

MANAGING PASTURES FOR BETTER SOILS:

PRACTICAL USE OF IMPROVED PASTURES IN CROP ROTATIONS: A NORTH WEST NEW SOUTH WALES EXPERIENCE.

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Abstract: *The use of improved pastures in crop rotations in the Moree area has proved to be beneficial over the last 30 years. A rotation of 5 years cropping and 7 years pasture is used. If lucerne dies, the length of the pasture phase is reduced, but if a good grass/medic/lucerne mix survives, the pasture phase is lengthened. Lucerne and medics are best sown in autumn and the grasses in spring. The best cultivars are: lucerne, Aurora and Pioneer 5929; medic, snail; grasses, purple pigeon and Bambatsi panic. To maintain persistence, the pasture species are allowed to seed down each year. Seed of purple pigeon is harvested on the property when 90 to 95% of the seed is ripe. This rotation system has maintained crop yield, preserved soil structure, improved carrying capacity, reduced vegetable matter in wool, fattened lambs, finished steers, controlled weeds (wild oats, burrs) and evened out some of the "boons and busts" in income.*

INTRODUCTION

Maneroo is a family property of 2220 ha situated approximately 35km south east of Moree, on the eastern fringe of the North West Plains of New South Wales. The soil types range from alluvial loam, merging into friable dark Brigalow clay loam (the predominant soil type). There are also areas of heavy black earth clay plain, and about 120 hectares of light sandy ridge that is still fully timbered (and will remain so). About 1300 hectares have at some stage been cropped. The remaining area is partly cleared and cropped, with the exception of various tree lines, shade trees and four areas of trees for timber.

FARM ENTERPRISES

My father aggregated this holding in 1927-31 and started cropping in 1932, primarily to eradicate wiregrass along the creek areas, and kangaroo grass on the black earth plain. These grasses had increased as a result of continuous overstocking. Originally the cash crops served as a way of paying to clear and clean up the country prior to sowing lucerne. However, as cropping became more mechanised and profitable, it became an integral part of the operation, in conjunction with the sheep.

The combination of dual purpose sheep (Corriedale), cropping and a few cattle continued through until the early 1970's, when the sheep enterprise became less economic. This resulted in a reduction in sheep numbers and a build-up of the cattle herd.

Through observations as an agricultural student, and work experience in England, my father developed a pasture/crop rotation policy on "Maneroo" which has continued to be my prime strategy.

In the days when sheep were the dominant enterprise, lucerne rotation was a satisfactory strategy, although we tended to let the lucerne revert back to some natural grass before cropping recommenced to replenish the organic matter status of the soil. With the change to cattle, problems arose with lucerne pastures which lacked roughage and caused bloat. Also, in the last years of lucerne leys, production declined due to invasion by native grasses. We started experimenting with improved grasses but ryegrass, phalaris and other temperate grasses all proved unsuitable. Ryegrass persisted for a while but had little feed value. At about this time blue-green and spotted aphids wiped out all our lucerne stands.

NEW LUCERNES, CLOVERS & MEDICS

The whole pasture phase had to begin again, with the first priority given to lucerne establishment. The earlier varieties did not persist, but eventually we settled for the variety Sequel, then Aurora and Pioneer 5929. In hindsight, the aphids did us a favour as in my opinion the new varieties are superior to Hunter River in resistance to root diseases and waterlogging. Seedling vigour is better and the new pasture is better able to handle the first summer. Even last year in drought conditions, the two paddocks sown to lucerne have survived.

At the same time as the new lucerne we started experimenting with clovers and medics, finally settling on snail medic as having the best persistence and level of production. I was led to believe that the snail medics would not persist in this climate (600 mm annual rainfall). However, I have one 6-year-old stand which is better now than it was at establishment. I attributed this success to high initial seeding rates (>5 kg/ha) and destocking every year to allow time for

pod set. I then adjust the stocking rate pressure to ensure that the pods are not eaten before they are buried in the soil.

Since the introduction of the newer varieties, I have sown lucerne in every year when the conditions have been good enough to sow a winter cereal crop. By following this simple guide, I have not had one failure to date.

For successful establishment, I feel that there are four major points to observe when sowing pastures:

1. *Seed-bed*. This must be good and firm with a fine tilth on the top. If there is some stubble or other mulch on top, so much the better;
2. *Seeding equipment*. A grass seed box is essential. Mixing lucerne or clover with a cereal and sowing through the grain box wastes good seed. The only plants that will establish are those in the furrows with little soil cover;
3. *Inoculation*. This is essential. Fresh inoculum should be mixed with the seed as close to sowing as possible. It can make the difference between a weak sickly seedling and a healthy one; and,
4. *Cover crop*. This must be sown at a lower rate than normal to minimise competition to the new pasture. You must decide whether your main purpose is to establish pasture or grow a high yielding grain crop.

