producers over the period considered in the study. The four chapters that follow contain a discussion of the theoretical issues associated with the study. They are followed by three chapters in which the empirical research is outlined.