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A survey of the use of perennial pastures as part of the pasture crop rotation in the mixed farming zone of southern New South Wales

Future Farm Industries CRC Technical Report 3

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Future Farm Industries CRC aims to transform Australian agriculture and rural landscapes by developing and applying Profitable Perennials™ technologies to innovative farming systems and new regional industries.

A survey of the use of perennial pastures as part of the pasture-crop rotation in the mixed farming zone of southern New South Wales

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Table of Contents

Executive summary

This report summarises the results of a survey conducted in 2009 in the mixed farming zone of southern New South Wales to determine the use of perennial pasture species within the pasture-crop rotation. The survey was part of the *EverCrop* project within the Future Farm Industries CRC. A total of 95 farmers were surveyed. Respondents were mainly farmers who attended workshops and farmer meetings organised by farming system groups and district agronomists. The location of the properties surveyed ranged from Temora and Ariah Park in the northern part of the target zone to Holbrook and Brocklesby in the south. Comparisons of pre-drought, current and future land allocation and management are made.

Averaged over the whole region at any one time about 52% of the land managed by respondents is under crop, 29% sown to pasture containing perennials, and 19% sown to annual pasture species only. About 20% of farms had 5% or less of land under crop, and 10% of farms reported having more than 80% of land under crop.

The reasons given for having perennial pastures as part of the pasture-crop rotation included increased stocking rates, increased animal liveweights and reduced need for supplementary feeding. Responsiveness to summer rain, provision of out of season feed and improved ground cover were the three key advantages identified by producers for incorporating perennial pastures. Negative aspects of perennials identified by farmers included expensive to sow, difficulty in removing prior to cropping and reduced crop yields after perennials.

Lucerne was the most widely grown perennial. 84% of farms reported having some pastures containing lucerne, 48% of farms reported having phalaris, 31% had native perennial grasses and 26% had chicory. Twice as many farms in the eastern part of the region had chicory as those in the western region. Perennial ryegrass and tall fescue were present on less than 2% of farms. A significant proportion of farms had only a small proportion of pastures under lucerne with 42% of farms in the east and 34% of farms in western region having up to half their perennial pasture area sown to perennial species other than lucerne.

Cover-cropping was the most common method of establishing pastures with 83% of farmers utilising this technique.

Forty-one percent of farms had a stocking rate of 1-2 ewes/ha across the whole farm and a further 26% had 1 ewe/ha or less. Stocking rates had declined across the whole region due to drought. The prolonged drought does not appear to have influenced the proportion of crop and pasture sown or future land allocation intentions. Based on interviews with farmers the drought has served to justify the continued role of livestock enterprises in the system due to their stabilising effect on farm income.

Most farms lambed in April-May (31% of farms) with a further 25% lambing in August. Calving time was spread out between February-October with most calving in August-September (54%) and a further 18% calving in February.

The results from this survey will be used to identify issues restraining the greater use and adoption of perennials in farming systems. The area currently sown to pastures and crops reported in the survey will be compared with the optimum proportion of crop and pasture predicted from the bioeconomic model MIDAS as part of the *EverCrop* research project. The *EverCrop* project will also seek ways of overcoming the constraints identified and quantify the benefits of perennials to the farming system.

Introduction

A major goal of the Future Farm Industries (FFI CRC) is to increase the profitability and sustainability of farming through the greater use of perennial pasture species in farming systems. Perennial pasture species have been shown to provide feed for livestock over a longer period and utilise rainfall more effectively. They also convey a number of important natural resource management benefits such as reducing deep drainage which can lead to dryland salinity, soil acidification and increase river salinity. Some perennials such as perennial grasses also increase ground cover leading to reduced soil erosion.

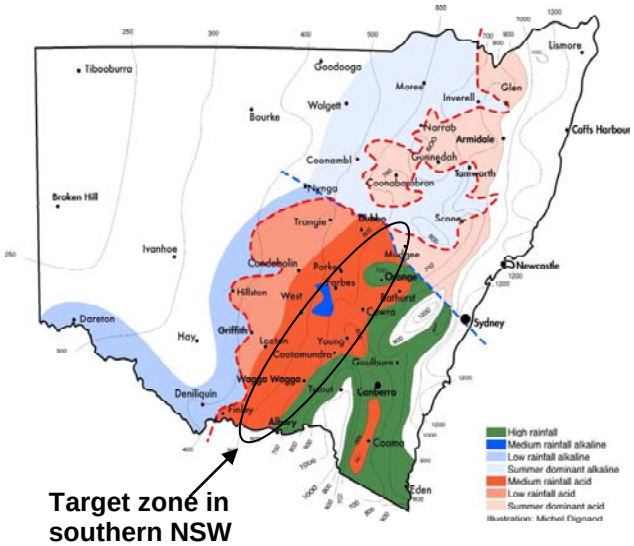
The *EverCrop* project was set up by the FFI CRC with financial support from the Grains Research and Development Corporation to promote the awareness and adoption of perennial pasture species as part of mixed farming enterprises in southern NSW. The *EverCrop* project has several components including the establishment of on-farm participatory research sites in combination with farmer groups, using bioeconomic models to determine the impact of perennials on farm profit and targeted research on issues found to be inhibiting the greater adoption of perennials.

At the commencement of the project a survey of farmers was undertaken to benchmark the current use of perennials as part of the rotation in southern NSW and determine farmer attitudes to perennial pasture species. This survey was designed to set up baseline values for criteria such as:

- Current ratio of crop and pasture on farms in the target region
- The proportion of farm sown to perennial pasture species
- Perennial species they are sowing
- Planned changes in the area sown to perennial pasture species
- Farmer perspectives on advantages and disadvantages of sowing perennials
- Factors restricting greater use of perennials in pasture-crop rotations.

