A BASELINE OF ADOPTION OF PASTURE MANAGEMENT PRACTICES - NORTH EAST REGION

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CENTRE FOR LAND PROTECTION RESEARCH

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Abbreviations

ABS	Australian Bureau of Statistics
LMU	Land Management Units
DSE	Dry Sheep Equivalent
TPSKP	Temperate Pastures Sustainability Key Program

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 East 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 East Region can be summarised as follows:

- The ABS farm census is the only available comprehensive measure of the rate of perennial pasture establishment in the North East Region. The ABS farm survey for 1993/94 shows a rate of all perennial pasture sowing in the catchment of 0.86 percent per annum, with 0.75 percent to phalaris based pastures and 0.11 percent to lucerne. Both these measures increased during 1995/96 for a total perennial pasture resown rate of 3 percent.

- There is no available independent study which can be used to calibrate the ABS pasture sowing data. It would be necessary to obtain more information on pasture resowing and improved pasture management practices in the region through farm surveys.

- 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 1986/87 during a short period of high wool prices, fell in the latter part of the 1980s, and appears to have continued to fall since.

- This low rate of perennial pasture sowing is unlikely to bring about a significant increase in the area of active perennial pasture in the catchment. At this rate it is unlikely to maintain existing perennial pasture areas. Half the surveyed farmers understood the importance of correct fertiliser management for the persistence of perennial pastures. However, ABS and other local studies revealed a low adoption of improved pasture management systems such as top dressing and rotational grazing management strategies in the region.

- The ABS farm survey in 1994/95 shows the rate of pasture top dressing as 20 percent. This rate has increased to 35 percent in 1996/97 due to a reduction in total pasture area reported during this year. There is no other data available in the region which can be used to calibrate the ABS fertiliser data. However, comparisons between ABS data and data from farm surveys in other regions have shown that the ABS fertiliser question provides a reliable measure of the maintenance of improved perennial pastures.

- There is no ABS data which can be used to monitor the use of grazing rotation practices. Data available from other surveys in the catchment identify strategic grazing as the predominant method of grazing management in the region, followed by set stocking. This highlights the low adoption of rotational grazing.

- Cost of establishment and maintenance, loss of production while pastures were sown and established, and lack of time were the main reasons reported for low adoption rates. Poor persistence of introduced pastures, poor soil conditions in the region, lack of knowledge of land degradation issues and management skills required to maintain pastures were also of major concern when deciding the sowing areas.

- The Condon *et al.* (1995) study identified the following groups of graziers according to their commitment to pasture renovation.

Committed: This group of farmers have a high percentage of their farm sown to perennial pastures and are adopting the total package of improved pasture management practices on their perennial pastures. This group consists of 7 percent of the population and is driven by an interest in production and profit.

Partial adopters: This group consisted of 22 percent of the population and used parts of the pasture package. This group has a smaller proportion of their farm sown to perennial pastures and sees cost of inputs as the main barrier to pasture improvement. They pay high attention to improved grazing management practices such as increasing stocking rates and top dressing resown pastures.

Belt tighteners: This was the largest group identified, constituting 40 percent of the farming population. They claim to have large areas of improved perennial pastures. Members of this group are risk averse and see cost as the main barrier to pasture improvement. Most of these farmers have not sown improved pastures nor applied superphosphate during the last few years.

Comfortable: This group of older farmers looking towards retirement, were winding down their level of interest in agriculture and had no intention of investing in significant projects. They were longing to live an easier life on the land without going into extra risk and were happy with the income from farm and other sources for the foreseeable future. They claim a significant area of perennial pastures on their farm, but were not interested in resowing, top dressing or changing from set stocking to rotational grazing even if the risk of these practices were minimised.

Sceptics: This group of graziers view phalaris as an unpalatable weed which can be toxic to stock. It is unlikely that they will ever sow phalaris on their farms. This group comprised 7 percent of the population.

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1 THE NORTH EAST REGION

1.1 Sustainability in the North East Region

The North East Region includes the Upper Murray, Kiewa and Ovens catchments of the Murray Darling Basin and covers a total of approximately 1.97 million hectares. Rainfall in the region varies from 600 mm/yr in the west of the area to 1200 mm/yr in the upper valleys. The climate is effectively Mediterranean with hot dry summers and cool wet winters.

Sixty percent of the North East Region consists of public land while beef, dairy and sheep production are the main agricultural enterprises. Dryland pasture predominates on hills with duplex soils and on alluvial valleys, while broadacre cropping is concentrated on the northern plains. (North East Regional Catchment Strategy 1997; North East Regional Landcare Plan 1993).

The major land management units (LMUs) dominating the North East Region are Riverine Plains and Hills. The distribution of these land management units and public land in the region is shown in Figure 1.

The major land degradation forms in the region are increasing soil acidity, soil structure decline, dryland salinity, waterlogging and weed invasion. Land management methods 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 666 000 ha in the region (86 percent of the agricultural land) is estimated to be either strongly or extremely acidic. Sixty-eight percent of agricultural land in the region suffers severe soil structure decline, while another 25 percent shows a moderate structural decline. Salinisation is not a major problem, with only an estimated 250 ha of salt affected land in the region (OCE 1991).

The North East Regional Landcare Plan (1993) recommends the establishment and improved management of perennial pastures, strategic tree planting, fencing and revegetation of affected areas, and establishment of conservation cropping practices 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. 1*990). 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 are of 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 grazing industry in north east region.

- Perennial pasture sowing rate

  The North East Regional Landcare Plan recommends sowing deep rooted perennial pastures on potential high recharge areas and on all erodible grazing land to improve the condition of soil.

