# A BASELINE OF ADOPTION OF PASTURE MANAGEMENT PRACTICES - NORTH CENTRAL REGION

**August 2001**

**CENTRE FOR LAND PROTECTION RESEARCH**

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**Abbreviations**

| | |
|---|---|
| ABS | Australian Bureau of Statistics |
| LMU | Land Management Units |
| SMP | Salinity Management Plans |
| DSE | Dry Sheep Equivalent |

**SUMMARY**

The aim of this report is to document baseline information about the state of adoption of pasture establishment and management practices in the North Central Region of Victoria and to evaluate the tools for continued monitoring of the adoption of these practices.

Based upon the available data, the progress towards adoption of pasture management practices in the North Central Region can be summarised as follows:

- There is only one comprehensive measure of the rate of perennial pasture establishment in the North Central Region. The ABS farm survey for 1993/94 provides a measure of the rate of all perennial pasture sowing in the region of 2.2 percent per annum, almost half to lucerne and half to phalaris based pastures. Both these measures increased in 1996, reaching a total of 5.3 percent which dropped to 4.2 percent during the following year.

- There is no available independent study which can be used to calibrate the ABS pasture sowing data. The best means of achieving this calibration would be to repeat part of the Salinity Program baseline study with an improved set of pasture questions.

- Previous farm censuses did not differentiate annual from perennial pasture. However, it can be deduced from these that the rate of pasture sowing peaked in 1987/88 during a short period of high wool prices, and fell to almost half that level by 1990/91, and appears to have continued to fall since.

- This low rate of perennial pasture sowing is unlikely to promote a significant increase in the area of active perennial pasture in the catchment. At this rate it is unlikely to maintain the area of existing perennial pasture, as there is evidence that the lack of maintenance of perennial pastures is likely to reduce their persistence. ABS and other local studies highlighted the low adoption of improved pasture management systems such as top dressing and rotational grazing management strategies.

- In 1994/95 the rate of pasture top dressing was approximately 10 percent. This ABS derived figure is comparable to the results of the Salinity Program baseline study which found a top dressing rate of 8 percent in the previous year (1993/94). This result gives confidence in the ABS farm survey as a means of monitoring the maintenance of improved perennial pastures. The ABS reported an increase in pasture top dressing, with 22 percent of the pasture area being fertilised by 28 percent of the farmers during 1997.

- There is no ABS data which can be used to monitor the use of grazing rotation practices. Data available from other surveys conducted in the catchment reveals that set stocking is the predominant method of grazing management.

- Research in the North Central Region has revealed that there are a number of clear segments in the market for perennial phalaris pasture.

  *Committed:* This group of farmers have a high percentage of their farm sown to exotic perennial pastures. They have maintained an active resowing program throughout the period of low wool prices. They top-dress their pastures regularly. Most either rotationally graze or graze strategically. This group rarely represents more than 15 percent of the population and often as little as 5 percent of the population. Members are driven by an interest in production and profit.

*The Pasture Dabblers:* This group has a smaller proportion of the farm under perennial pasture, typically around a third of the property or less. This pasture is regularly top-dressed, and often will be managed by strategic grazing. Members of this group are motivated by increasing productivity and increasing income, but are constrained in further developing their pastures by commitment to other business or work interests. In Shaw's study of the Eppalock region of Victoria, these producers made up 15 percent of the farm population. They generally had an off-farm job which provided economic security to the household.

*The Crop Focused:* Found only in the mixed cropping zone, these producers see pastures as a means to improve soil fertility for the next crop and sometimes as a means to maintain sheep until they are required to eat down the next stubble. Their attitude towards grasses is often ambivalent or negative, and to perennial pastures is almost totally negative. A phalaris pasture is seen as a paddock of weeds waiting for a crop. Lucerne, being harder to establish and easier to kill through neglect, is preferred by these farmers. It is less likely to become a crop weed.

*Belt Tighteners:* This is generally the largest group of producers identified, constituting between 30 and 40 percent of the population in much of the north central grazing area. When asked about the status of their pastures, most members will claim large areas of improved perennial pasture. However, in wool producing areas most will not have applied superphosphate in the last five years. Members are risk averse and see cost as the main barrier to pasture improvement.

*Comfortable:* Many of this group would claim they have significant areas of perennial pastures, but see no need to either resow, top-dress, or to change from set stocking to a more labour intensive method of management. Often these farmers are getting older, likely without family to take over the farm. Income from the farm and other sources is sufficient for the foreseeable future, without the need to take on extra risk or extra work entailed in pasture establishment and rotational grazing.

*Sceptics:* In areas where phalaris persistence is not a problem, these producers view phalaris as a weed which becomes rank and unpalatable, a fire risk and a toxic danger to stock. In the Shaw (1994) and Baird (1993) studies this group comprised between 10 and 20 percent of the sample in the Eppalock and Joyce's Creek areas of the North Central Region. Many in this segment hold strong views about the moral imperative of low stocking rates and are unrepentant about their set stocking methods.

*Retreatists:* Found around major population centres, this group is composed mainly of rural residential dwellers or absentee hobby farmers who have purchased a property predominantly for lifestyle reasons. They find no time during the week to undertake any significant management tasks, and on the weekend the management of the farm must compete with other family demands. Members of this group generally see pasture improvement and management as contributing little to family objectives and are more attracted to tree planting which provides aesthetic and possibly capital gain benefits.

- In areas where lucerne is the appropriate perennial pasture, the market segmentations have been generally simpler, with four distinct groups found in 1994.

  The *established lucerne growers* did not complain of financial or technical difficulties in lucerne establishment and management. They had an average of 50 percent of their farm under lucerne, but comprised less than 10 percent of the farm population.

  Another group of *lucerne planners* had a small area of their farm under lucerne and intended to sow a significant area. However, longitudinal studies show this intention is rarely implemented. This group comprised approximately 30 percent of the population.

The *deterred growers* were the largest group. They believed lucerne to be an asset on the farm, but doubted it was worth the risk of sowing due to technical difficulties with establishment.

The *disinterested* saw no need for lucerne on the farm. These farmers generally comprised a quarter of the population. These farmers operated smaller farms, and in many ways resembled the 'comfortable' segment associated with phalaris.

- The poor establishment success rate of lucerne was seen as a major barrier to its adoption by farmers in 1994. However, since this time establishment success rates have risen as a result of extension programs.

- Despite improvements in the success rate of lucerne establishment (e.g. undersowing to safflower) and the good performance of lucerne during dry years in the mid 1990s, there was no net increase in the area of lucerne in the period from 1994 to 1997.

Research and extension is recommended, to increase understanding of benefits of winter/spring lambing, increasing stocking rates, and the use of lucerne in cropping rotations

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# A BASELINE OF ADOPTION OF PASTURE MANAGEMENT PRACTICES - NORTH CENTRAL REGION

## August 2001


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### 1 THE NORTH CENTRAL REGION

#### 1.1 Sustainability in the North Central Region

The North Central Region comprises the unirrigated regions of the catchments of the Loddon, Avoca, Campaspe and the Avon Richardson, and covers about 2.3 million hectares. Over 65 percent of the region's land is used for agricultural production. The predominant enterprise, livestock grazing, occurs mainly in the south, while cropping is more prevalent in the north of the region.

The predominant land management units (LMUs) in the region are: the Riverine Plains, the Mallee Plains , the Volcanic Rises, the Wimmera Plains, the Granites and the Sedimentary Rises (Figure 1).

The major land degradation forms in the region are dryland salinity, soil and water erosion, soil structure decline, weeds and pest animals. Land management practices such as excessive grazing, overcultivation and replacement of woodlands and native perennial grasslands with introduced annual pasture species have largely contributed to these problems. A total of approximately 30 000 ha of agricultural land is estimated to be salt affected (North Central Regional Catchment Strategy 1997). It is estimated that approximately $1.2 million annual loss of agricultural production is due to salinity in these catchment areas (Avoca Catchment Salinity Management Plan 1992; Loddon Catchment Salinity Management Plan 1992; Campaspe Catchment Salinity Management Plan 1992 & Avon-Richardson Land and Water Management Plan 1992).

Establishment and improved management of perennial pastures, strategic tree planting, and fencing and revegetation of affected areas, along with a series of other sustainable soil management techniques, are promoted in the area as solutions to these problems.

The benefits of sowing perennial pastures in overcoming soil degradation lies within their potential to reduce recharge by extracting water from a greater volume of soil than annual pastures, using their deep root system. Perennial pastures also have the capacity to trap leached nitrates, reducing the rate of soil acidification by 50 kg lime/ha/year compared to annuals (Ridley *et al.* 1990). However, appropriate pasture management practices such as use of fertiliser, pest and disease control methods, and more importantly, grazing management systems, largely affect the maximum water use by perennial pastures.

The potential to increase carrying capacity and gross margin per hectare are the additional benefits associated with perennial pasture. However, the initial capital costs involved in establishing perennial pastures is a major concern to farmers in the region.

#### 1.2 Indicator Practices

The following practices have been selected as indicators of the extent of adoption of sustainable pasture management practices in the grazing industry in the North Central Region.

- Perennial pasture sowing rate

  The four salinity management plans (SMPs) in the North Central Region recommend sowing perennial pastures on the majority of medium recharge land and high recharge areas, as a salinity control measure. The plans set a 30 year target of areas of perennial pastures to be achieved on different land management units, with an annual total of 10 075ha in the region.

- Top dressing of perennial pastures

  Annual top dressing of newly sown pastures is an important factor in maintaining a dense, vigorous pasture in order to have an impact on reducing watertable, and also to gain high productivity through increased gross margins. Unfertilised pastures will decline to annual pastures and eventually to an annual and native pasture mix.

- Stock management methods used: rotational grazing systems

  Higher stocking rates and rotational grazing systems are required to utilise newly sown pastures in order to achieve maximum profitability. This is often the best way to deal with any weeds and to ensure optimum pasture growth. From the salinity control point of view it is also necessary to introduce rotational grazing systems, which will increase leaf area, plant growth and root development in order to maximise the water use of perennial pastures.