Background to target region

The mixed farming zone of southern NSW includes a combination of cropping and livestock activities typically in a phased rotation. The length of the pasture and crop phases varies depending on the relative profitability of crops and livestock but typically each phase is about four to six years in duration. This combination of livestock and crops conveys a number of advantages including income diversification, minimisation of risk from variation in climate and commodity prices as well as production advantages including weed control, restoration of soil fertility and improvement in soil structure.



Rainfall

Rainfall ranges from around 650 mm in the higher elevation and undulating slopes to the east of the region, declining to around 400 mm in the Riverina Plains to the west. The annual rainfall distribution varies from a uniform distribution pattern in the northern parts to more winter dominant in the south. The growing season is regarded as predominantly autumn-winter-spring although less reliable rainfall over summer can produce significant amounts of feed. Rainfall over the last nine years has been significantly below average and much of the region being drought declared. Rainfall at Wagga Wagga for example has averaged 397 mm over the last nine years and 364 mm over the last four years compared to the 100 year average of 523 mm.

Soil types

The four main soil types across the region are:

- Non-arable Tenosols; skeletal soils, shallow or rocky, often steeply sloping, can also include low lying areas not suitable for cultivation
- Grey Vertosols; sodic grey clays, heavy textured cracking soils, poorly drained, low infiltration rates, subsoil constraints to root growth, can be saline at depth, can have gilgai present, often present on floodplains of inland steams, parent material alluvial or sedimentary
- Light Red Kandosols; acidic gradational soils, lack clear or abrupt B horizon, heavy sandy loams, includes red earths
- Red Chromosols; duplex soils, generally not strongly acidic, acid trend with depth, includes red brown earths and podzolic soils, generally favourable physical properties.

The kandosols and chromosols have become acid with farming over time. Most of the arable soils have been limed to pH 5 ($CaCl_2$) or greater to correct surface acidity but many of these soils can have an acid sub soil restricting growth of acid sensitive species.

Crops

The region is suitable to a wide range of winter crops. The main crops sown are wheat (*Triticum aestivum*), oats (*Avena sativa*), barley (*Hordeum vulgare*), triticale (*Triticale* spp) and canola (*Brassica napus*). Pulses such as field peas (*Pisum sativum*), lupins (*Lupinus* spp) and vetches (*Vicia* spp) can also be grown but low economic returns restrict their wider use. Generally there is insufficient summer rain for warm season crops such as sunflowers (*Helianthus annuus*), maize (*Zea mays*) and sorghum (*Sorghum*) although they can be grown with supplementary irrigation.

Pastures

The pastures sown as part of the pasture phase are typically based on the annual legume subterranean clover (*Trifolium subterraneum*) which is well adapted to the mostly cool season growing period (autumn-winter-spring). Volunteer annual grasses and broadleaf weeds can make up a significant component of these pastures. Burr medic (*Medicago polymorpha*) is naturalised on large segments of land within this zone. Other annual legumes such as balansa clover (*T. michelianum*), gland clover (*T. glanduliferum*) and biserulla (*Biserulla pelecinus*) are also adapted to the region.

Lucerne (*Medicago sativa*) is the dominant perennial pasture species grown throughout the region. Although widely grown, its more extensive use is limited by susceptibility to acid

soils, waterlogging and poor persistence under set stocking. Concerns with animal health issues arising from grazing pure lucerne, such as bloat and redgut, prevent some farmers from expanding the area sown. Other perennial pasture species potentially adapted to parts of the region include chicory (*Cichorium intybus*) and perennial grasses such as phalaris (*Phalaris aquatica*), tall fescue (*Festuca arundinacae*) and cocksfoot (*Dactylus glomerata*). The region is generally too dry and drought prone for species such as white clover (*T. repens*) or perennial ryegrass (*Lolium perenne*) to persist.

Livestock enterprises

There is diverse range of livestock activities within the region based on sheep and cattle.

Typically sheep enterprises are based on either Merino ewes or 1st cross ewes. Traditionally Merino ewes have been joined to Merino rams for wool production with a proportion joined to long wool British breed rams to produce prime lamb mothers.

With the continued trend of lower wool prices coupled with the increase in both mutton and lamb prices there has been a gradual shift into sheep meat production. Many producers now join the majority of their Merinos ewes to either terminal rams for lamb meat production or maternal rams to produce prime lamb mothers. Some producers have stayed with Merinos and put effort into finishing the wether and cull ewe lambs for the meat market. Others have moved solely into producing prime lambs by selling all their Merinos and buying in replacement 1st cross ewes.

Either way, there has been an increased need to extend the growing season to either provide green feed later in the year to finish lambs or earlier in the year to feed lambing ewes. This need has resulted in increasing use of grazing cereal crops and pastures such as lucerne and chicory.

Cattle are more commonly run in the southern area of the region. Breeding forms the basis of most enterprises with trading often forming part of the system. The majority of production is aimed at yearling production for the feedlots or supermarket trade. During the last decade there has been a steady increase in the numbers finished in feedlots making up approximately 35% of all animals slaughtered. This number has dropped significantly over the last two years as a result of a large drop in cattle numbers coupled with high grain prices and large fluctuations of the Australian dollar.

The survey

Target groups

Farmers surveyed were typically members of farmer groups such as Landcare or Farming Systems Groups. The groups were located across the region with differing rainfall and soil types. Farmers surveyed were those who regularly attended farmer groups and were interested in increasing the sustainability and productivity of the farmer enterprise and could be regarded as more progressive. The full age spectrum was represented although the groups are likely to have a larger proportion of younger farmers than in the general farming community.