- Top dressing of perennial pastures

  Annual top dressing of newly sown pastures is an important factor in maintaining a dense, vigorous pasture that will have an impact on reducing the watertable and also improve 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

  Heavy grazing needs to be introduced through increased stocking rates to utilise newly sown pastures in order to achieve maximum profitability. Such a method is often the best way to deal with any weeds and ensure optimum pasture growth. From the salinity control point of view it is also necessary to introduce rotational grazing systems which enable the pastures to increase leaf area, plant growth and root development in order to maximise the water use of perennial pastures.

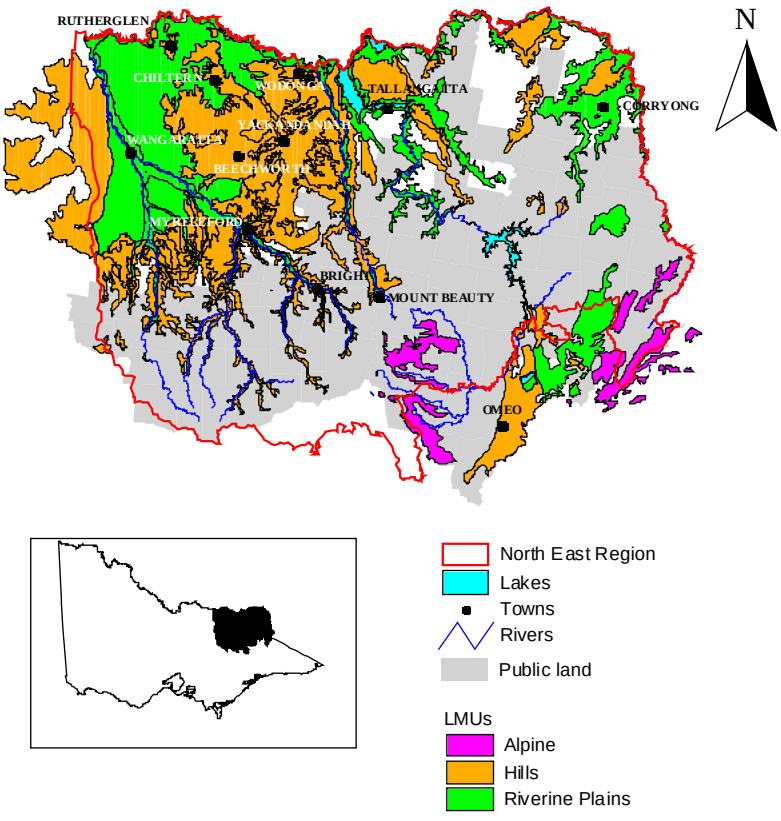


Figure 1 Land management units in North East Region

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 pasture 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 Producer survey of Temperate Pastures Sustainability Key Program (TPSKP) (Lees & Reeve 1994)

The Meat Research Corporation's TPSKP program is aimed at developing guidelines and techniques to upgrade run-down pastures and maintain newly sown perennial pastures to a desirable level in high rainfall zones. As a part of this program a survey was carried out in these zones to determine the on-farm contexts within which these techniques could be applied. Another objective of this survey was to establish baseline data on pasture management systems used on farms as well as farmer attitudes towards these systems. This data could then be used to determine changes that might occur during the period 1994-2000. A 35 percent response rate was received to a detailed questionnaire mailed out to 227 livestock producers in the Rutherglen area. As the low response rates were associated with areas where cropping and/or native pasture predominated, this response rate is considered representative for the proposed study.

2.3 Landcare: Does it make a difference? The North East sustainable farming survey (Curtis & de Lacy 1994)

As a part of a wider project of Landcare evaluation throughout Australia, a study was carried out in North East Victoria (by the Johnstone Centre at Charles Sturt University) to assess the effectiveness of the Landcare group. The study attempted to measure the impact of Landcare participation on land-holder's awareness and knowledge of key resource management issues, as well as their adoption of ‘best bet’ management practices. Information for this study was collected through a survey questionnaire mailed to all land managers in 12 catchment areas including nine Landcare areas and three non Landcare areas. The survey received a 59 percent and 42 percent response rate in Landcare areas and non-Landcare areas respectively.

2.4 Qualitative study of pasture improvement (Condon *et al.* 1995)

A study of farmer attitudes, perceptions and motivations to the establishment and management of perennial pastures was carried out in three locations across Victoria in order to determine the barriers to adoption of perennial pastures. The North East Region was selected as one of the locations. This was the initial stage of a project funded by the National Landcare Program, aimed at increasing farmer awareness and understanding of the technology associated with perennial pasture establishment and management. In-depth interviews using a semi-structured questionnaire were conducted with 27 farmers in the North East Region.

2.5 Farmer knowledge and experience with perennial grasses (Miller & Curtis 1995)

Researchers at the Johnstone Centre at Charles Sturt University carried out a research study in the high rainfall areas of the southern Murray Darling Basin, to gain direct detailed information on farmer knowledge and experience with establishment and management of native and introduced perennial grasses. This research was commissioned by the 'Community Grass Project' funded by the Murray Darling Basin Commission. A total of 26 land-holders were purposely selected across a range of environments, social and individual situations to obtain maximum possible information on knowledge and experience of perennial pastures. This sample included seven land-holders from the upper Murray region between Corryong and Springhurst and nine from the Goulburn region between Benalla and Seymour in Victoria. The remaining farmers were from NSW. An interview guide with a list of issues to be explored was used in semi-structured interviews.