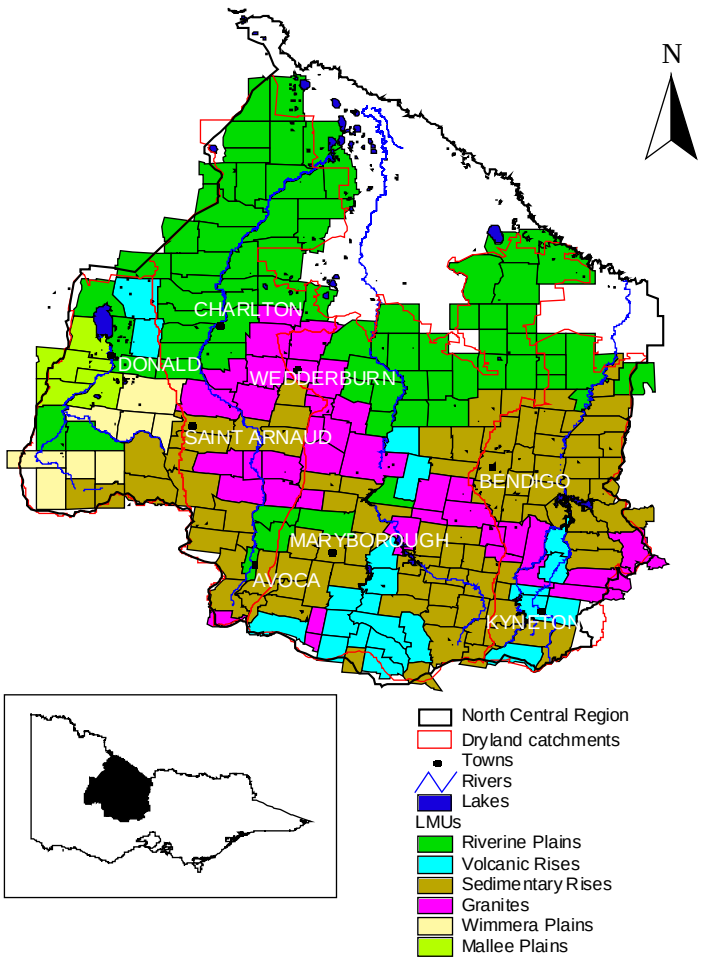



**Figure 1** Land management units in North Central Region

## 2 DATA SOURCES AVAILABLE

### 2.1 Australian Bureau of Statistics

The Australian Bureau of Statistics (ABS) farm census is distributed annually to all Australian farming businesses which meet a minimum gross income criterion. There is a legislative requirement that all farm business operators complete and return the farm census. In the last decade the ABS farm census has intermittently included questions covering use of fallow, grain legumes, soil ameliorants, fertiliser use and pastures. In recent years questions have covered the total area and resown area of perennial pastures and lucerne pasture. Data from the ABS farm census is normally available only in aggregated form at state or local government area. As part of this project data was purchased disaggregated at parish levels. As parishes are significantly smaller than local government areas, the ABS data was reaggregated according to catchment and soil type boundaries.

### 2.2 Attitudes to pasture renovation (Wegman Consulting 1986)

A qualitative study among graziers was conducted to explore attitudes to pasture renovation with respect to perceived problems, current practices and the role of herbicides in pasture renovation. This study used focus groups composed of herbicide users and non-users in key pasture renovation areas in Victoria and New South Wales. Bendigo was one of the three locations selected for this study.

### 2.3 Farmers' perceptions of dryland soil salinity (Vanclay & Cary 1989)

A study was commissioned by the Land Protection Division of the Department of Conservation, Forests and Lands to measure farmers' knowledge and awareness of dryland salinity, to determine constraints to the adoption of salinity control measures and ways to overcome these barriers, and to encourage further adoption of salinity control measures. A random sample of 131 land managers from the Loddon and Avoca catchment areas were personally interviewed using a questionnaire. The study received a 91 percent response rate. The results of this study were used as a baseline to monitor the environmental beliefs and conservation behaviours of the landholders in the North Central Region.

### 2.4 Monitoring Landcare in Central Victoria (Wilkinson & Cary 1992)

As part of the on-going monitoring of Landcare on farms in North Central Victoria, the same sample farmers from the upper Loddon and Avoca river catchments selected for the Vanclay and Cary (1989) study were reinterviewed with a view to compare the beliefs and attitudes of these farmers across time. Of the 131 families interviewed in 1988, 111 were reinterviewed in 1991.

### 2.5 Farmers' perceptions of phalaris: a qualitative approach to developing a marketing strategy for perennial pastures (Baird 1993)

A study was carried out in the Upper Loddon dryland catchment area to determine farmers' perceptions of phalaris and the influences on its adoption. Thirty graziers owning farms larger than 200 ha in the Middle-Joyce's Creek subcatchment (a high priority area for high recharge control) were selected and personally interviewed. A market segmentation was carried out to categorise these farmers based on their past sowing behaviour and intention to sow phalaris.

### 2.6 The adoption of dryland lucerne in North Central Victoria (Ransom & Barr 1994)

As a part of the Department of Agriculture extension and research project 'Lucerne for Profit', a survey was carried out in North Central Victoria to estimate the area of dryland lucerne grown in the past, the area at the time of the survey, and the areas likely to be grown in the future. The study also investigated farmer attitudes to lucerne and barriers to its adoption. An 80 percent response rate was received for a questionnaire mailed to 120 randomly selected farmers on grazing, cropping or mixed farms in 12 shires. The sample farmers were categorised according to their lucerne strategies.

### 2.7 A survey of pastures in the Lake Eppalock catchment (Shaw 1994)

A study was conducted in the Eppalock catchment to determine the area of land sown to perennial pasture species in the 30 years since the Eppalock catchment project was initiated, and to investigate the status of these pastures. The study also looked at any relationships between major pasture management techniques and pasture conditions in order to develop active plans and priorities for future pasture improvement programs. Sixty land-holders representing northern, central and southern regions of the catchment were randomly selected for the survey. A two-stage survey was conducted using a questionnaire, followed by farm visits to collect data on the status of perennial pasture species from the 'best' and the 'worst' perennial pasture paddocks on each property.

### 2.8 Avoca catchment pasture survey (Hall 1995)

A survey was carried out in the high priority areas in the southern Avoca catchment to determine the paddock areas sown to perennial pastures. This information will be used as baseline data, to determine the rate of adoption of perennial pastures in the catchment area. The outcome of this survey will determine the success of the Avoca Salinity Management Plan, which recommends establishment of perennial pastures as a salinity control practice. One hundred and ninety-six paddocks were randomly selected along the roadsides of the high priority areas to cover different land classes in the area. Paddocks were ranked according to the existence of different types of pastures. The survey will be repeated annually over the next few years.

### 2.9 Salinity control in North Central Victoria (Luke, Karunaratne & Barr 1995)

A survey was carried out in the North Central Region to document baseline information about the state of adoption of salinity control practices and farmers' beliefs about the advantages and disadvantages of these practices. One hundred and fifty farmers representing all land management units and catchments were randomly selected from a list of land-holders from the ABS. Personal interviews were carried out using a structured questionnaire. They received an 86 percent response rate. This survey will be repeated in the future to determine whether adoption rates of farm management practices recommended in the salinity management plans are on target.

### 2.10 Land use survey of the southern Avon-Richardson catchment (Demeo 1995)

To measure the area of perennial pastures sown in the high priority Sedimentary Rises and Alluvial Plains LMUs (in the Avon-Richardson catchment), two 'drive by' surveys were carried out during 1994 and 1995. These surveys, covering 291 paddocks along 91 km of roadside, classified the pasture type into annual and perennial pastures. The data from these surveys are to be used as a baseline to monitor the rates of adoption of perennial pastures in the catchment and to determine action plans for extension programs.

### 2.11 Dryland lucerne-establishment and management in North Central Victoria (Oxley 1997)

The 1994 Dryland Lucerne Survey in North Central Victoria was repeated in 1997 in order to measure the extent of changes in the adoption of lucerne and to understand the factors influencing these changes. The same respondents from the previous survey were resurveyed and a 53 percent response rate was achieved. Utilising new farmer categories developed according to their recent lucerne strategies, 15 personal interviews were carried out to determine the factors influencing the changes in adoption of lucerne.

# 3 MEASURING PERENNIAL PASTURE ESTABLISHMENT AND MANAGEMENT

## 3.1 Pasture resown rates

### 3.1.1 Australian Bureau of Statistics

The questions on the ABS census from 1984 to 1990 asked farmers for their total pasture area, and areas sown or resown with pastures during that particular year (see Appendix 1). While these surveys could be used to compare rates of pasture resowing, these questions do not distinguish between perennial and annual pastures. However, local knowledge suggests that the absolute rate of pasture resowing may be a reasonable indicator of measuring adoption of perennial pastures.

Pasture questions in 1991 to 1993 included the total pasture area, and did not measure the pasture resown area, making the information useless for measuring the adoption rates. Research in NSW and Victoria shows there is tremendous variation in the quality of pastures described as 'perennial' by farmers.

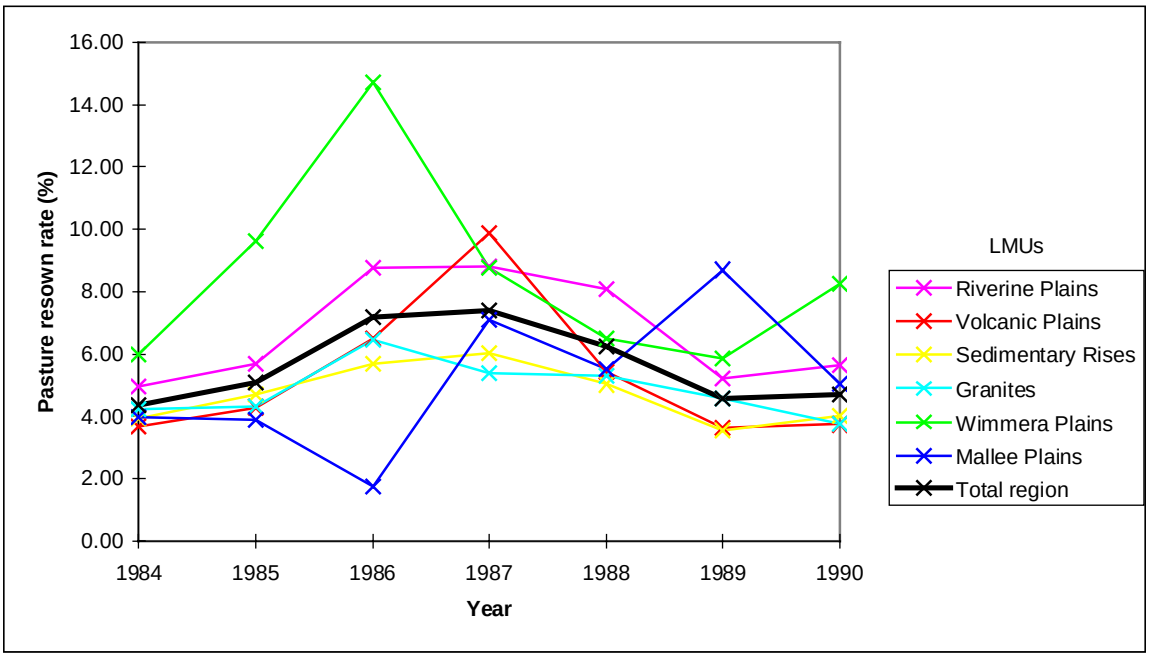
The questions included in the 1993/94 census provide the most valuable information on perennial pasture resown rates. This separates the total area of pasture and the pasture resown during that year, allowing the calculation of the pasture resown rate. A major advantage of this set of questions is that it separates lucerne, other perennial pasture and annual pastures in pasture mixtures.