Methodology

Farmers were given a standard questionnaire (Appendix) to complete in a group setting. The identity of farmers was not recorded but the geographic location of their properties was identified to enable differences in responses with rainfall and region to be extracted.

Where participants were asked to rank in order of importance a series of answers to a particular question, answers were given a score based on the response. The highest rank received the greatest score and the lowest rank the least. Respondent scores were summed to give an overall ranking for each answer to the question.

Results are presented for the whole region and broken down into the eastern and western components of the region. The eastern region included 44 farms in the higher rainfall zone (550-700 mm), located predominantly around the towns of Cootamundra, Burrumbuttock and, Brocklesby, East and West Hume. The western region had 51 farms located in the lower rainfall zone (450-550mm), located around the towns of Ariah Park, Temora, Junee and Henty.

Stocking rates are presented as both the stocking rate reported over the whole farm area and the stocking rate based on the area of pasture on particular properties.

Results

Question 1. Percentage of farm sown to crop, perennial pasture and annual pasture

- **Current allocation to crop and pasture**

Based on responses over the whole region, currently at any one time 52% of land is under crop, 29% contains perennial pasture and 19% annual pastures. This represents a relatively high use of perennials in current systems across the region (Table 1 and Fig. 1).

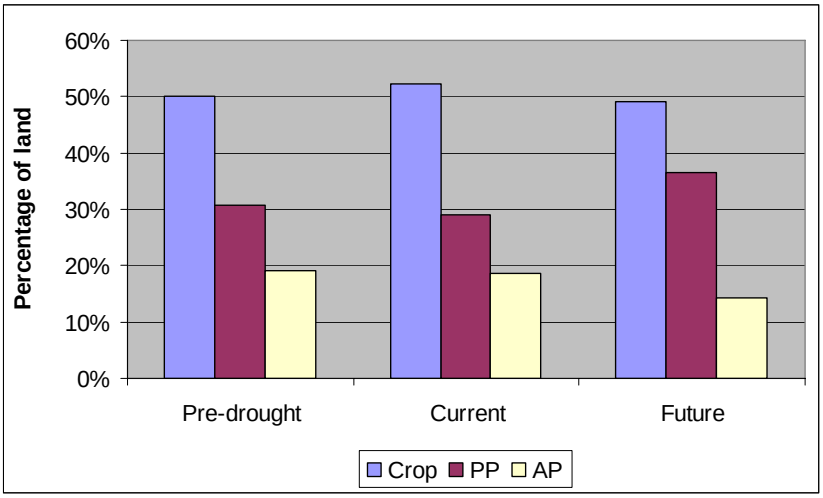


Fig. 1. Percentage of land sown to crop, perennial pasture (PP) and annual pasture (AP) over the whole region

- **Changes during the drought**

On average the area under crop and pasture has remained relatively constant during the drought with about 50% in crop at any one time (Table 1).

When responses were split into eastern and western regions, the area under crop declined by 5% to 45% in the eastern zone and increased by 5% to 60% in the west. Perennial pastures were more widely grown in the eastern zone at about 38% of the region with this level the same as pre-drought levels. In the western region, the area sown to perennials reduced by about 4% to the current level of 21%.

Table 1. Percentage of farms sown to crop, perennial pasture and annual pasture pre-drought, currently and planned or the future

	Whole region			Eastern zone			Western zone		
	Pre-drought	Current	Future	Pre-drought	Current	Future	Pre-drought	Current	Future
Crop	50%	52%	49%	45%	45%	42%	55%	60%	56%
PP	31%	29%	36%	38%	38%	44%	25%	21%	29%
AP	19%	19%	14%	18%	17%	14%	20%	20%	14%

- **Future trends**

Farmers across the region indicated that in the future they are likely to decrease the area of annual pasture and increase the use of perennial species by about 7%. The area under crop is likely to decline by about 3%. There was no real difference between farmers in the east or west of the region.

- **Breakdown of farms based on area of crop**

About 7% of farmers surveyed have an intensive cropping enterprise with > 80% of their property under crop and a low proportion of perennial or annual pasture. The distribution between farms was similar in both the eastern and western regions (Fig. 2).

Approximately 30% of farms across the whole region have between 60-80% of their land sown to crop. However, the distribution differs markedly with 48% of farms in the west falling into this category and only 12% of farmers in the east.

Across the region approximately 28% of producers have between 40-60% of their land sown to crop. The distribution is greater for the eastern part of the region with 34% and 23% in the west.

The number of producers with between 20-40% of their land sown to crop varies between 25% and 16% for the east and west respectively. The average over the whole region is about 20%.

About 11% of farms across the whole region have a low proportion of crop (<20% crop). The majority of these farms are located in the eastern zone with approximately 21% while the west has approximately 6% of farms with less than 20% of their land area under crop.

- **Breakdown of farms based on area of perennial pasture**

Currently 42% of farms across the whole region have less than 20% of their farm sown to perennial pastures. In the east only 25% fall into this category while in the west this category makes up 55% of farmers.

Over the whole region, 22% of farmers had 40% or more of their farm sown to perennials. The majority of these farmers were located in the eastern region with 36% compared to only 10% in the western region (Fig. 2).

Remark*:*

Farms in the region continue to allocate approximately half their farm area to pastures despite the apparent greater potential returns from cropping. Reasons given for maintaining a significant livestock enterprise are reliability of income and cash flow from stock which balances the higher input costs and greater seasonal risk associated with cropping. There was no trend to increasing the area sown to crop in the future.