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 total pasture area and areas sown or resown with pastures during the survey year. This pasture resown area could be used to compare the pasture resown rates. However, these questions do not distinguish between perennial and annual pastures. 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 only 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 survey provide the most valuable information on perennial pasture resown rates. This survey question distinguishes between the total area of pasture and the pasture resown during that year. This allows the pasture resown rate to be calculated. 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 pastures sown or resown during that 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 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.

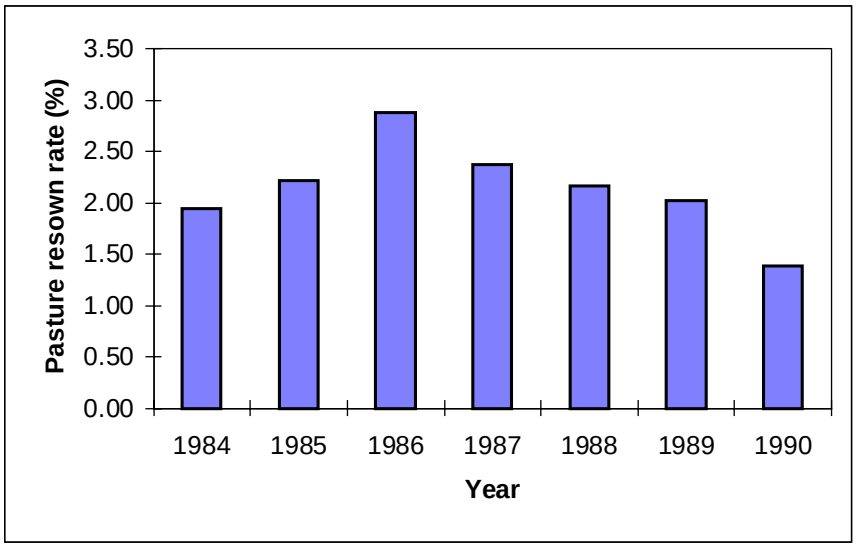
A pasture question similar to the 1993/94 format was repeated in 1995/96 and 1996/97 and the data therefore can be used as a measure of change in lucerne and perennial pasture adoption rates.

The pasture questions on the census in different years are shown in Appendix 1. The inconsistency in the 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 in the region are shown in Figure 2. The small areas of the Riverine Plains and Hills Lmu, compared to public land in the region, makes it difficult to aggregate data according to land management units. Hence, the resown rates are given as a total of the region. The parish level resown rates in 1986 are mapped in Figure 3. Figures for the total region show a relationship between wool prices and pasture resowing rates. There were high wool prices in the mid 1980s and a corresponding increase in resown rates in 1985 and 1986, followed by a drop in the latter part of the 1980s associated with low wool prices. As mentioned earlier, this measure does not distinguish between perennial and annual pastures but is still an adequate indicator of resowing rate changes for perennial pasture.

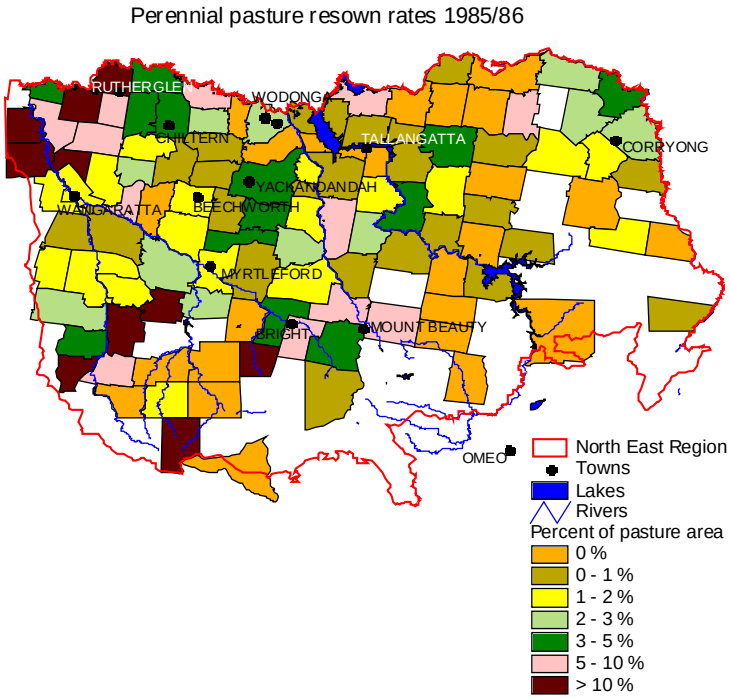
The 1993/94 ABS farm census data shows that 18 percent of the existing pasture in the North East Region was described as perennial, while another 4 percent was under lucerne pastures. However, field surveys suggest the quality of much of this existing perennial pasture may be low (Quigley & Morgan 1990).

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 the 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 area in the region, 0.75 percent was sown or resown with perennial pastures during this season, while only 0.11 percent was resown to lucerne. Perennial pasture and lucerne pasture resown rates in 1993/94 in the North East Region are mapped in Figure 4.