The questions in the 1994/95 census asked for the area of pasture sown or resown during the census year and did not include the total pasture area. This difference between the two sets of questions during 1993/94 and 1994/95 has led to unreliable responses to the 1994/95 question, with many farmers filling in the total area of pasture rather than sown area. Hence, these results are not included in this report.

A pasture question similar to the 1993/94 format was repeated in the 1995/96 and 1996/97 censuses and can be used as a measure of change in lucerne and perennial pasture adoption rates.

The pasture questions on the census in different years are shown in Appendix 1. The inconsistency of pasture questions in the ABS census during the last decade limits their role in determining a trend in perennial pasture and lucerne adoption rates.

Total pasture resown rates from 1984 to 1990 on different land management units are shown in Figure 2. Figures for the total dryland region suggest a relationship between wool prices and pasture resowing rates. There were high wool prices in mid 1980s and a corresponding increase in resown rates, followed by a drop in the latter part of the 1980s associated with low wool prices. The increase in pasture area in 1986 is evident on all LMUs except the Mallee Plains. The pasture area on the Wimmera Plains and Granite LMUs dropped in 1987. The Riverine Plains and Wimmera Plains LMUs showed the highest resown rates, while low rates were shown on the Sedimentary Rises LMU during this period. As mentioned earlier, this measure does not distinguish between perennial and annual pastures, but is still an indicator of resowing rate changes for perennial pasture.




Source: Australian Bureau of Statistics (1984-1990).

**Figure 2** Total pasture resown rates on different land management units in the North Central Region (1984-1990)

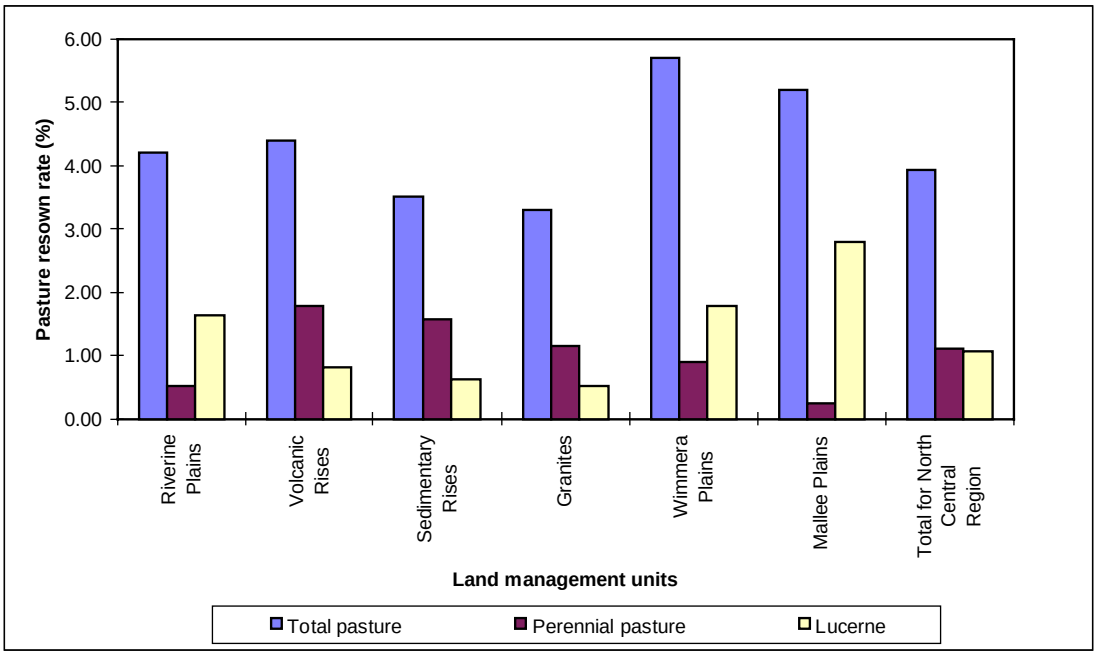
The 1993/94 ABS farm census data shows that only 16 percent of the existing pasture in the north central dryland area was described as perennial pastures, while another 11 percent was under lucerne pastures. However, field surveys suggest the quality of much of this existing perennial pasture may be low (Quigley & Morgan 1990).

For 1993/94, lucerne resowing rates were calculated considering pure lucerne resown during the season, together with mixture of lucerne and other pasture species, as a percentage of total pasture area. Similarly the perennial pasture resown rates included a category with a mixture of perennial grasses and legumes, excluding lucerne. Of the total pasture in the region, 1.1 percent was sown or resown with perennial pastures during the season, while another 1.06 percent was resown to lucerne. The Volcanic Rises and Sedimentary Rises LMUs dominated in perennial pasture resown rates, reaching 1.8 and 1.6 percent of the total pasture area respectively. The Mallee Plains and Wimmera Plains LMUs had the highest lucerne resown rates of 2.8 percent and 1.6 percent respectively. However, the Riverine Plains LMU had the highest lucerne resown area with almost 5000 ha being resown to lucerne, while the Sedimentary Rises LMU had the highest perennial pasture resown area accounting for half the resown pastures during the season (Table 1 and Figure 3). Perennial pasture and lucerne pasture resown rates in 1993/94 in the North Central Region are mapped in Figure 4.

**Table 1** Pasture resown area (ha) in the North Central Region according to LMUs (1993/94).

| LMU | Lucerne | Perennial pasture | Total pasture area |
|---|---|---|---|
| Riverine Plains | 5408 | 1678 | 329235 |
| Volcanic Rises | 781 | 1727 | 96807 |
| Sedimentary Rises | 1970 | 5016 | 319687 |
| Granites | 900 | 2019 | 175532 |
| Wimmera Plains | 828 | 420 | 46271 |
| Mallee Plains | 568 | 50 | 20279 |
| North Central Region Total | 10455 | 10910 | 987811 |

Source: Australian Bureau of Statistics (1993/94)

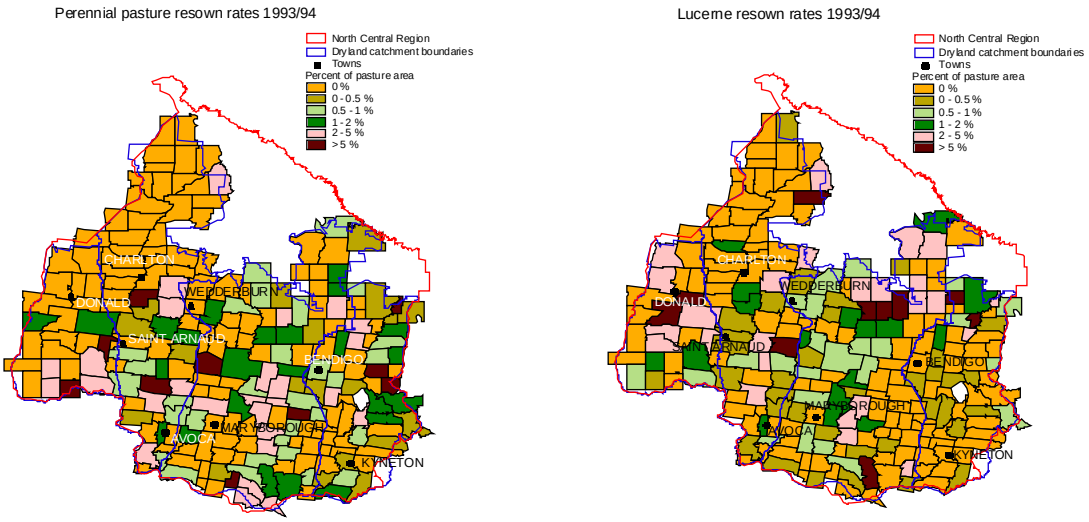



Source: Australian Bureau of Statistics (1993/94)

**Figure 3** Pasture resown rates in the North Central Region (1993/94)

The 1995/96 farm census data shows that the percentage of existing pasture reported as perennial pastures had increased by 11 percent during the two years from 1994 to 1996, while the percentage of lucerne pasture remained unchanged (Table 2). However, there is a huge reduction in total lucerne area reported in the region, while more lucerne was resown in the 1995/96 season compared to 1993/94. There is a significant increase in both lucerne and perennial pasture resown rates, with 2.4 percent and 2.9 percent of total pasture area in the region being sown or resown with lucerne and perennial pastures respectively (Table 2).

A significant increase in lucerne resown area was shown on the Riverine Plains, Volcanic Rises and Sedimentary Rises LMUs resulting in 3.7, 2.0 and 1.7 percent of the total pasture area in each land management type being sown to lucerne respectively. The Riverine Plains LMU had the highest lucerne resown area with over 7500 ha being resown to lucerne, followed by the Sedimentary Rises with 3600 ha resown to lucerne. The Granites and Volcanic Rises LMUs dominated in perennial pasture resown rates, covering 4.2 and 3.5 percent of the total pasture area respectively. However, the Sedimentary Rises and the Riverine Plains LMUs had the highest perennial pasture resown areas (Table 3 and Figure 5). Perennial pasture and lucerne pasture resown rates in 1995/96 in the North Central Region are mapped in Figure 6.