Only a small proportion of farms (8-9%) are intensively cropped with little or no pasture with most farms maintaining a balanced livestock-crop enterprise mix. Farmers in the drier western zone are more likely to have a higher proportion of crop than in the eastern zone. However, if the recent fall in grain price continues as a result of increased production world wide we could see a shift to a more balanced livestock-crop enterprise.

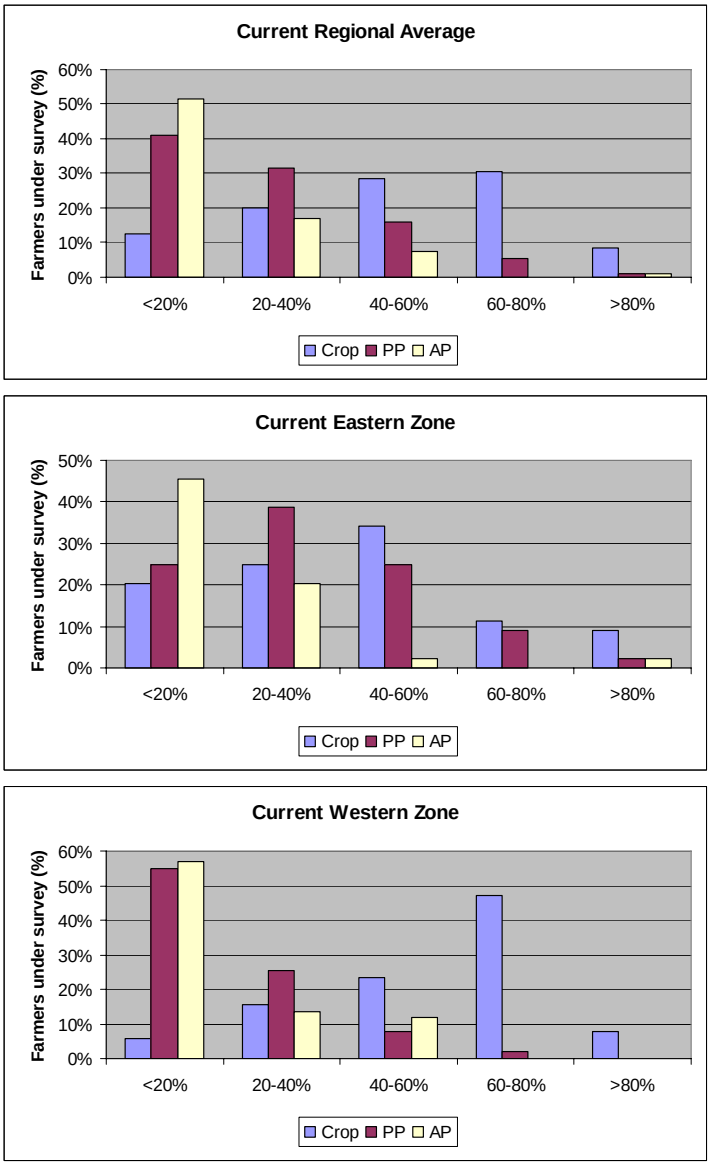


Fig. 2. Percentage of farms reporting percentage of farm area currently sown to crop, Perennial Pasture (PP) and Annual Pasture (AP)

Question 2. Percentage of perennial pasture area sown to particular perennial species

In considering this question it is important to distinguish between the proportions of farms having a species present vs the actual area it occupies on the farm as a percentage of the area sown to perennial pasture.

- **Lucerne**

Averaged over the whole region lucerne was the most common perennial species being grown on 84% of all farms (Table 2). This percentage was consistent in both the eastern (86%, Table 3) and western zone (82%, Table 4).

The actual area of lucerne on farms was similar across the region from east to west. In the west 47% of farms had more than 50% of their perennial pasture area sown to lucerne and the east 50% of farms had more than 50% of their perennial pasture area sown to perennials.

In the eastern zone 7% of farms have 90-100% of their perennial pasture area sown to lucerne while in the west this figure is much higher at 37%. Part of this difference is due to a larger number of farms in the east having other perennial species such as phalaris and chicory (see below). This could be explained in part by the presence of more acid soils in the east that are less suitable for growing lucerne.

- **Phalaris**

After lucerne the next most common perennial species was phalaris with an average of 48% of farms reporting growing phalaris. A higher proportion of farms in the eastern zone (64%) grew phalaris than in the western zone (35%). Unlike lucerne, few reported large areas of phalaris with only 24% of farmers in the east and 18% of farmers in the west having at least 50% of perennial pasture area under phalaris. In the eastern zone about 29% of farms had between 1 and 30% of perennial pasture area sown to phalaris while in the west there was only12% of farms having up to 30% of pasture area under phalaris (Table 2, Table 3 and Table 4).

- **Native grasses**

Native grass pastures represented the third most common perennial across the whole region with it being reported on 31% of farms. The percentage varied slightly with the eastern zone having 35% compared to 29% in the west. In both the east and western region there tended to be a relatively small area of perennial pastures with native grasses with the highest proportion of farms reporting up to 10% of their perennial pastures being native grasses (Table 2, Table 3 and Table 4).

- **Chicory**

Chicory was sown on 26% of farms across the whole region which was similar to native grasses with 27%. The proportion of farms having chicory was twice as high in the eastern zone with 36% compared to the west with 18%. In both the eastern and western zones 41% - 50 % of perennial pastures were sown to chicory as either part of a mixed sword or as a straight pasture (Table 2, Table 3 and Table 4).