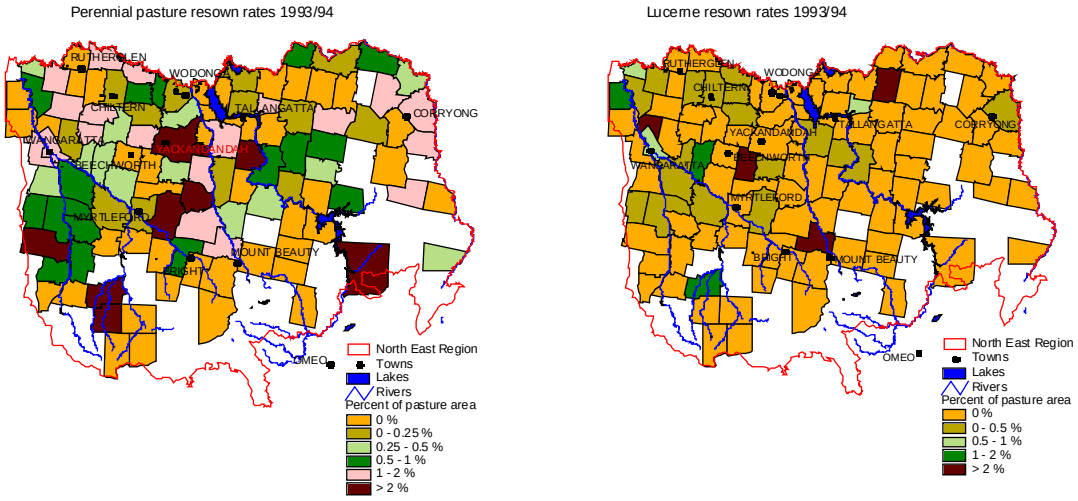
Source: Australian Bureau of Statistics (1984-1990)

Figure 2 Total pasture resown rate in the North East Region (1984-1990)



Source: Australian Bureau of Statistics (1985/86)

Figure 3 Pasture resown rates in the North East Region (1985/86)



Source: Australian Bureau of Statistics (1993/94)

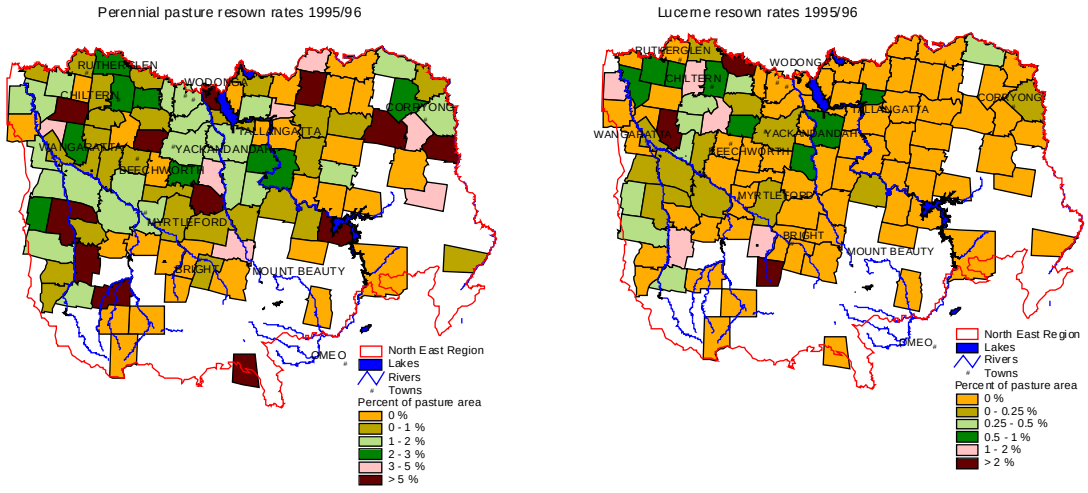
Figure 4 Pasture resown rates in the North East Region (1993/94)

Both perennial pasture and lucerne areas reported in 1996 dropped compared to areas reported in 1994. However, the percentage of existing pasture reported as perennial pastures almost doubled in 1996, mainly due to a huge reduction in total pasture area reported during this year (Table 1). There was an increasing trend in perennial pasture and lucerne resown rates with more farmers sowing or resowing these pastures on larger areas (Table 1). These measures declined in the following year with only 2.2 and 0.1 percent of total reported pasture being sown or resown to perennial pastures and lucerne respectively in the 1996/97 season. Perennial pasture and lucerne pasture resown rates for 1995/96 and 1996/97 in the North East Region are mapped in Figures 5 and 6 respectively.

Table 1 Pasture resown areas in the North East Region (1993/94-1996/97).

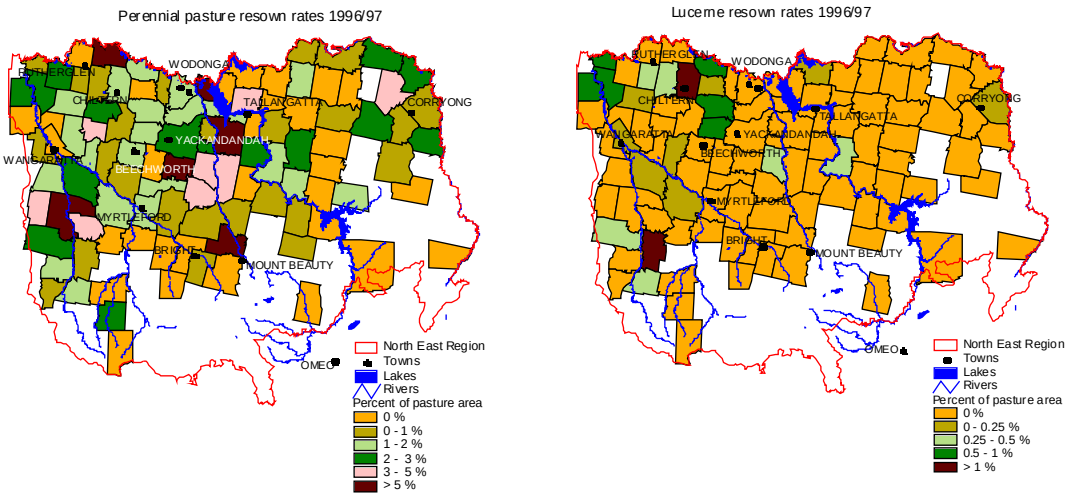
Measure	1993/94	1995/96	1996/97
Total pasture area (ha)	551862	275528	266943
Total pasture reswon area (ha)	12462	15170	12190
Total perennial pasture area (ha)	99993	91522	95649
Total lucerne area (ha)	21469	5224	3215
Perennial pasture resown area (ha)	4122	7281	5970
Lucerne resown area (ha)	615	995	384
Perennial pasture (%)	18.1	33.2	35.8
Lucerne pasture (%)	3.9	1.9	1.2
Perennial pasture resown rate (%)	0.8	2.6	2.2
Lucerne resown rate (%)	0.1	0.4	0.1