Source: Australian Bureau of Statistics (1993/94)

**Figure 4** Pasture resown rates in the North Central Region (1993/94)

**Table 2** Pasture resown areas in the North Central Region (1993/94-1996/97)

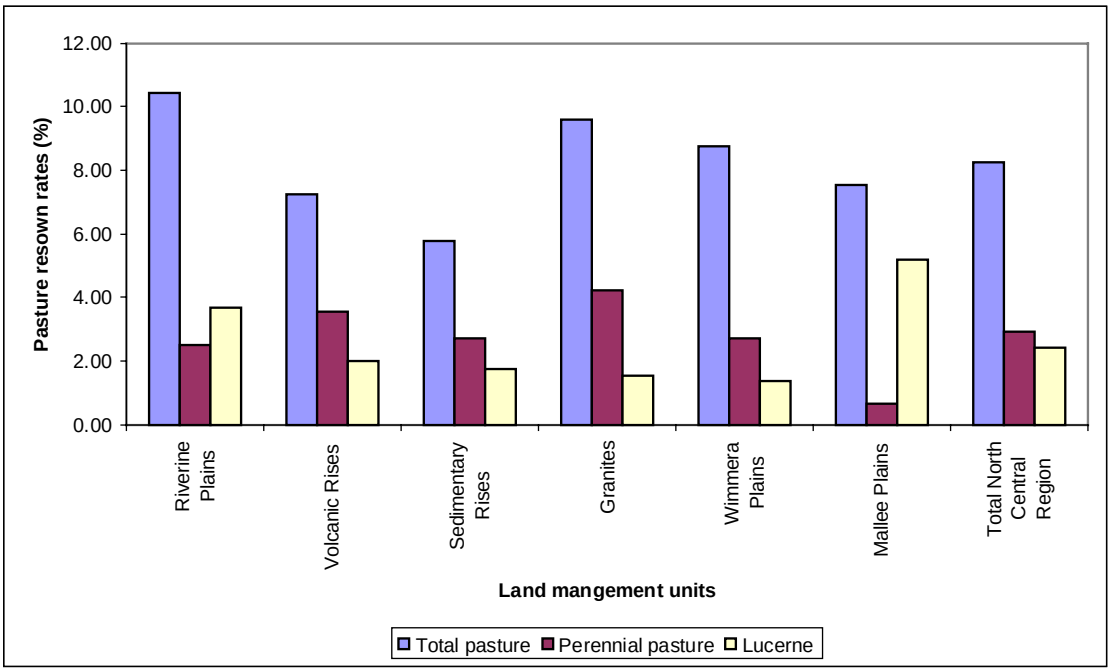
| Measure | 1993/94 | 1995/96 | 1996/97 |
|---|---|---|---|
| Total pasture area (ha) | 987811 | 623561 | 688970 |
| Total pasture reswon area (ha) | 38812 | 51538 | 48315 |
| Total perennial pasture area (ha) | 157613 | 167899 | 183669 |
| Total lucerne area (ha) | 106745 | 71078 | 76222 |
| Perennial pasture resown area (ha) | 10910 | 18284 | 15860 |
| Lucerne resown area (ha) | 10455 | 15054 | 13427 |
| Perennial pasture (%) | 16.0 | 26.9 | 26.0 |
| Lucrene pasture (%) | 11.0 | 11.4 | 11.0 |
| Perennial pasture resown rate (%) | 1.1 | 2.9 | 2.3 |
| Lucerne resown rate (%) | 1.1 | 2.4 | 1.9 |

Source: Australian Bureau of Statistics (1993/94-1995/96)

**Table 3** Pasture resown areas (ha) in the North Central Region according to LMUs (1995/96, 1996/97)

| LMU | 1995/96 | | | 1996/97 | | |
|---|---|---|---|---|---|---|
| | Lucerne | Perennial Pasture | Total Pasture area | Lucerne | Perennial Pasture | Total Pasture area |
| Riverine Plains | 7581 | 5115 | 205541 | 7572 | 3693 | 225499 |
| Volcanic Rises | 1326 | 2359 | 66814 | 783 | 1981 | 66276 |
| Sedimentary Rises | 3641 | 5685 | 210010 | 2485 | 5774 | 225028 |
| Granites | 1550 | 4211 | 99714 | 844 | 3124 | 123718 |
| Wimmera Plains | 432 | 848 | 31354 | 912 | 1238 | 35996 |
| Mallee Plains | 524 | 66 | 10128 | 831 | 50 | 12453 |
| North Central Region Total | 15054 | 18284 | 623561 | 13427 | 15860 | 688970 |

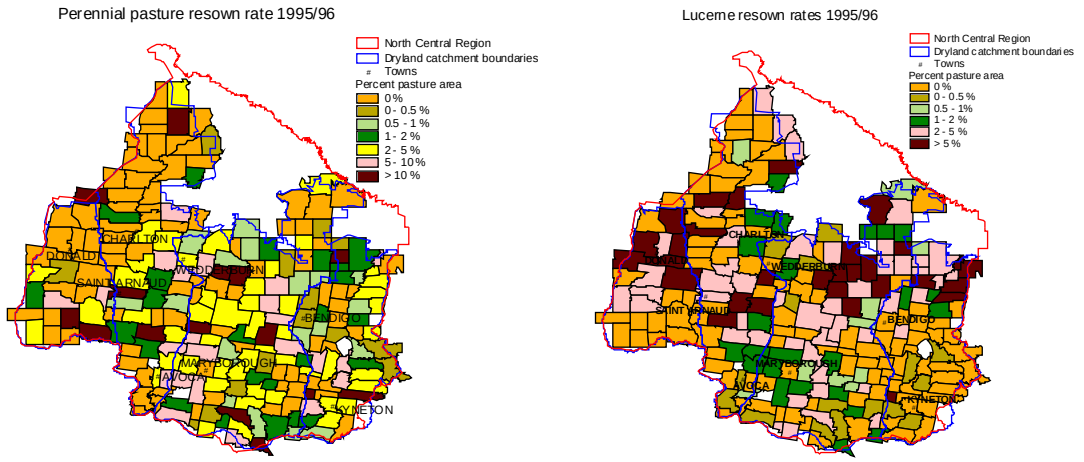
Source: Australian Bureau of Statistics (1995/96-1996/97)




Source: Australian Bureau of Statistics (1995/96)

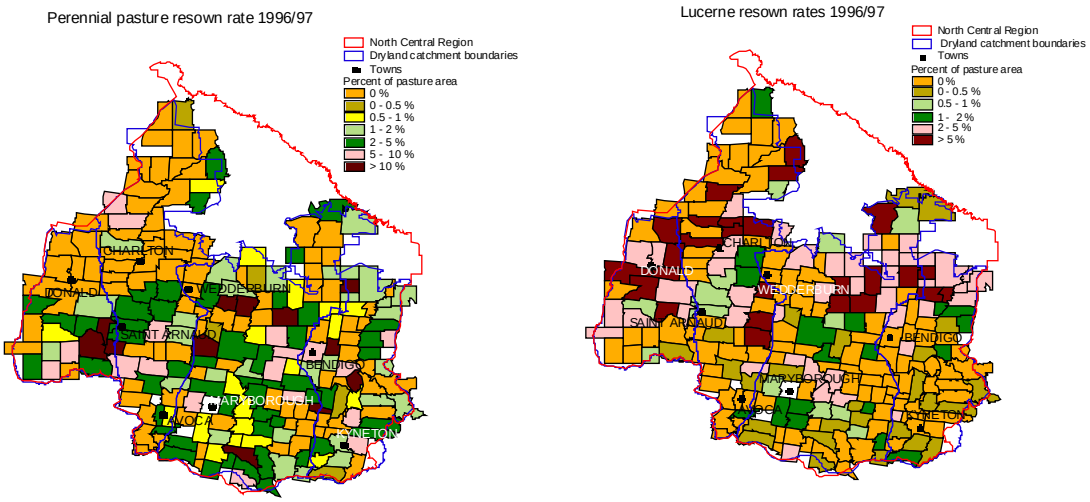
**Figure 5** Pasture resown rates in the North Central Region (1995/96)

The census in the following year revealed a reduction in perennial pasture and lucerne resown areas (Table 2). Lucerne resown areas declined mainly in the volcanic, sedimentary and granite areas, while a reduction in the area of perennial pasture was more evident on the Riverine Plains and Granites LMUs. In contrast, both the Wimmera and Mallee Plains showed an increase in pasture resown rates (Table 3). Perennial pasture and lucerne resown rates in 1996/97 in the North Central Region are mapped in Figure 7.




Source: Australian Bureau of Statistics (1995/96)

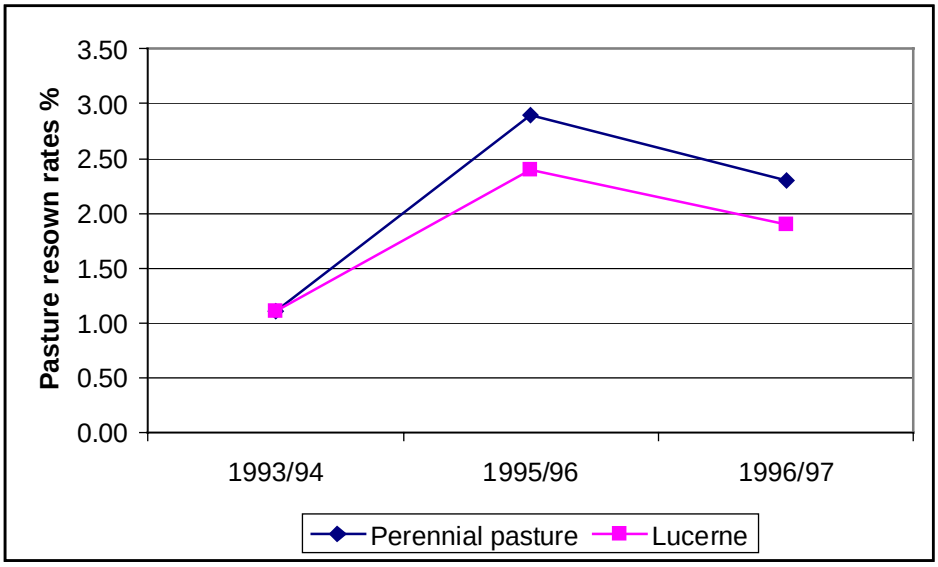
**Figure 6** Pasture resown rates in the North Central Region (1995/96)




Source: Australian Bureau of Statistics (1995/96)

**Figure 7** Pasture resown rates in the North Central Region (1996/97)

Figure 8 shows the overall trend in pasture resowing rates in the North Central Region from 1993/94 to 1996/97. The rates of resowing of both perennial pastures and lucerne showed a similar trend, with a marked increase in 1995/96 followed by a drop in 1996/97.




Source: Australian Bureau of Statistics (1993/94-1996/97)

**Figure 8** Trends in pasture resown rates in North Central Region (1993/94-1996/97)

3.1.2 Farmers' perceptions of dryland soil salinity (Vanclay & Cary 1989)

At the time of this survey, 67 percent of the farmers had phalaris based perennial pasture mixtures on their farms. The area covered by this pasture mixture ranged from 1 to 527 ha, with an average of 102 ha. However, many of these farmers stated that they did not intend to grow phalaris in the future. Their preferred average area of phalaris on their farms was 226 ha and they intended to sow a mean area of 39 ha in the following three years.

3.1.3 Monitoring Landcare in Central Victoria (Wilkinson & Cary 1992)

Between 1988 and 1991, 50 percent of land-holders had sown some phalaris based perennial pastures on an average of 7.3 ha per year (or 1.4 percent of the area of the farm). This increased the percentage of the total farm area sown to phalaris in the Loddon and Avoca catchments from 16 percent to 20 percent by the end of this period.