Remark*:*

Lucerne is clearly the most widely grown perennial species with a high level of adoption. Lucerne is less dominant in the eastern zone where issues such as soil acidity and a greater range of perennial options such as phalaris and chicory are available. The eastern zone is also more undulating and in some areas less suitable for rotational grazing which lucerne prefers.

Table 2. Percentage of farms reporting particular percentage of nominated species on their property as a percentage of perennial pasture area: Whole region

Species	0-10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	80-90%	90-100%	Total farms%
Lucerne	7%	4%	4%	5%	16%	4%	7%	8%	4%	23%	84%
Chicory	4%	7%	2%	0%	11%	0%	0%	0%	0%	2%	26%
Phalaris	7%	6%	6%	3%	5%	3%	4%	4%	4%	4%	48%
Native	12%	7%	4%	2%	2%	1%	0%	2%	0%	0%	31%
Pere rye	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	2%
Fescue	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	2%

Table 3. Percentage of farms reporting particular percentage of nominated species on their property as a percentage of perennial pasture area: Eastern region

Species	0-10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	80-90%	90-100%	Total farms%
Lucerne	7%	7%	7%	7%	14%	9%	14%	11%	5%	7%	86%
Chicory	9%	14%	0%	0%	11%	0%	0%	0%	0%	2%	36%
Phalaris	11%	11%	7%	5%	7%	7%	5%	2%	5%	5%	64%
Native	14%	7%	5%	2%	2%	0%	0%	5%	0%	0%	35%
Pere rye	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	2%
Fescue	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%

Table 4. Percentage of farms reporting particular percentage of nominated species on their property as a percentage of perennial pasture area: Western region

Species	0-10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	80-90%	90-100%	Total farms%
Lucerne	8%	2%	2%	4%	18%	0%	2%	6%	4%	37%	82%
Chicory	0%	2%	4%	0%	10%	0%	0%	0%	0%	2%	18%
Phalaris	4%	2%	6%	2%	4%	0%	4%	6%	4%	4%	35%
Native	12%	8%	4%	2%	2%	2%	0%	0%	0%	0%	29%
Pere rye	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	2%
Fescue	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	2%

Question 3. Do you establish perennial pastures by undersowing?

Over the whole region 83% of farmers used cover-cropping (undersowing) at some time to establish pastures (Table 5).

Cover-cropping is more common in the western region with 93% of farmers using it at some time for pasture establishment compared to only 73% of farmers in the eastern zone.

In the western zone approximately two thirds (67%) of farmers either mostly or always use cover-cropping to sow perennial pastures. In the east the number of farmers is less at approximately 43%.

Although the effect of drought on future pasture sowing techniques was not asked, recent interviews with farmers suggest the use of cover-cropping is declining with the drier weather resulting in an increase in direct sowing without a covercrop.

Remark*:*

Cover-cropping has clearly been the dominant method of pasture establishment. It is seen as an effective way of reducing the cost of pasture establishment by avoiding additional cultivation and sowing costs. The success of this technique however is much lower under moisture stress conditions and although not asked as part of the survey farmers are reporting a high failure rate in lower rainfall years. As a result many farmers report moving away from cover-cropping to direct pasture sowings in the year after crop. There was a lot of interest from farmers in obtaining better information on the effectiveness of cover-cropping under moisture limiting conditions in terms of the effect on pasture establishment and long term pasture productivity.

Table 5. Percentage of farms using undersowing for establishing pastures on average over whole region and in the eastern and western zone

Response	Whole region	Eastern region	Western region
Never	17%	27%	7%
Sometimes	30%	29%	25%
Mostly	33%	33%	27%
Always	20%	10%	42%

Question 4. Reasons for sowing perennial pasture.

Respondents were asked to rank the reasons for sowing perennial pastures (one being the highest to six being the lowest). Each rank was then weighted to produce an overall score. Rank 1 had a weighting of six, rank 2 a weighting of five and so on down to rank six with a weighting of one (Table 6).

Increased stocking rate was ranked number one by 11 respondents. It also had the highest total score of 91 across all 6 rankings and the highest combined score of 89 for the top three ranks.

It is interesting that increased stocking rates was the main reason for sowing perennial pastures even though stocking rates have been steadily declining over last few years as a result of the drought.

The 'increased turnoff weights' was ranked first by only three respondents yet eight respondents ranked it second and four respondents ranked it third. This gave a combined score for the top three ranks of 74 and a total combined score across the six ranks of 79.

The 'reduced need for supplementary feeding' was ranked first by five respondents yet its total combined score for all six ranks was 73 and only 52 for the combined top three ranks.

While it could be argued either way which is ranked second or third, in reality 'increased turn off weights' and 'reduced supplementary feeding' are linked as there are tradeoffs depending on when lambing occurs. Lambing early in the year results in increased supplementary feeding of ewes but higher turn off weights of progeny, while lambing later results in reduced supplementary feeding of ewes but lower turn off weights. Extending the growing window at both ends of the growing season benefits both.

Remark:

Perennial pastures are seen by farmers as conveying significant benefits to livestock in terms of increasing stocking rates, higher growth rates and reduced need for supplementary feeding. This suggests that the feed supply curve from perennials is better matched to animal livestock requirements than annual pasture production. Farmers did not rate natural resource management (NRM) benefits that flow from perennials as being a high priority for using perennials on their farm.

Table 6. Ranking of reasons why respondents grow perennial pastures

Number of respondents and weighted score	Rank1	Rank 2	Rank 3	Weighted score	Overall rank
Increased stocking rate	48	13	12	448	1
Increased livestock turnoff weight	16	33	19	397	3
Reduced need for supplementary feed	26	19	25	405	2
N fixation	9	12	17	307	4
NRM issues	11	10	9	285	5

- **Positive experiences with perennial pasture species.**

Respondents were asked to identify positive experiences they have had with their two main perennial pasture species.