SUBTROPICAL GRASSES

At the same time as I was experimenting with new lucerne and clover cultivars, I was testing sub-tropical grasses on another site on the property. Good establishments were obtained with Biloela buffel grass, Bambatsi and green panic, and purple pigeon grass. Green panic faded out to the shade areas. Biloela buffel grew well, but was found to be unpalatable and was discontinued. This left us with Bambatsi panic and Purple pigeon grass. Both these blocks were harvested for seed. With the run of dry summers there have been problems with subsequent stands of panic, but Purple pigeon grass has established well on three occasions. This species has proven to be the easiest to establish; it produces a large volume of feed, and responds very quickly to rain. I now have one 6 year- old stand which shows no sign of thinning out primarily due to my policy of allowing it seed once a year. Bambatsi panic is as good or better than purple pigeon grass but is harder to establish due to small seed size. I also feel there is a place for Katambora Rhodes grass, but to date have not managed to establish any worthwhile area.

TIME OF SOWING

Trials conducted by NSW Agriculture at 'Maneroo' over 3 years have shown that autumn sowing is marginally safer than spring sowing. However, in my experience, spring sowing, at about the same time as for grain sorghum, has resulted in good germination and establishment provided competition from summer grasses is minimal.

Lucerne is best sown in autumn/winter and the grasses in spring. This has created some problems in combining the two. I have tried sowing lucerne and clovers into established grass pastures with limited success and have now decided it is preferable to establish the legume first and then

sow the grass through it, a strategy which I tried last spring. There was a very good germination of grass, but most of it died from a lack of rain in late summer. However, I am sure that this will prove to be the best alternative, but only after the lucerne stand has started to thin out. This particular area was 6 years old and probably still thick enough to provide competition for the grass. The long-term aim is develop a mixed grass/medic pasture.

BLOAT IN CATTLE

To prevent bloat problems with cattle in spring, and also get the desired mixture, I oversow oats and barley into lucerne swards in autumn with a seeder fitted with narrow (2 cm) points. Early dry sowing is best to prevent excessive damage to lucerne and to germinating annual medics. Sod seeding probably aids medic germination somewhat, although fields not oversown still have good establishment.

GRASS SEED PRODUCTION

I harvest my own seed as it is not economic to employ a contractor for small areas. By doing it this way I have the opportunity for experimentation and minimise seed cost. Timing is vital for efficient seed harvesting. On my first attempt I took the advice of others and harvested panic and pigeon grass when about 30% of the seed was fully ripe. The seed of both was very damp and had to be spread out on a floor to dry, turning twice daily, and taking 10 days to fully dry out. The following year because of various delays, grass seed was harvested when 60% was fully ripe. There was a small loss due to shattering, but the viable seed count increased significantly. The third time I only harvested the purple pigeon grass and left it until 90-95% fully ripe. At this stage shattering losses were 10-15% with further loss during harvest. However the viable seed count was even better as shown in Table 1.

These tests were conducted on ungraded seed. Note that any loss in yield has been more than offset by the increase in total viable seed. Another advantage was that later harvested seed was less likely to spoilage by heating and was easier to dry.

I have found that by replacing the bottom harvester sieve with 3 or 5 mm perforated sheet metal I can get a sample clean enough to sow without grading. This aids in keeping costs down.

PASTURE-CROP ROTATIONS

At "Maneroo", a ratio of 5 years of cropping to approximately 7 years of pasture (which is the expected life span

Table 1: Germination counts and total viability for purple pigeon grass after 4 weeks.

Year	Stage of harvest ripeness (%)	Fresh germination (%)	Germination of other seeds (%)	Total germination (%)
1	33	19	33	52
2	66	22	38	60
3	90-95	48	32	80

of lucerne) is used. If the lucerne does not last this long I shorten the next cropping phase. The ratio also depends on seasonal conditions. If a good grass/medic/lucerne mix is achieved, I hope to extend the pasture phase further.

LONG-TERM ADVANTAGES OF PASTURE-CROP ROTATION

1. For the past 60 years, paddocks have been cropped on a rotational basis without fertiliser application. In spite of this, our crop yields and quality are still more than competitive with other farms in this area.
2. There has been no problem with soil erosion or loss of structure. Hard pan has not been a problem either.
3. Improved pastures provide at least a 50% higher annual carrying capacity than natural pasture.
4. Vegetable matter in the wool has been kept to low levels by confining sheep to the improved pasture in late summer through to shearing. The improved pasture species have no invasive seeds, and compete well with burrs which are no longer a problem.
5. Prime lambs can be fattened which is not possible on native pasture.
6. High protein pasture allows for early turn-off of steers and also allows heifers to be joined at 14 months as standard procedure.
7. Controlled grazing of pastures minimised wild oat problems in the cropping phase. To date (except for

one small trial), no herbicide has been used for wild oat control which has helped to keep cropping costs down.

8. The mixed enterprise has to some extent evened out some of the 'boom and busts' in each enterprise. Also crops that fail because of drought have some grazing value, and are not total write offs.

DISADVANTAGES

1. There needs to be some modification to seeding equipment, and in some cases, a heavy roller may be an advantage;
2. There will always be some risk in establishing pasture;
3. Pastures do require a sound management strategy to remain productive. If pastures are not destocked and allowed to seed and rejuvenate, their life-span will be shortened. This depends on the intended life-span in the first place; and ,
4. There has to be adequate fencing and water supply to allow livestock to be rotated on paddocks to take full advantage of the improved pasture.

In summary, these few drawbacks are more than offset by the advantages outlined. The ultimate advantage I hope will be that in another 30 years this land will be as sound and profitable as it is today, and was 30 years ago when I first took it over.