There was a significant relationship between farm size and the adoption of phalaris based pastures, with large and medium size farms having larger proportions of their farms sown to perennial pastures than on small farms.

3.1.4 Farmers' perceptions of phalaris: a qualitative approach to developing a marketing strategy for perennial pastures (Baird 1993)

This study was of a qualitative nature and did not collect data on pasture areas sown. Only 43 percent of farmers interviewed had sown phalaris during the five years from 1988 to 1993 and were intending to sow in the future. Twenty percent of the farmers who had not sown pastures during that five years reported the intention to sow in the future.

### 3.1.5 The adoption of dryland lucerne in North Central Victoria (Ransom & Barr 1994)

This survey revealed that an average of 87 ha per farm was under dryland lucerne at the time of the survey. Approximately half the farms in the survey had no lucerne on their properties. An average of 25 ha per farm, equivalent to 1.9 percent of the farm, was sown to lucerne during the 1991 season. The average area intended to be sown in the 1992 season was only 28 ha. The total area of lucerne increased from 4.2 percent of farmland in 1984 to 7.6 percent in 1991.

An attempt to project the future lucerne rates using the given establishment success rates, suggests that 11.5 percent of farmland in the region will be under lucerne by the year 2001, which could be increased up to 17.1 percent by improving the lucerne establishment success rate of all farmers to 70 percent.

### 3.1.6 A survey of pastures in the Lake Eppalock catchment (Shaw 1994)

This study revealed that 77 percent of the surveyed properties had been sown to perennial pastures within the last 30 years, covering an average of 55 percent of these properties. More than half the perennial pasture growers reported being convinced of the value of perennial pastures, with 68 percent of them (49 percent of the total sample) planning to sow more pastures within the following three years. More than three-quarters of this group were willing to increase their rate of sowing by an average of another 21 ha with increased financial assistance (at least up to 40 percent of the cost of sowing the pasture). Half the farmers who reported no immediate plans to sow pastures in future were willing to accept financial assistance while the remainder were not prepared to sow even with assistance. This later group totalled 12 percent of the entire sample.

### 3.1.7 Avoca catchment pasture survey (Hall 1995)

In this pasture survey, an average of 12 percent of the surveyed paddock area consisted of perennial pastures, while unimproved pasture was the dominant type covering 55 percent of the survey route. Native grasses consisted of another 10 percent of the area, while 23 percent was covered by crop and forest area. Phalaris and cocksfoot dominated the perennial pasture species covering 57 percent of the perennial pasture area, while lucerne represented 39 percent. The remaining 4 percent of the perennial pastures consisted of tall wheat grass. The Upland Alluvial Plains LMU had more perennial pastures than the Sedimentary Rises LMU in the area.

### 3.1.8 Salinity control in North Central Victoria (Luke, Karunaratne & Barr 1995)

Sixty-two percent of the farm area in the region was estimated to be under pastures, while 35 percent of this pasture area was sown to lucerne (6 percent) and perennial pastures (29%). The ABS statistics for the region in the same year shows twice as much lucerne and a lower percentage of perennial pastures.

The salinity control survey revealed that 71 percent of farmers in the region were either using perennial pastures in their current farming systems or had used them in the past, while 29 percent did not have any experience with perennial pastures. However, 45 percent of farmers had perennial grass pastures on an average of 268 ha per farm in 1993/94, meaning that the remaining 26 percent were farmers who had ceased sowing perennial pastures. Fifty-four percent of farmers reported the intention to sow perennial pastures in the following year.

The average area of dryland lucerne was reported as 93 ha per farm, with 74 percent of farmers in the region either using lucerne in their current farming system or having grown lucerne in the past. A simple market segmentation of the sample farmers reveals a group of lucerne growers (10 percent of the sample) who had lucerne on an average of 28 percent of the farm area, and were keen to increase this area up to 60 percent. A quarter of the sample had no lucerne and no interest in having lucerne on their farms, for various reasons. The majority of the sample (65 percent) had little lucerne on their farms (1.6 percent of the farm), but were very interested in increasing this to an average of 25 ha. These market segments were consistent with the groups identified in a study of the adoption of lucerne in the region (Ransom & Barr 1994).

#### 3.1.9 Land use survey of the southern Avon-Richardson catchment (Demeo 1995)

This survey assessed the status of land use in the hill and rising country of the Avon-Richardson catchment during 1994 and 1995. There was no significant change in the distribution of land use between the two years. The pasture area in the region was dominated by annual pastures, which covered about 54 percent of the area. Improved perennial pastures occupied 23 percent and 26 percent of the surveyed area during 1994 and 1995 respectively, with phalaris and cocksfoot being the largest perennial pasture type sown in the area. Lucerne occupied 9 percent and 6 percent of the perennial pasture areas in the two years respectively and covered only about 2 percent of the total surveyed area. The level of management of these pastures were assessed to be very low.

This survey also compared the pasture areas on the Sedimentary Rises and Alluvial Plains LMUs, and revealed that 18 percent of the Sedimentary Rises was sown to perennial pastures, while another 59 percent was annual pastures. These rates were significantly different to the figures estimated for the Alluvial Plains LMU, being 41 percent perennial pastures and 37 percent annual pastures.

#### 3.1.10 Dryland lucerne-establishment and management in North Central Victoria (Oxley 1997)

The poor establishment success rate of lucerne was seen as a major barrier to its adoption by farmers in 1994. Since this time many farmers have become more familiar with lucerne establishment and management, and more report that they are convinced of its benefits. Establishment success rates have risen as a result of extension programs. Despite improvements in the success rate of lucerne establishment (e.g. undersowing to safflower) and the good performance of lucerne during dry years in the mid 1990s, there was no net increase in the area of lucerne in the period 1994-97. Although there was a minor increase in the area of lucerne on the farms of the *lucerne planners* and the *deterred growers*, this was more than offset by a decrease on the farms of *established lucerne growers* who shifted the emphasis of their enterprise towards cropping.

### 3.2 Fertiliser applications on pasture

Fertiliser rates and frequency of application play an important role in maintaining a stable perennial pasture free of weeds and inferior grasses. Poorly managed perennial pastures will have no greater impact on watertable control than will annual pastures. Hence, application of fertiliser on pastures is used as a proxy for measuring the level of pasture management undertaken by farmers in the region.

### 3.2.1 Australian Bureau of Statistics

In the 1987/88 agricultural census farmers were asked the areas of pure lucerne, other pastures and crops fertilised, as well as the type and quantity of fertiliser applied. The 1988/89 and 1989/90 questions collected the same information for total pasture areas but did not separate pure lucerne from other pastures. A similar set of questions were asked again in the 1994/95 season. The 1995/96 and 1996/97 census questions asked for the total pasture areas top-dressed or fertilised and did not collect information on types of fertilisers used. These sets of questions are shown in Appendix 2.

Only 21 percent of the total pasture area was fertilised by 36 percent of farmers in 1987/88. These measures increased during 1989 and 1990. During these two years more farmers used fertiliser, while the pasture area fertilised dropped slightly during 1990 (Table 4). There was a larger drop in fertiliser usage during the five years from 1990 to 1995. Both the area fertilised and the number of farmers using fertiliser decreased, with less than a quarter of farmers using fertiliser on only 10 percent of the pasture area. The reduction in use of fertiliser is clearly related to the prolonged period of low wool prices. Fertiliser use increased slightly again during 1995/96, and continued to increase with 22 percent of the total pasture area being fertilised by 28 percent of farmers in the 1996/97 season (Table 4).

**Table 4** Measure of fertiliser application on pastures in the North Central Region (1988-1997)

| Measure | 1987/88 | 1988/89 | 1989/90 | 1994/95 | 1995/96 | 1996/97 |
|---|---|---|---|---|---|---|
| Pasture area fertilised, as a proportion of total farm area (%) | 11.4 | 14.2 | 13.6 | 5.8 | 6.6 | 8.8 |
| Proportion of pasture area fertilised (%) | 21.0 | 24.3 | 23.2 | 10.3 | 18.7 | 22.3 |
| Farmers using fertiliser on pastures (%) | 36.1 | 42.5 | 42.8 | 23.6 | 25.8 | 28.4 |
| Lucerne area fertilised (%) | 52.0 | _ | _ | _ | _ | _ |
| Farmers using fertiliser on lucerne (%) | 62.9 | _ | _ | _ | _ | _ |

Source: Australian Bureau of Statistics (1988-1990)

The rate of application of superphosphate (kilograms per hectare) over the pasture area fertilised and the entire pasture area is shown in Table 5. A fall in fertiliser rates occurred during 1989 followed by an increase in 1990 and 1995 (Table 5). The apparent high rates of superphosphate application in 1995 were a result of few farmers using superphosphate on a small area of pastures. The number of farmers using superphosphate had decreased by a third during the five years from 1990 to 1995. The rates were higher on the Riverine Plains LMU with higher pasture resown rates compared to the other land management units (Table 6).

**Table 5** Rate of application of superphosphate (kg/ha)

| Measure | 1988 | 1989 | 1990 | 1995 |
|---|---|---|---|---|
| Rate per area fertilised | 126.0 | 123.0 | 128.0 | 153.0 |
| Rate per entire pasture area | 25.0 | 30.0 | 29.6 | 15.7 |
| Rate on lucerne pastures | 248.0 | | | |

Source: Australian Bureau of Statistics (1988-1995)

**Table 6** Rate of application of superphosphate on different LMUs (kg/ha)

| | 1988 | | 1989 | 1990 | 1995 |
|---|---|---|---|---|---|
| LMU | Perennial pastures | Lucerne | Perennial pastures | | |
| Riverine Plains | 178.2 | 333.77 | 164.1 | 195.2 | 202.9 |
| Volcanic Rises | 109.1 | 211.5 | 124.4 | 105.5 | 143.1 |
| Sedimentary Rises | 116.5 | 225.7 | 112.0 | 115.1 | 138.5 |
| Granites | 112.5 | 213.2 | 115.9 | 109.7 | 111.4 |
| Wimmera Plains | 119.6 | 103.6 | 108.6 | 133.9 | 199.6 |
| Mallee Plains | 91.8 | 207.2 | 128.8 | 99.4 | 73.3 |

Source: Australian Bureau of Statistics (1988-1995)

3.2.2 Farmers' perceptions of phalaris: a qualitative approach to developing a marketing strategy for perennial pastures (Baird 1993)

Sixty-two percent of adopters of phalaris based pastures perceived fertiliser usage as one of the most important practices in successfully establishing phalaris, compared to 18 percent of non-adopters. However, the study did not look into actual numbers of farmers who used fertiliser on their pastures.