The main advantages of lucerne reported were production of feed following summer rain, providing feed when nothing else grows and surviving the drought well.

The result for chicory were less clear, however four of the six respondents felt that it provides feed when nothing else grows and responds well to summer rain.

Phalaris scored well in environmental aspects with 13 respondents identifying it provides improved year round ground cover and improves soil organic matter. It also survived the drought well (Table 7).

Table 7. Number of respondents reporting positive experiences with the 3 main perennial pasture species.

Response	Lucerne	Chicory	Phalaris
Survived drought well	15	1	4
Provides feed when nothing else grows	17	2	2
Good feed response from summer rain	18	2	2
Improved organic matter	3	1	5
Improved year round ground cover	5	0	7

- **Negative experiences with perennial pasture species**

Respondents were asked to identify negative experiences they have had with their two main perennial pasture species.

The two main negative experiences for lucerne with 10 respondents each, was its costly to sow and its difficulty to kill prior to the cropping phase. Seven respondents felt it reduced yields in the following crop (Table 8).

There were no major negative experiences with chicory other than its poor survival and its potential to lower crop yields. .

Seven respondents felt that phalaris was costly to sow and five respondents felt it did not survive the drought well which is in contrast to four respondents who felt that it did.

Remark*:*

Phalaris was seen as increasing ground cover whereas anecdotally lucerne has been seen as providing poor ground cover and promoting soil erosion. Several respondents sow chicory with lucerne to potentially reduce red gut in sheep and or soil erosion.

Table 8. Respondents negative experiences with the three main perennial pasture species.

Response	Lucerne	Chicory	Phalaris
Hard to sow (poor establishment)	2	0	2
Poor survival	1	2	5
Costly	10	0	7
Difficult to manage grazing	2	0	0
Difficult to kill for cropping	10	0	3
Lower yield after perennial pastures	7	1	1

Question 5. Stocking rate

Of the 95 survey respondents, 70 run sheep and 29 run cattle with some producers running both. In the east of the region 32 respondents run sheep and 18 run cattle which equates to an approximate ratio of 2 to 1. In the west the ratio is much larger, for every single cattle producer there is approximately 3.5 sheep producers

- **Sheep stocking rates (ewes)**

Over the whole region, the number of sheep varied from 1 to 10 ewes/ha based on the stock carried over the whole farm area. The most common stocking rate was 2 ewes/ha with 41% of farms reporting this carrying capacity (Fig. 3a). The average was 2.1 ewes/ha and this varied from 2.4 ewes/ha in the east to 1.8 ewes/ha in the west. Approximately 80 % of farms in both the east and western areas of the region run up to 3 ewes/ha.

When stocking rates were expressed as the number carried per unit area of pasture, stocking rates were approximately twice as high as when based on the whole farm area with most farms carrying between 3 and 5 ewes/ha (Fig. 3b). A small proportion of farms carried stocking rates as high as 18 ewes/ha.

As a result of the drought the number of ewes run per hectare (whole farm basis) has fallen by 15% from an average of 2.4 ewes/ha pre-drought. The decline was greater in the western region with a 21% drop compared to 9% in the east (Fig. 3a).

The number of farms carrying 3 ewes/ha over and greater the whole farm declined while there was a corresponding increase in the number of farms carrying up to 2 ewes/ha (Fig. 3a).

The number of lambs run per hectare has decreased by approximately 16% down to 1 lamb/ha from 1.2 lambs/ha. This figure is approximately half the number of ewes carried per hectare. The reason for this difference may be a result of some confusion between animals bred and actually sold as lambs.

Remark*:*

The most common stocking rates are relatively low when measured on a whole farm area basis but they increase to around 3-8 ewes/ha when the area sown to crop is removed. A small group of farms maintain relatively high stocking rates of approximately 12-18 ewes/pasture ha. Farmers with these very high stocking rates may be relying on grazing cereal crops over winter or supplementary grain feeding.

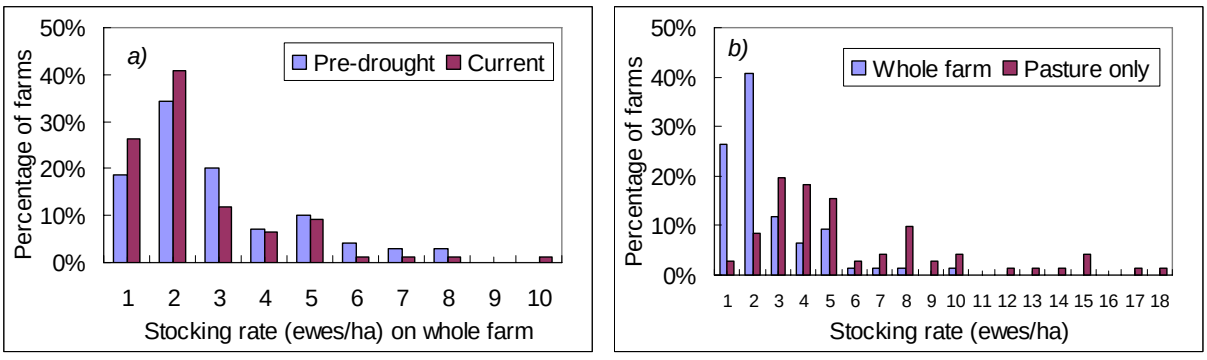


Fig. 3. Percentage of farms reporting nominated stocking rate (ewes/ha) across the whole region

- **Cattle stocking rates (cows)**

Most farms (94%) reported cattle stocking rates of less than 1 cow/ha expressed on a total farm area with 69% reporting a stocking rate less than 0.25 cows/ha. The average number of cows carried across the whole region was 1.1 cows/ha with no real difference between east and west (Fig. 4a).