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



Source: Australian Bureau of Statistics (1995/96)

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



Source: Australian Bureau of Statistics (1996/97)

Figure 6 Pasture resown rates in the North East Region (1996/97)

3.1.2 Producer survey of TPSK program (Lees & Reeve 1994)

This study did not collect information on pasture resown rates. The farmers were asked to assess the worth of a set of practices for maintaining pasture quality. Fifty percent of the interviewees reported the worth of resowing pastures that are old, while 64 percent perceived resowing run-down pasture as worthy practice.

3.1.3 Landcare: does it make a difference? The North East sustainable farming survey (Curtis 1994)

This survey collected information on the amount of perennial pasture that was available by January 1993 and the area of perennial pasture established during the two years from 1991 to 1993. Seventy-eight percent of the total respondents had an average of 66 ha (36 percent of each property) of perennial pastures on their properties as of January 1993. Fifty-nine percent had less than 100 ha of perennial pastures while only 19 percent had over 100 ha. Only 46 percent of land-holders had planted an average of 7.4 ha (4 percent of each property) of perennial pastures in the two years from 1991 to 1993. Twenty-three percent of land-holders had established no more than 10 ha while another 13 percent had sown between 11 to 20 ha. Only 10 percent had resown over 20 ha of perennial pastures during this period.

A comparison between Landcare participants and non-participants (in Landcare catchment areas) revealed a significant positive relationship between Landcare participation and establishment of perennial pastures in January 1993. Eighty-two percent of Landcare participants had some areas of perennial pasture with a mean of 38 percent of each property under perennial pasture while only 65 percent of non-participants had perennial pastures on an average of 28 percent of their property. Forty-eight percent of Landcare participants had planted perennial pastures in the two years from 1991 to 1993, compared to 41 percent of non-participants. This may be attributed to their greater awareness of land degradation issues and better understanding of key resource management topics than non-participants.

3.1.4 Qualitative study of pasture improvement (Condon et al. 1995)

The Condon study was more of a qualitative nature and did not ask for resown areas. The average annual area sown was limited to approximately 3.5 percent of the total farm, although most farmers reported increasing this to about 9 percent under favourable conditions. All the farmers interviewed recognised improved perennial pastures as an important aspect of their future farm plan. Eighty-eight percent of the respondents were not satisfied with the state of their pasture and reported the intention to sow or improve these pastures in the future.

3.1.5 Farmer knowledge and experience with perennial grasses (Miller & Curtis 1995)

The sample of this study includes properties from both northern Victoria and NSW. Most of the findings are reported as a whole for both regions, hence the difficulty in separating information for northern Victoria. However, in some occasions individual cases are discussed separately.

The majority of the farmers interviewed had sown introduced perennial grasses at some stage and nearly all of them have experienced some sort of establishment failures. A quarter of these farms had paddocks with perennial pastures over 30 years old and another quarter had sown pastures more than 10 years ago. Despite its establishment failures, direct drilling was the preferred sowing method among most graziers, while aerial sowing was mostly unsuccessful on the few farms that adopted this practice.

3.2 Fertiliser applications on pasture

Fertiliser rates and frequencies of applications play an important role in maintaining a stable perennial pasture growth 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 question was asked again in the 1994/95 season on the use of selected fertilisers on established pastures. The 1995/96 census 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.

Over one third of the pasture area was fertilised by 56 percent of the farmers in 1987/88. There was no significant change in both these measures during 1988/89, while there was a reduction in 1990 (Table 2). This was caused by the reduction in both the number of farmers using fertiliser and the area fertilised during 1990. Increased number of farmers completing the census and an increase in the total pasture area have also contributed to this reduction in percentages. There was a huge 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 only 20 percent of the pasture area being fertilised by 33 percent of farmers. A further reduction in both the area and number of farmers using fertiliser is reported in 1996. However, the percentage of pasture area fertilised in 1996 increased due to a huge reduction in the total pasture area reported during that year. No significant change in use of fertiliser was evident during 1996/97 (Table 2). The reduction in use of fertiliser clearly is related to the prolonged period of poor wool prices.

Table 2 Measure of fertiliser application on pastures in the North East Region (1988-1997).

Measure	1987/88	1988/89	1989/90	1994/95	1995/96	1996/97
Pasture fertilised, as a proportion of total farm area (%)	22.2	21.5	19.6	14.2	13.5	13.9
Proportion of pasture area fertilised (%)	38.0	37.1	32.3	19.7	33.0	35.1
Farmers using fertiliser on pastures (%)	56.4	57	51.7	32.8	31.1	32.2
Lucerne area fertilised (%)	76.0	*	*	*	*	*
Farmers using fertiliser on lucerne (%)	58.2	*	*	*	*	*

Source: Australian Bureau of Statistics (1988-1997)
*Information for lucerne was not collected during these seasons

The rate of application of superphosphate (kilograms per hectare) over the pasture area fertilised and the entire pasture area is shown in Table 3. There was no significant difference in fertiliser rates from 1998 to 1990. There was an increase in fertiliser rates during the five years from 1990 to 1995, with more fertiliser being used on less pasture area.