3.2.3 A survey of pastures in the Lake Eppalock catchment (Shaw 1994)

This study collected information on frequency of fertiliser application and categorised the respondents into six groups according to the proportion of perennial pastures on their properties and the frequency of maintenance fertiliser applications. Almost half of the respondents with a large proportion of perennial pastures (12 percent of the survey population) were maintaining it by applying fertiliser annually or biannually (pasture converts). The remainder of those with large proportions of the farm under perennial pasture were not applying fertiliser with this frequency and were grouped as *belt tighteners* (Table 7). Another 8 percent of the growers were fertilising their small proportions of perennial pastures frequently. The majority were 'non-maintainers' with no fertiliser applications reported in the past and no intention to do so in future. Twenty-three percent of the respondents did not have any perennial pastures on their properties.

Analysis showed a reduction in level of fertiliser maintenance of perennial pastures when the frequency of application in the past three years was compared with the applications in the previous seven years. Some of the 'non-maintainers' once applyed fertiliser frequently but had stopped . In contrast, all the respondents fertilising a small area of pastures had been continuously following this practice and intend to continue doing so in future. The overall quality of the pastures suggests that farmers are not applying sufficient fertiliser of the right type.

The majority of respondents reported planning to fertilise their new and existing perennial pastures once or twice in their first three years, with a mean application rate of 10.6 units of phosphorus (P), using single superphosphate. The high cost of fertiliser and the lack of finances was a major concern for most of the farmers in increasing their fertiliser applications. Most reported being willing to increase the rate and frequency of maintenance fertiliser applications if their economic situation improves.

Unfortunately, the design of this survey did not allow a direct comparison with the ABS questions on pasture maintenance.

**Table 7** Percentage of farmers maintaining large and small proportions of perennial pastures

| Group | Percentage |
|---|---|
| Maintaining a large proportion of perennial pasture *(Pasture Converts)* | 12 |
| Not maintaining a large proportion of perennial pasture *(Belt Tighteners)* | 13 |
| Maintaining a small proportion of perennial pasture *(Dabblers)* | 8 |
| Not maintaining a small proportion (but will sow) *(Partial Adopters)* | 25 |
| Not maintaining a small proportion (and will not sow) *(Comfortable)* | 15 |
| Without perennial pasture *(Unbelievers)* | 23 |

Source: Lake Eppalock survey (Shaw 1994)

3.2.4 Salinity control in North Central Victoria (Luke, Karunaratne & Barr 1995)

Forty-six percent of farmers had top-dressed some of their pastures including annual, perennial and lucerne based pastures in 1993/94 and 57 percent reported the intention to top-dress in 1994/95 season. Seventeen percent of the total perennial pasture area was top-dressed with single superphosphate by 45 percent of perennial pasture growers.

It is possible to use this survey to calibrate the ABS pasture data if it is assumed that there has been little change in fertiliser application between 1993/94 and 1994/95. The total area of all pasture fertilised, as a percentage of total farm area in the catchment, was 4.2 percent. Using the ABS data in the following year, the comparable estimate is 5.8 percent. The Luke, Karunaratne & Barr (1995) study estimated the percentage of pasture top-dressed at 8.0 percent. This compared with the ABS estimate of 10.3 percent in 1994/95. These results, although not strictly comparable, give a degree of confidence that the ABS estimates are not wildly inaccurate, and are useable as an estimate of the rate of pasture top dressing.

High pasture productivity (68 percent) and improved feed quality (37 percent) were the main advantages of top dressing perceived by the majority of farmers. Thirty-five percent of farmers did not perceive any disadvantages in top dressing, while the cost of fertiliser was the main obstacle reported by the remaining farmers. Only four percent of farmers believed that there were no advantages in top dressing pastures

Two-thirds of lucerne growers top-dressed an average of 18 ha per farm, covering 20 percent of the total lucerne area with single superphosphate at a rate of 70 kg per hectare. Nine percent of lucerne growers also applied lime on an average area of three hectares.

3.2.5 Overall summary on fertiliser applications

The rate of fertiliser application in the region is below the required amounts to increase pasture productivity. The recommended rate of superphosphate for the region varies from 125-250 kg/ha depending on the soil type. While a majority of farmers recognise the importance of fertiliser in successfully establishing and maintaining perennial pastures, fewer than half of the catchment's graziers treat any of their pastures with fertiliser. The high cost of fertiliser and the lack of finances were the major obstacles reported to the increase in fertiliser application rates.

### 3.3 Grazing management on pasture

3.3.1 The adoption of dryland lucerne in north central Victoria (Ransom & Barr 1994)

The overall stocking rate in the sample farms was 4.3 DSE per hectare with no significant difference between the different segment groups. This reveals that even the *established lucerne growers* have not increased their stocking rates sufficient to utilise the productive potential of dryland lucerne. Only a minority in all market segments believed that stocking rates could be increased on large well-managed lucerne areas.

Only 36 percent of the total respondents were confident about the ability to implement rotational grazing systems on their farms, the majority of these being *established lucerne growers* and *lucerne planners*. Most of the *deterred growers* and *disinterested* believed rotational grazing was difficult to carry out on their farms. The cost of fencing and water supply for each paddock was their concern in this regard.

Winter-spring lambing was believed to be a desirable management practice on a large lucerne area. Despite this, practice did not match belief. None of the *established lucerne growers* reported using spring or winter lambing.

3.3.2 A survey of pastures in the Lake Eppalock catchment (Shaw 1994)

Fifty-six percent of perennial pasture growers said they practiced set stocking while the remainder had some system of moving their stock. The condition of stock and pastures and seasonal factors were taken into account when shifting stock from one paddock to another. Rotational grazing was not a common practice, and was not well understood by many farmers.

This study recommended increasing understanding of stock management and the effect of stock on pasture growth and persistence. The study also highlighted the necessity to incorporate issues involving the management of existing perennial pastures in future extension programs to achieve potential production and water use benefits of perennial pastures.

Around three-quarters of perennial pasture growers were willing to increase their stock numbers if they had more reliable feed. Farmers already maintaining their pastures were more interested in this process than the non-maintainers. The pasture maintainers not willing to increase their stock either believed their farms are already running to capacity or thought that it would not be profitable. Most of the non-maintainers did not want extra work due to old age and ill health.

3.3.3 Salinity control in North Central Victoria (Luke, Karunaratne & Barr 1995)

About 42 percent of lucerne growers had increased their stocking rates from 10 percent to 200 percent, after lucerne establishment, while over 75 percent of perennial pasture growers had increased stocking rates between 5 and 300 percent.

3.3.4 Dryland lucerne - establishment and management in North Central Victoria (Oxley 1997)

Overall, there has been very little change in attitudes and beliefs about stock management on lucerne. The attitude to increasing stocking rates has not shown a significant change over the period from 1991-1997. A majority of respondents were still unsure whether to run the same number of stock and feed them better on substantial areas of dryland lucerne, or to increase stocking rates.

Spring lambing was believed to be an appropriate management practice on large lucerne areas by all groups of farmers. Over 60 percent of *established growers* practised this technique, while about 45 percent of *planners* and less than 20 percent of *deterred* and *disinterested* farmers lambed part or all of their flock in spring.

### 3.3.5 Overall summary on grazing management

More than half of the graziers in the region practised set stocking while the remainder moved their stock depending on the condition of stock and pastures and seasonal factors. Rotational grazing was not a common practice. There has been very little change in attitudes and beliefs about rotational grazing management over the period of the study and farmers in the region require more understanding of stock management practices. In contrast, there has been a movement towards spring lambing by those with significant areas of improved perennial pastures.

## 4 UNDERSTANDING LOW RATES OF ADOPTION

In promoting the adoption of perennial pastures and improved pasture management practices it is important to understand the factors influencing and/or limiting the use of these practices. Several studies have identified these factors and the following section summarises these studies in the North Central Region.

### 4.1 Attitudes to pasture renovation (Wegman Consulting 1986)

Farmers' perceptions, ignorance and anxiety were said to be real barriers to further pasture renovation. Overall, most farmers involved in this study recognised the need for high producing pastures. These farmers however had different opinions and perceptions on pasture renovation. They had no objective method of assessing their pasture, but used a visual assessment. The variation in this measure had an impact on the use of pasture renovation activities. Non-users of herbicides were mostly satisfied with what they were achieving from their pastures and were not interested in spending more on pasture renovation. Most farmers, especially the non-users of herbicides, believed in controlled grazing management systems to slow down the pasture degradation process, and were more concerned about having desirable pasture species. Most graziers were cautious of changes in technology and automatically rejected those they believed to be not suitable for their farms. Most of these farmers depended on visual evidence of success of a new technology before they decide to adopt.

### 4.2 Farmers' perceptions of dryland soil salinity (Vanclay & Cary 1989)

This study attempted to analyse the farmers' beliefs about salinity control practices and major barriers to their adoption. The study revealed that farmers had a negative attitude to the growing of phalaris. Non-adopters, both with and without previous phalaris experience, were concerned about establishment and management difficulties and were not aware of the effects of phalaris on salinity control. The survey also revealed that Landcare members grew significantly more phalaris than non-members, and were more inclined towards growing it in the future.

### 4.3 Monitoring Landcare in Central Victoria (Wilkinson & Cary 1992)

The key finding of this study was the clear statistical relationship between beliefs about the profitability of improved pasture and the rate of pasture sowing. Beliefs about salinity appeared unrelated to sowing behaviour.

Sixty-seven percent of the farmers mentioned problems in establishing phalaris while 62 percent have experienced problems in managing it. The main management concerns of these farmers was phalaris out-competing other plants and its toxicity to stock. This study also showed a positive relationship between Landcare membership/time of joining and phalaris based pasture sowings, with farmers joining Landcare prior to 1988 sowing more pasture than those who joined after 1988. Non-members had the smallest rates of resowing.

Responding to a question on constraints to land conservation practices, almost all farmers mentioned financial difficulties as a limiting factor. Lack of time and farmers' attitudes and lack of knowledge were highlighted in about a quarter of the sample. However, more farmers practised pasture improvement in 1991 than in 1988.

Government grants for land conservation, and increased extension and education were the main suggestions made by farmers to aid them in land conservation.

### 4.4 Farmers' perceptions of phalaris: a qualitative approach to developing a marketing strategy for perennial pastures (Baird 1993)

The prospect of increasing productivity, either by increasing stocking rates or increasing feed for stock, was the most dominant factor encouraging farmers to grow phalaris in future. Only 19 percent of farmers sow phalaris for salinity control. Stock problems associated with phalaris (such as toxicity, worms, poor stock production and unpalatability) was the most frequently mentioned barrier to future adoption.

The study identified three categories of graziers with regard to their pasture sowing behaviour and future intentions to sow phalaris.