The number of cows run per hectare has decreased with drought by approximately 16% down from 1.3 cows/ha. In the east the drop has been the greatest with 21% compared to the west with only an 8% fall.

There was also a fall of approximately 50% in the number of steers and heifers carried, however this figure may be less accurate as there appears to be some confusion with farm bred and purchased animals.

When stocking rates are expressed on the basis on pasture area only, there was little change in the number of farms carrying 1 cow/ha but a marked decline in the number carrying 0.5 cows /pasture ha and an increase in the number carrying 3.5-5 cows/pasture ha (Fig. 4b).

Remark*:*

The responses show cattle stocking rates have declined due to drought and are considerably lower in the eastern areas than in the west. It appears that the number of animals grown out or traded has decreased dramatically as producers place greater priority on breeders.

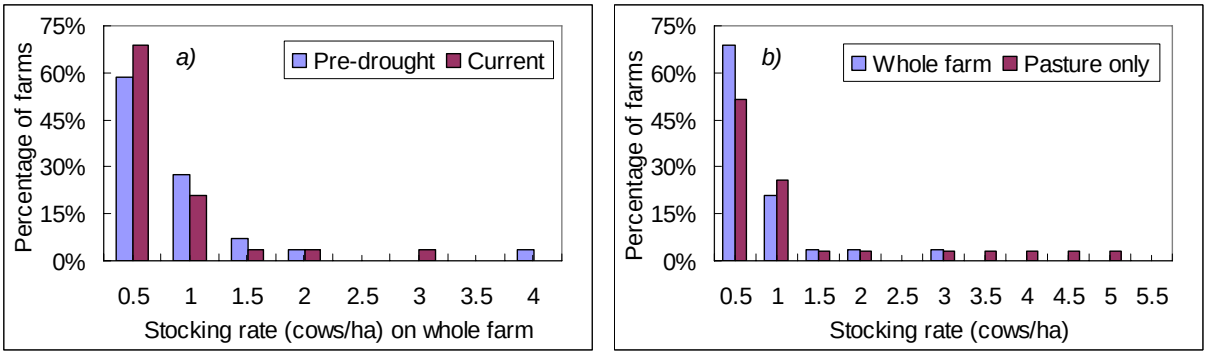


Fig. 4. Percentage of farms reporting nominated stocking rate for cattle pre-drought and currently in whole region

- **Lambing time**

The most common lambing time over the region was April-May with 42% of farms reporting lambing at this time, followed by 31% of farms lambing in July-August. The proportion of farms lambing in April-May was similar across the eastern and western parts of the region. The spring lambing was more spread out in the western region with 16% of farms lambing in July and 13% in August compared to 8% in July and 25% in August in the east. In the west approximately 13% of farms lamb in March compared to 6% in the east (Table 9 and Fig. 5).

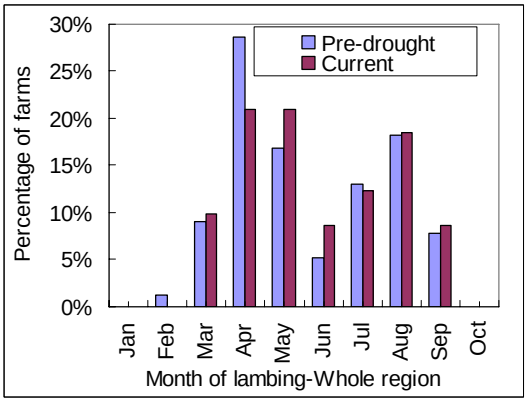
As a result of the drought, there had been a decline in the total number of farms lambing in April and an increase in June lambing in the east and in the west the decline in April lambing was compensated by an increase in May lambing.

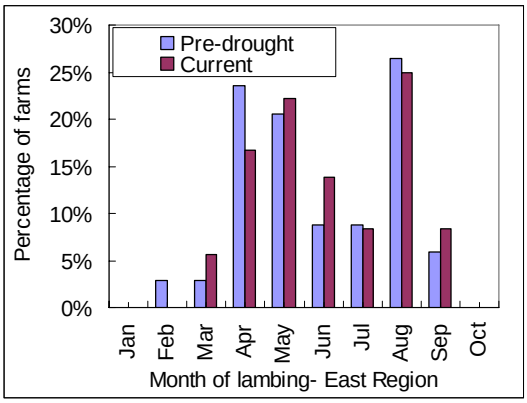
Remark*:*

Responses suggest that lambing time has been delayed in both spring and autumn due to drought. The autumn delay could reflect the delayed start to the growing season and reduced autumn feed that is occurring during the extended drought in the region.

Table 9. Percentage of farmers who lamb in nominated month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Pre-drought	0%	1%	9%	29%	17%	5%	13%	18%	8%	0%
Current	0%	0%	10%	21%	21%	9%	12%	19%	9%	0%





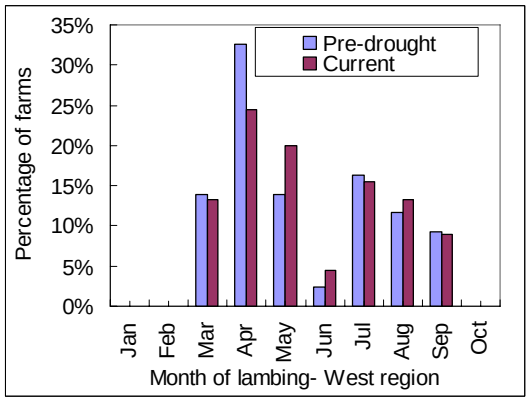


Fig. 5. Percentage of farms lambing in nominated month for each region pre-drought and currently

- **Calving time**

Across the whole region calving was spread between February to October. By far the largest majority of farms calved in August –September with 54% and a smaller number in February with 18%. There was little change due to drought except for 3% of farmers calving in September rather than August (Table 10 and Fig. 6).