Table 3 Rate of application of superphosphate (kg/ha) (1988-1995)

Measure	1988	1989	1990	1995
Rate per area fertilised	111.2	118.8	116.4	163.8
Rate per entire pasture area	42.3	44.1	37.6	32.3
Rate on lucerne pastures	219.0	*	*	*

Source: Australian Bureau of Statistics (1988-1995)
*Information for lucerne was not collected during these seasons

3.2.2 Producer survey of TPSK program (Lees & Reeve 1994)

The frequency of fertiliser applications were analysed in this study to understand fertiliser use on pasture paddocks. Only 22 percent of farmers applied fertiliser to most, or all, of their paddocks every year, while another 19 percent fertilised about half of their paddocks every year. Twenty-four percent had not applied any fertiliser for the 3 years from 1991-1993 (Table 4). Only 34 percent of the respondents considered using higher fertiliser rates than the average rates for the district as a worthwhile practice, while another 14 percent regarded this as not appropriate.

Table 4 Frequency of fertiliser applications

Frequency	Percent of respondents
No fertiliser in last three years	23.8
No fertiliser in occasional years	14.3
Less than half the paddocks every year	20.6
About half the paddocks every year	19.0
Most paddocks every year	9.5
All paddocks every year	12.7

Source: Lees and Reeve (1994)

3.2.3 Qualitative study of pasture improvement (Condon *et al.* 1995)

Fifty-five percent of farmers recognised the importance of correct fertiliser management for the persistence of perennial pastures. Nevertheless over 70 percent of respondents used the same rate of fertiliser over the whole farm area each year or every two years. Only 7 percent of graziers put higher rates on newly sown pastures and 26 percent used extra fertiliser on their hay paddocks, while none of the farmers applied higher rates for perennial pastures compared to the rest of the farm.

3.2.4 Farmer knowledge and experience with perennial grasses (Miller & Curtis 1995)

Farmers in this study gave highest priority to newly sown pastures and fertilised every year or second year for the first five years using recommended standard fertiliser sowing mix and rates depending on the financial situation.

Fertiliser rates and frequency of application on established perennial pastures depended on several factors, such as seasonal conditions, livestock feed requirements, quality and quantity of hay needed, and above all the availability of finances. The rate of application of superphosphate in most of these properties ranged from 80 to 200 kg/ha every second year.

3.3 Grazing management on pasture

3.3.1 Producer survey of TPSK program (Lees & Reeve 1994)

Strategic grazing all year round was the most popular grazing management systems used by 42 percent of farmers in the region. Set stocking all year round was used by a quarter of graziers while rotational grazing all year round was used only by 19 percent of respondents. A minority of farmers in the region were using other rotational grazing systems needed to achieve a reduction in watertable recharge. This includes 5 percent of graziers using rotational grazing mainly in spring and sometimes in summer, combined with set stocking at other times.

Forty percent of the graziers in the region considered method of grazing management as a very important factor in achieving a successful grazing enterprise. However, 83 percent of respondents perceived grazing management as worth doing to obtain a desirable pasture composition. The majority of graziers reported a high flexibility in manipulating grazing pressure on selected paddocks for spring grazing management. They mentioned either they were already, or they might be able to, close up one or two paddocks or increase grazing pressure in some paddocks during spring. Some mentioned the ability to rotate stock from paddock to paddock several times, to improve pasture quality.

3.3.2 Qualitative study of pasture improvement (Condon *et al*. 1995)

Seventy-five percent of farmers interviewed in the region understood grazing management as spelling pasture at certain times of the year and thought that it is important for long-term persistence and productivity of perennial pastures. However, only one-quarter of respondents recognised that newly sown pastures should not be grazed too early.

Fifteen percent of graziers practiced set stocking while another 66 percent strategically stocked their paddocks. Visual assessment of availability of pasture and animal health condition were the main basis for moving their sock. Another 18 percent of farmers practiced rotational grazing systems.

The estimated stocking rate in the region ranged from 2.7 to 18 DSE/ha with an average rate of 9 DSE/ha.

3.3.3 Farmer knowledge and experience with perennial grasses (Miller & Curtis 1995)

This study looked at the management strategies used by graziers on native and introduced improved perennial pastures. Most land-holders did not graze their newly sown pastures for the first 12 months, allowing it to set seed, while some did graze new pastures lightly with lambs or cattle before seeding. Grazing management after the first 12 months was determined depending on the livestock requirements, seasonal conditions, need for hay supplies and weed control.

Established perennial pastures were generally set stocked with periods of spelling. Few graziers either reduced stock or removed them during spring, allowing phalaris to persist over the summer, while some practiced autumn spelling of pastures. Most farmers set stocked their pastures during winter and did not spell them. Only two farmers interviewed used some sort of rotational grazing system on their small properties, with over half the farm sown to perennial pastures. Visual assessment of pasture availability and condition of livestock were the main factors considered in determining the grazing strategies. Factors such as soil condition, market prices, weed control, animal health and feed requirement of different classes of stock were also considered in deciding stocking rates and moving of stock.

Land managers in the region have estimated a two to four fold increase in stocking rates on paddocks sown to introduced perennial pastures, compared to annual pastures. However, some farmers were reluctant to increase stocking rates due to risk of erosion in hill country. The extent of improved perennial pastures on properties had a direct influence on increasing stocking rates. Most properties with less than 10 percent of the farm area under introduced perennial pastures had not changed their stocking rates significantly, whereas the properties having perennial pastures on more than half their area had gradually increased their stocking rates.