The 43 percent of graziers who had sown phalaris during the five years from 1988-1993 and were intending to sow in the future were grouped as a*dopters*. They sought information from outside and placed a greater value on extension services. Most had sown new varieties and had a very positive attitude to phalaris, especially to its ability to carry an increased stocking rate . The majority of this group had set plans to sow it. For more than half the *adopters*, the availability of finances was an important factor in making the decision to sow or not to sow phalaris. Financial incentives provided by the government would encourage them to sow more phalaris. Most *adopters* considered establishment and management of phalaris to be easier than that of lucerne. Appropriate grazing management and fertiliser application were seen as important management practices by this group of farmers.

The 20 percent of farmers who had not sown phalaris in the five years between 1988-1993, but with the intention of sowing in the future, were identified as *intenders*.

The remainder were identified as *non-adopters* and made up 37 percent of the sample. They had not sown phalaris during the five year period and did not intend to do so in the future. Some *non-adopters* considered phalaris as an uncontrollable weed that will dominate all other species. Its incompatibility with the cropping program and stock health problems were also of major concern to these farmers. Financial situation was not an influential factor in deciding not to sow phalaris for majority of this group.

Seventy-seven percent of the respondents in the latter two groups had sown phalaris sometime before 1988. They had used old varieties, were unsatisfied with their pastures, and did not perceive it as increasing stocking rates. Their opinion on phalaris was based mainly on their own experience rather than outside information. It is likely that these farmers have not used appropriate grazing management strategies to manage pasture composition. Increased labour, establishment costs and poor hay quality were also of concern to these farmers. However, none of the respondents in this category considered phalaris establishment to be harder than that of lucerne, while about half of them mentioned phalaris as harder to manage than lucerne, and preferred to grow lucerne. Management difficulty of this was mainly related to controlling the growth of phalaris through increasing grazing intensity, difficulty in killing phalaris to sow a crop, and its toxicity to stock.

### 4.5 The adoption of dryland lucerne in North Central Victoria (Ransom 1994)

The poor establishment success rate of lucerne (average 30 percent) was the major barrier to its adoption for a large number of farmers. The main reasons for establishment failure mentioned were seasonal variation and damage by insect pests. This study identified four different groups of farmers according to their lucerne strategies.

The *established lucerne growers* did not complain of financial or technical difficulties in lucerne establishment and management. They had on average of 50 percent of their farm under lucerne, but comprised less than 10 percent of the farm population.

Another group *lucerne planners* had a small area of their farm under lucerne and intended to sow a significant area. However, longitudinal studies show this intention is rarely implemented. This group comprised approximately 30 percent of the population.

The *deterred growers* were the largest group. They believed lucerne to be a potential asset on the farm, but doubted it was worth the risk of sowing due to technical difficulties with establishment.

The *disinterested* saw no need for lucerne on the farm. These farmers generally comprised a quarter of the population. These farmers operated smaller farms, and in many ways resembled the *comfortable* segment associated with phalaris growing.

A further analysis of this study revealed that the intensive cropping areas were mainly represented by *deterred* and *disinterested* farmers who tend to believe that lucerne was not appropriate on their farms. The main reason being the difficulty in practicing rotational grazing, followed by cost of establishment, and risk of establishment failure. A third of this group believe that a large area of lucerne would increase their overall farm profitability, and were prepared to grow it if these problems could be overcome.

### 4.6 A survey of pastures in the Lake Eppalock catchment (Shaw 1994)

The majority of farmers (86 percent) did not consider the persistence of phalaris to be a major problem. An unusual season in which pastures were able to run and set seed was likely an influence of this response. Establishment difficulties due to various reasons were mentioned as a problem by few farmers.

The study categorised the respondents into six groups according to the proportion of perennial pastures on their properties and the frequency of maintenance fertiliser applications. *Partial Adopters* (25 percent of respondents) intended to sow new perennial pastures in the following three years and were keen to improve their production and profit margin. They had a positive attitude to perennial pastures but a limited understanding of their maintenance processes. They had not maintained their pastures during the previous three years. Hence, the necessity to improve their pasture management skills.

*Dabblers,* a group of financially well established farmers, maintained a small proportion of their farm under perennial pastures and reported the intention to sow new pastures in the following three years, as well as maintaining existing pastures with top dressing. This group was interested in trying out new technology, but needed to increase their understanding of grazing management to improve their perennial pastures.

*Pasture Converts* (12 percent of respondents) were maintaining a large proportion of perennial pastures (more than 75 percent of the property), had applied fertiliser for the last 10 years and were to improve productivity through increased stocking rates, upgrading rundown pastures, and by improving their management skills.

*Belt Tighteners* (13 percent) were not maintaining a large proportion of perennial pastures (75 percent of their property) and do not believe in investing money on maintaining existing pastures, but are prepared to sow new pastures. This group either do not understand the role of maintenance in improving pastures or are satisfied with the current pastures and are willing to renovate rundown pastures.

*Comfortable* (15 percent), a group of generally older farmers comfortable with their current lifestyle and do not intend to increase their area or their level of management of perennial pastures.

*Unbelievers* (23 percent of respondents) had negative attitudes towards perennial pastures and did not believe in sowing them on their properties.

### 4.7 Salinity control in North Central Victoria (Luke, Karunaratne & Barr 1995)

Lucerne was recognised for its high quality as a feed and the ability to use it as hay by most of the farmers in this study, while only 12 percent of the sample mentioned its ability to control watertable and soil salinity. Nearly one-third of farmers did not see any disadvantages of growing lucerne, while 40 percent reported no disadvantages in growing perennial pastures. Establishment difficulties with lucerne were considered a problem for 17 percent of farmers, while management problems (difficult to manage and need to rotationally graze) were highlighted by 21 percent. Some farmers considered that lucerne interferes with their cropping program, and this was the major disadvantage reported in growing perennial pastures. Cost was not seen as a major problem in growing lucerne or perennial pastures, while the usefulness of perennial pasture as a summer feed and its ability to increase stocking rates, were the main advantages mentioned by the farmers.

### 4.8 Dryland lucerne - establishment and management in North Central Victoria (Oxley 1997)

Respondents to this survey were re-categorised using the same segmentation process used in the 1991 survey (Ransom & Barr 1994). The results of the survey suggest that many farmers have become more familiar with lucerne establishment and management and are more convinced of the benefits of lucerne. Only a small number of farmers have experienced continued problems with establishment and management. This survey also identified factors affecting farmer perception of lucerne and there by the extent of lucerne area.

The increased establishment success rates have significantly changed attitudes to establishment difficulties and the high costs of establishment of lucerne among *deterred* and *disinterested* growers. These farmers now have a more positive attitude to these factors and are more convinced of benefits of growing lucerne. Using new techniques such as spring sowing (mainly with a safflower cover crop) was stated as the main reason for this success rate. Techniques such as better seed placement, machinery modification, alternate row sowing and undersowing with legumes have also largely contributed to these changes. Direct extension contacts and neighbours were stated as the main sources of information for these techniques. This highlights the positive impact of lucerne extension programs on the adoption of lucerne in the region.

Seasonal conditions have also influenced farmer perceptions and decisions regarding lucerne. The high growth rate of lucerne during the drought in 1994 convinced farmers of lucerne's ability to perform in drought conditions and provide high quality feed. This too may have contributed to the farmer's positive perceptions of lucerne.

Improving grain prices in 1995/96 season motivated many farmers to reduce their lucerne area to plant more crop. This change has mainly happened amongst *established lucerne growers* who have larger farms and the biggest areas of lucerne. The overall result has been little change in the area of the catchment under dryland lucerne.

## 5 RECOMMENDATIONS

The aim of this report is to provide baseline information and establish trends in adoption of pasture management practices in the North Central Region. The information in this report has been based on available research studies and provides reasonable trends in adoption of dryland lucerne in the region. Accurate long-term measures of the area of phalaris pastures sown in the region will be need to be obtained by continued use of the ABS farm census. One of the limitations to using ABS data in determining the adoption trends is the changing format of questions each year. Consistency in the format of questions is important in providing reliable information to measure trends in adoption rates. The adoption rates estimated from the 1993/94 ABS data provides a reasonably reliable baseline and can be used to monitor future adoption of these practices. A question similar to the 1993/94 format was repeated in 1995/96 and again in 1996/97 which provides suitable continuity of data. Hence, the same format can be used in future to estimate the adoption of perennial pastures. However, a repeat of the Agriculture Victoria baseline study with improved questions on the area of pasture sown would enable a true calibration of the ABS phalaris data.

The 1994/95 fertiliser question provides data to measure the use of selected fertilisers on established pastures. This question appears to be an acceptably accurate measure of pasture maintenance by top dressing. This data, however, does not provide information on other maintenance practices important in pasture management, particularly rotational grazing. The 1995/96 ABS census included a question on maintenance and management of established pastures and can be used in future to monitor the adoption of pasture management practices. This data does not include information on rotational grazing. To determine the adoption of improved grazing management techniques, it will be necessary to collect more data on grazing management practices.

The format of this question is as follows:

**ABS Pasture maintenance question in 1995/96**

**Maintenance and management of established pastures between 1 April 1995 and 31 March 1996**

**Area of established pasture over which the following maintenance or management operations were carried out:**

| | **Hectares** |
|---|---|
| *Top dressing of fertiliser ……..* | |
| *Weed control or spraying ……..* | |
| *Pest and disease control or spraying ……..* | |
| *Slashing or burning (other than prior to sowing the paddock)……..* | |

## 6 REFERENCES AND DATA SOURCES


Australian Bureau of Statistics (1984-1997) Parish aggregated farm census data supplied to Agriculture Victoria.

Avoca Community Working Group (1992) Avoca Catchment Salinity Management Plan, Department of Conservation and Environment, Bendigo.

Avoca-Loddon-Campaspe Regional Landcare Plan Working Group (1993) Avoca-Loddon-Campaspe Regional Landcare Plan.

Avon-Richardson Land and Water Management Group (1992) Avon-Richardson Land and Water Management Plan (draft).

Baird, K. (1993), 'Farmers' Perceptions of Phalaris: A Qualitative Approach to Developing a Marketing Strategy for Perennial Pastures'. Unpublished. BAgSci thesis, School of Agriculture, La Trobe University, Bundoora.

Campaspe Community Working Group (1992) Campaspe Catchment Salinity Management Plan, Department of Conservation and Environment, Bendigo.

Demeo, T. (1995) Land use survey of the Avon Richardson Catchment, Unpublished.

Hall, R. (1995) Avoca Catchment Pasture Survey, Agriculture Victoria, Bendigo.

Loddon Community Working Group (1992) Loddon Catchment Salinity Management Plan, Department of Conservation and Environment, Bendigo.

Luke, R., Karunaratne, K. & Barr, N. (1995) Salinity Control in North Central Victoria: A Measure of Farmers' Beliefs and Behaviours, Agriculture Victoria.