Calving in the western region was concentrated in August with 50% of farms calving at this time compared to only 32% in the east. However the number of farmers calving in September was higher in the eastern region at 21% compared to only 7% in the west.

Remark*:*

Calving is concentrated in August-September although there is a more even spread in the eastern areas. The responses show that calving time has been relatively unaffected by the drought other than a small shift between August and September calving in the east.

Table 10. Percentage of farmers who calve in nominated month (calving month) averaged across the region

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Pre-drought	0%	15%	6%	6%	6%	3%	6%	42%	12%	3%
Current	0%	18%	3%	3%	6%	3%	9%	39%	15%	3%

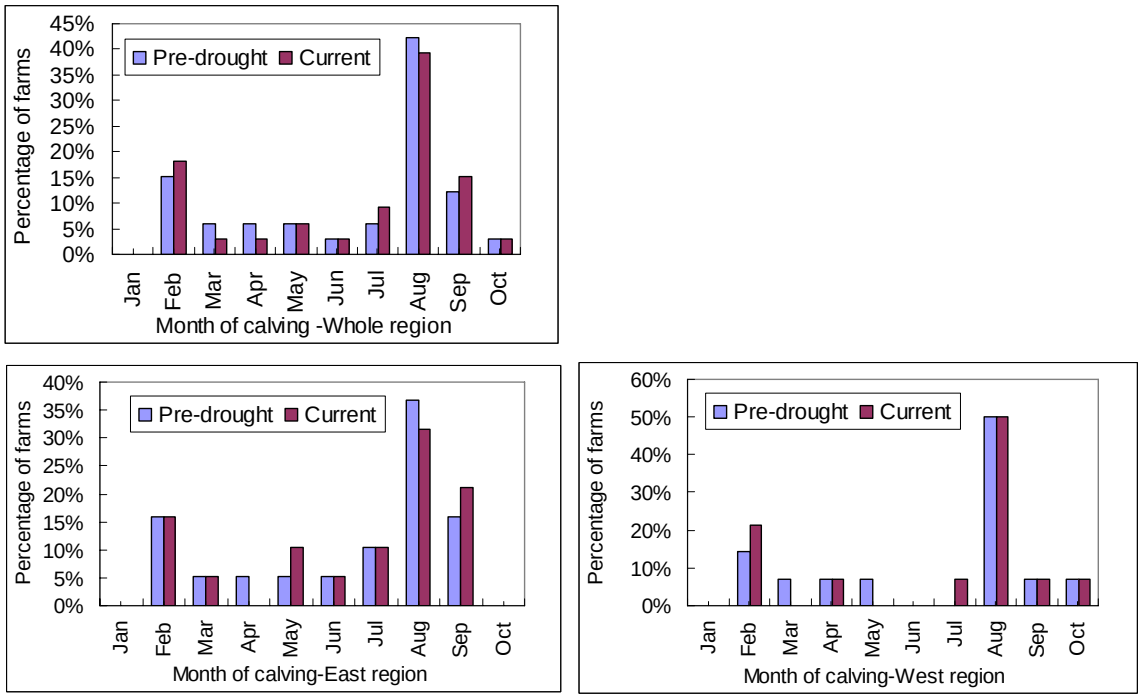


Fig. 6. Percentage of farms reporting calving in nominated month for each region pre-drought and currently

Appendix: EverCrop Benchmarking Survey 2009

Producer experiences

Property Location: closest town = _____

1. Farm	Pre drought	Current	Future
• Percentage of farm sown to crop each year	%	%	%
• Percentage of farm under perennial pastures each year	%	%	%
• Percentage of farm under annual pastures each year	%	%	%
	100%	100%	100%

2. Percentage of perennial pasture area sown to:	%
• Lucerne	
• Chicory	
• Phalaris/Cocksfoot/sub mix	
• Native pastures	
• Other (please indicate)	
Total	100%

3. Do you establish perennial pastures by under-sowing with a crop - please ✓			
Never	**Sometimes**	**Mostly**	**Always**

4. Rank in order reasons for sowing perennial pastures from **1 highest to 6 lowest**	Rank
• Increased stocking rate	
• Improved livestock turnoff weights	
• Reduced the need for supplementary feeding	
• To fix Nitrogen for cropping	
• NRM - Organic matter, ground cover, reduced acidity/salinity	
• Other (please indicate)	

Indicate your two main perennial pastures in A and B	**A_____**	**B_____**
Positive experiences (please tick ✓)		
• Survived Drought well		
• Provided green feed when nothing else grows		
• Good feed response from summer rain		
• Improved organic matter		
• Improved year round ground cover		
• Other (please indicate)		
Negative experiences (please tick ✓)		
• Hard to sow (poor establishment)		
• Poor survival		
• Costly		
• Difficult to manage grazing		
• Difficult to kill for cropping rotation		
• Lower crop yield after perennial pastures		
• Other (please indicate)		

5. Stocking rate (of **total** farm area)	Pre drought	Current
• Number of ewes per hectare		
• Number of lambs per hectare, including purchased		
• Main month of lambing		
• Number of cows per hectare		
• Number of steers/heifers per hectare, including purchased		
• Main month of calving		