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. The following section summarises these studies in the North East Region.

4.1 Producer survey of TPSK program (Lees & Reeve 1994)

Just over one third of respondents in the region felt pasture quality decline was a problem in the area and a little over half perceived it to be a problem on their own properties. Those who do not believe pasture quality decline to be a problem may be less likely to adopt improved grazing management practices.

4.2 Landcare: Does it make a difference? The North East sustainable farming survey (Curtis 1994)

Overall, land-holders in this study were concerned about the poor persistence of introduced perennial pastures, possible net economic returns on acidic and low phosphorous soils in the region, the advanced management skills required with increasing stocking rates, and the uncertainty about the capacity of perennial pastures to utilise excess water on recharge areas of high rainfall zones.

This study revealed that Landcare participants had significantly higher levels of adoption of almost all best management practices, including perennial pasture establishment, than the non-participants in Landcare. These farmers were significantly more aware of land degradation issues, had greater levels of knowledge of resource management topics, were more concerned about the economic impacts of land degradation issues, and had been farmers for longer than non-participants. However, the study suggests that changing attitudes are not the key to changing resource management practices and that additional resources are required to increase adoption of 'best bet' practices, together with a more regionally based approach.

4.3 Qualitative study of pasture improvement (Condon *et al*. 1995)

All farmers interviewed recognised the importance of pasture improvement and included this in their future farm plans. However, cost of establishment, unreliability of seasons, and loss of production while pastures were sown and established were the main barriers to a further increase in improved perennial pasture areas. In addition to these, the social situation of the farmer and other priorities in the household were also an influence on the decision to increase pasture area.

This study identified groups of graziers with regard to their commitments to pasture establishment and management. Seven percent of the farmers interviewed in the region were grouped as *Committed Graziers.* They had a positive attitude and a motivation towards pasture resowing and management. They also had a high percentage of their farm sown to introduced perennial pastures and were involved in a yearly pasture resowing plan with regular top dressing and rotational or strategic grazing. The main obstacle mentioned for the yearly resowing of pastures was loss of production from the new pasture paddocks during the establishment phase. This group was similar to the group of graziers in the Glenelg Region with an awareness-attitude-behaviour form of decision making process identified by O'Keeffe in his survey (Karunaratne & Barr 2001).

Twenty-two percent of farmers were categorised as *Partial Adopters.* These farmers used parts of the pasture package and the proportion of their pasture area resown was smaller than that of the former group. Resowing was not included into a yearly program and depended on the cost of inputs. This group perceived perennial pasture as a high quality feed and understood the possibility of increasing stocking rates. They paid greater attention to improved grazing management practices such as spring lambing, increasing stocking rates, and top dressing resown pastures to achieve higher productivity. However concerns about the problems in increasing stocking rates may discourage these farmers from resowing new pasture areas.

The third, and the largest group (48 percent), of graziers were identified as *Belt Tighteners.* These farmers only sow pastures during favourable economic conditions, although they claim to have large areas of improved perennial pastures. Many of them were generally dissatisfied with their pastures. These farmers are generally risk averse. Any pasture technology with a possible element of risk is likely to be unattractive to the members of this group. They believe it is not economic to resow or fertilise pasture while wool prices are low. The risk of establishment failure and the high cost of establishment were the major constraints to sowing mentioned by these graziers. Pasture was managed by set stocking and rotational grazing was not used. This group of farmers had a poor understanding of their production system and key influences on profitability.

The Comfortable were identified as a group of older farmers looking towards retirement, who were winding down their level of interest in agriculture and had no intention of investing in significant projects. They were longing to live an easier life on the land without going into extra risk, and were happy with the income from farm and other sources for the foreseeable future. They claim a significant area of perennial pastures on their farm, but were not interested in resowing, top dressing or changing from set stocking to rotational grazing even if the risk of these practices are minimised.

The last group *(Sceptics)* believe perennial pastures are of no value on their farm and view phalaris as an unpalatable weed which can be toxic to stock. It is unlikely that these farmers will ever sow improved perennial pastures on their farms. These perceptions of phalaris are thought to be an outcome of their unwillingness to use appropriate grazing strategies and heavy stocking rates. This group comprised 7 percent of the interviewed farmers.

4.4 Farmer knowledge and experience with perennial grasses (Miller & Curtis 1995)

Increasing production and carrying capacity were seen as the main advantages for establishing perennial pastures. Its effect on reducing land degradation problems, such as soil erosion, salinity and waterlogging, were recognised by only a few farmers interviewed.

The cost of establishment and maintenance was mentioned as the main reason for low adoption rates of perennial pastures on most farms. The scale of hill paddocks and the poor soils with low fertility and high acidity were also seen as restricting factors. Past experiences with unsuccessful establishments, stage in life, and personal interests in aspects of farming, as well as the poor persistence of new phalaris varieties and perennial ryegrass, also had contributed to low establishment rates.

Every farmer interviewed in the region perceived the importance of using phosphate fertilisers on introduced perennial pastures. They had either been involved in high input fertiliser trials on their farms or have visited trial sites and seen the changes in pasture composition and higher stocking rates achieved on these paddocks. However, the use of fertiliser was severely limited by the high cost of fertilisers and low wool prices. The beef market slump in the mid 1970s had influenced beef farmers to forego superphosphate applications for many years.

Most farmers understood the effect of sheep grazing on the long-term persistence of perennial pastures and the benefits of rotational grazing. However, the large amount of work and labour involved in rotational grazing was mentioned as an obstacle in using this management technique. Most graziers had used perennial pastures to increase production per hectare – through increasing weight gains and wool cuts per heads – rather than increasing stock numbers on those paddocks.