North Central Catchment and Land Protection Board (1997), North Central Regional Catchment Strategy.

Oxley, T. (1997) Dryland Lucerne - Establishment and Management in North Central Victoria, Unpublished.

Quigley, P.E. & Morgan, T. (1990) Survey of Pastures in Victoria, Research Review 1989-90, Pastoral Research Institute, Department of agriculture, Hamilton.

Ransom K. & Barr N. (1994) The Adoption of Dryland Lucerne in North Central Victoria, Research Report Series No. 151, Department of Agriculture, Bendigo.

Ridley, A.M., Slattery, W.J., Helyar, K.R. & Cowling, A. (1990) Acidification Under Grazed Annual and Perennial Grass Based Pastures', Australian Journal of Experimental Agriculture.

Shaw, H. (1994) A Survey of Pastures in the Lake Eppalock Catchment, Technical report series no. 217, Department of Agriculture, Bendigo.

Vanclay, F. M., & Cary, J.W. (1989) Farmers' Perception of Dryland Soil salinity, School of Agriculture and Forestry, The University of Melbourne.

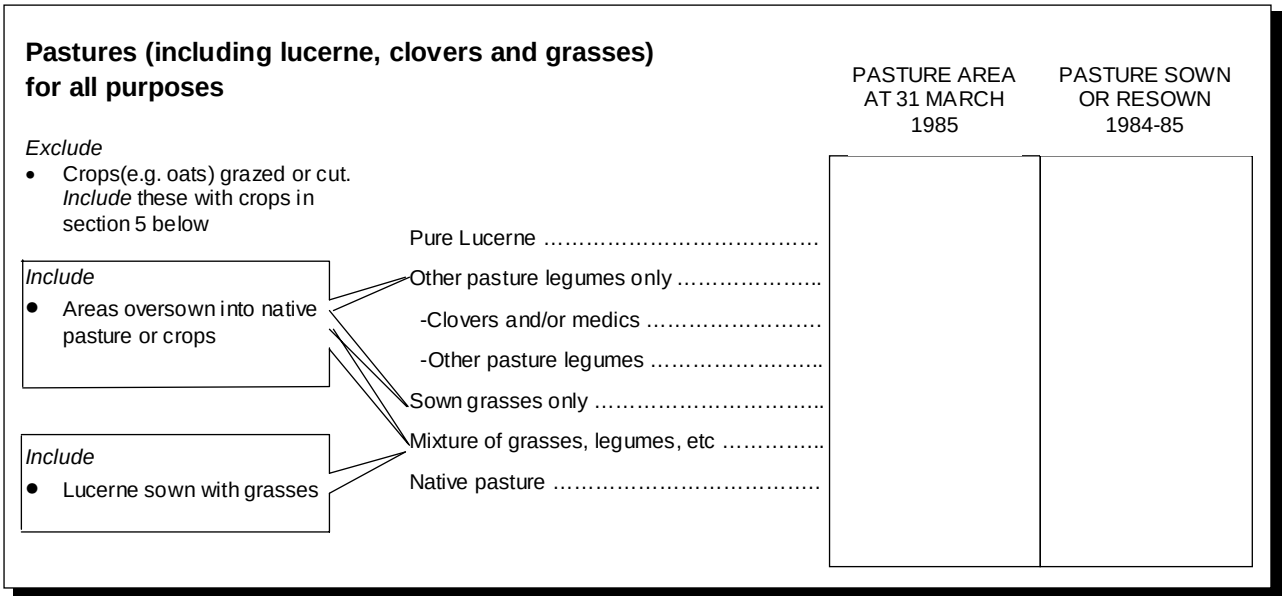
Wilkinson, R.L. & Cary, J.W. (1992) Monitoring LandCare in Central Victoria, School of Agriculture and Forestry, The University of Melbourne.

Wegman Consulting (1986) Attitudes to Pasture Renovation, Wegman Consulting, Melbourne.

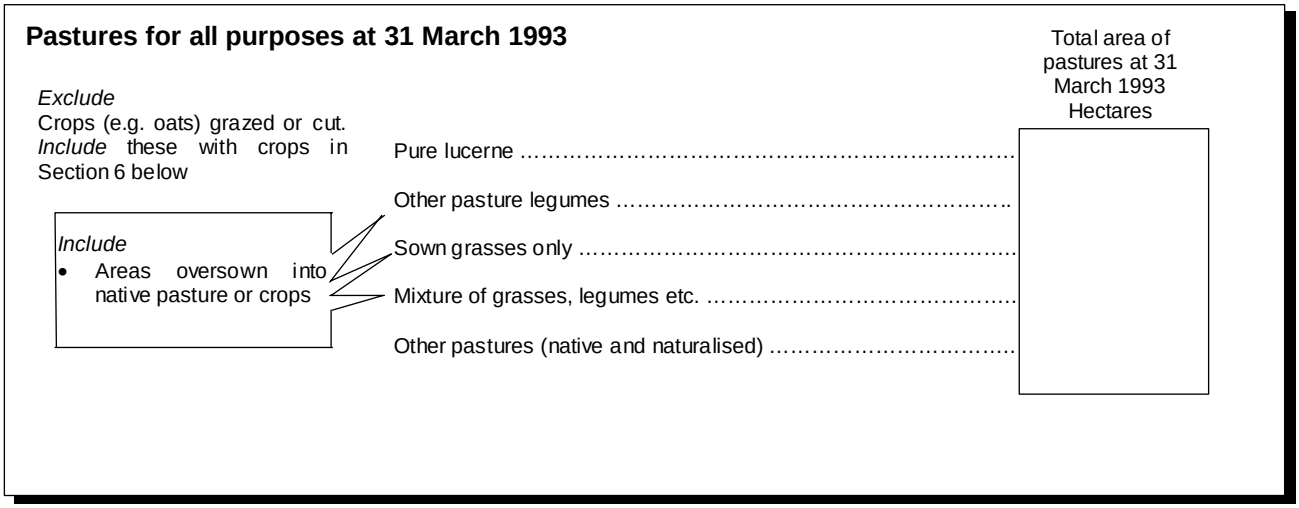
## 7 APPENDICES AUSTRALIAN BUREAU OF STATISTICS FARM CENSUS QUESTIONS

**Appendix 1** ABS pasture questions

**ABS pasture question 1984-1990**




**ABS pasture question from 1991-1993**



**ABS pasture question 1993/94**

**Pastures for all purposes at 31 March 1994**

*Exclude*

- Crops (e.g. oats) grazed or cut. Include these with crops in Part 1c below

*Include*

- Areas oversown into native pasture or crops

Perennial grasses include phalaris, cocksfoot and perennial ryegrass

| | Total area of pasture at 31 March 1994 Hectares | Pasture sown or resown during year ended 31 March 1994 Hectares |
|---|---|---|
| Pure lucerne ..... | | |
| Other pasture legumes ..... | | |
| Sown grasses only ..... | | |
| Mixture of lucerne and other pasture species..... | | |
| Mixture of perennial grasses and legumes excluding lucerne ..... | | |
| Mixture of annual grasses and legumes excluding lucerne ..... | | |
| Other pastures (native and naturalised) ..... | | |

**ABS pasture question 1994/95-1996/97**

**Pastures sown or resown for all purposes during year ended 31 March 1997**

*Include*

- Areas oversown into native pasture or crops

Perennial grasses include phalaris, cocksfoot and perennial ryegrass.

Legumes include clovers, medics and vetch.

Annual grasses include Wimmera rye grass.

| | Total area of pasture at 31 March 1997 Hectares | Pasture sown or resown during year ended 31 March 1997 Hectares |
|---|---|---|
| • **Sowings including lucerne:** | | |
| Pure lucerne ..... | | |
| Mixture of lucerne and other pasture species ..... | | |
| • **Sowings excluding lucerne:** | | |
| Pasture legumes only ..... | | |
| Mixture of perennial grasses and legumes ..... | | |
| Mixture of annual grasses and legumes ..... | | |
| Sown grasses only ..... | | |

**Appendix 2** ABS fertiliser questions

## ABS fertiliser question in 1987/88

**Artificial fertiliser used (whether applied by you, by contractors, or others)**
**Season 1987-88**

*Exclude* lime, gypsum and dolomite

*Enter* double and triple strength superphosphate as single strength equivalent,

| **Pastures and Crops Fertilised** | Area Fertilised | **Quantity and Type of Fertiliser Used** | | | | |
|---|---|---|---|---|---|---|
| | | Super-phosphate (including super with trace elements) | Straight nitrogenous types (e.g. urea, sulphate of ammonia) | Straight Potash | Mixtures of super, and potash | Other artificial fertilisers including complex mixtures and mixtures containing nitrogen |
| | Hectares | Tonnes | Tonnes | Tonnes | Tonnes | Tonnes |
| Pure lucerne | | | | | | |
| Other pastures (sown or native) | | | | | | |
| Wheat | | | | | | |
| Oats | | | | | | |
| Barley | | | | | | |
| Field peas | | | | | | |
| Other cereals | | | | | | |
| Oilseeds | | | | | | |
| Vegetables for human consumption | | | | | | |
| Fruit (including nuts) | | | | | | |
| Grape vines | | | | | | |
| Other (please specify) | | | | | | |

**ABS fertiliser question in 1988/89 and 1989/90**

**Artificial fertiliser used (whether applied by you, by contractors, or others) Season 1988-89**

*Exclude* lime, gypsum and dolomite

*Enter* double and triple strength superphosphate as single strength equivalent,

| Pastures and Crops Fertilised | Area Fertilised | Quantity and Type of Fertiliser Used | | | | |
|---|---|---|---|---|---|---|
| | | Super-phosphate (including super with trace elements) | Straight nitrogenous types (eg. urea, sulphate of ammonia) | Straight Potash | Mixtures of super, and potash | Other artificial fertilisers including complex mixtures and mixtures containing nitrogen |
| | Hectares | Tonnes | Tonnes | Tonnes | Tonnes | Tonnes |
| Pastures sown or native | | | | | | |
| Wheat | | | | | | |
| All other crops | | | | | | |

**ABS fertiliser question in 1994/95**

**Use of selected fertilisers on established pastures (whether applied by you, by contractors or by others) - Season 1994-95**

***Exclude***

- Pastures sown during the 1994-95 season

***Note***

- Use total fertiliser weight not weight of active constituents.

***Include***

- Double and triple super-phosphate, MAP or DAP

| | Hectares |
|---|---|
| Area of existing pasture top-dressed with fertilisers specified below | |

| | Tonnes |
|---|---|
| **Single superphosphate** used for top dressing existing pastures | |
| **High analysis fertilisers** used for top dressing existing pastures | |
| **Super-potash blends** used for top dressing existing pastures | |