5 RECOMMENDATIONS

The aim of this report is to provide baseline information and establish trends in the adoption of pasture management practices in the North East Region. The information in this report has been based on available research studies and provides reasonable trends in adoption of these practices 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 of using ABS data in determining the adoption trends is the changing format of the question each year. The consistency in the format of questions is important in getting reliable information to measure trends in adoption rates. The adoption rates estimated from 1993/94 ABS data provide 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 which provides suitable continuity in data. Hence, the same format can be used in future to estimate the adoption of perennial pastures.

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, although it 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, however, 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

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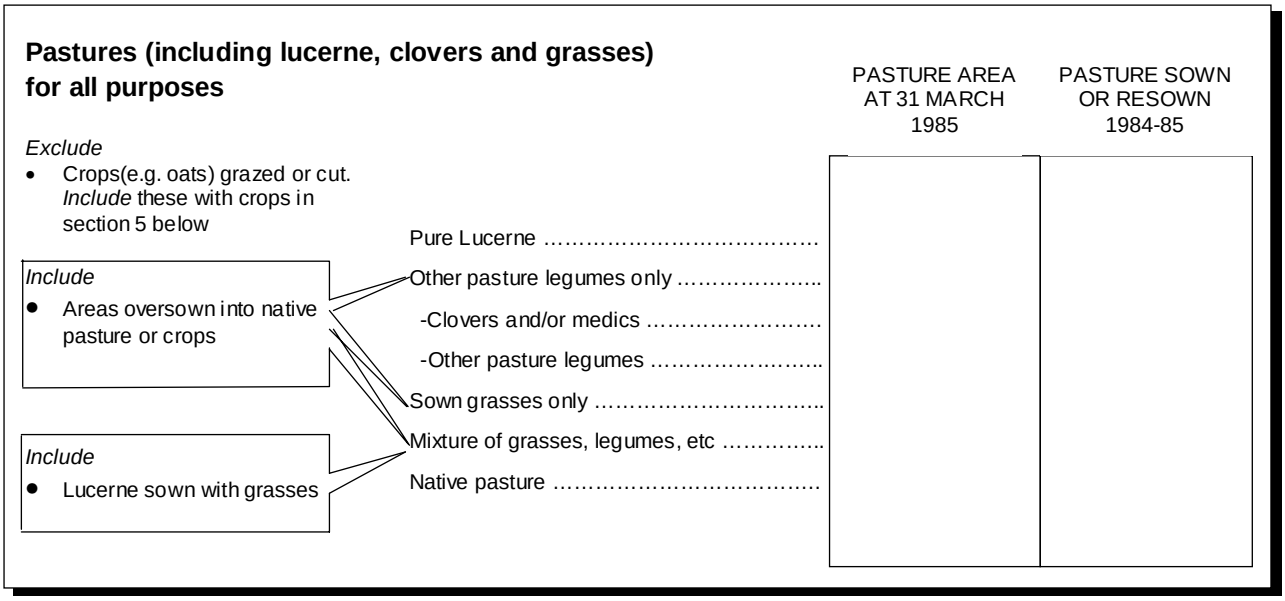
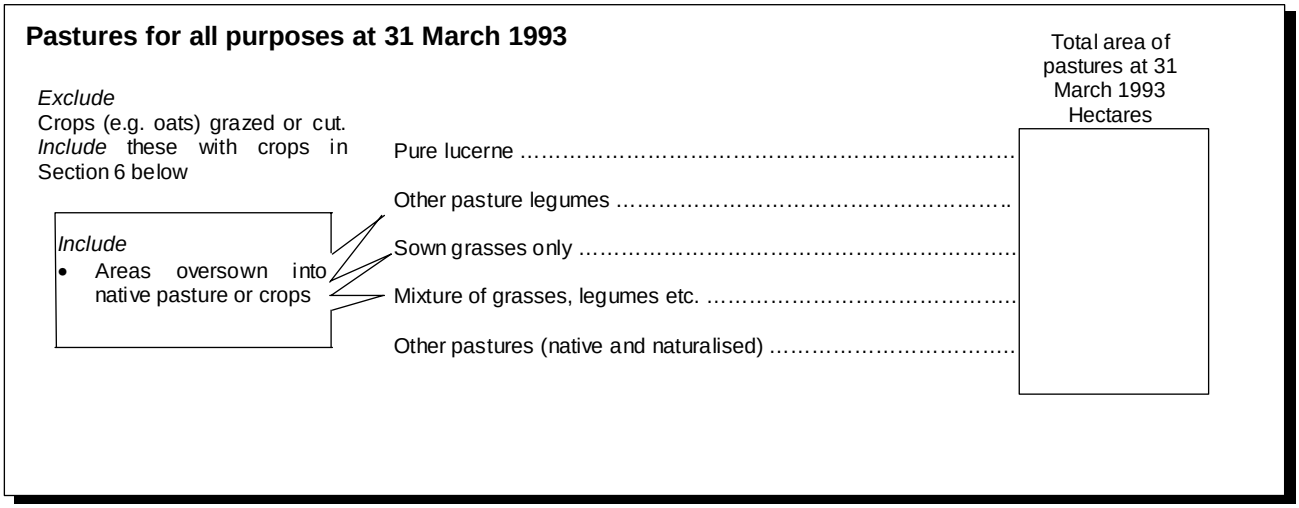
7 APPENDICES AUSTRALIAN BUREAU OF STATISTICS FARM CENSUS QUESTIONS

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	Tonnes
Area of existing pasture top-dressed with fertilisers specified below		
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		