

Part three of a three-part series:

# Pasture Cropping: Techniques and Equipment

By Colin Seis

Pasture cropping is a land management technique of sowing crops into living, perennial (usually native) pastures and having these crops grow symbiotically with existing pastures.

The reasons for Pasture Cropping can be very diverse, such as; reducing costs, increasing profit, growing fodder, grain or dual purpose crops (feed and grain), stimulating pasture, repairing soil structure, creating litter and ground cover, and improving soil biological health.

In parts 1 and 2 of this series we looked at the potential advantages of Pasture Cropping and trials carried out by the CSIRO. As well we have covered some of the techniques and land management practices used. In this final part of the series we look at perennial pastures, equipment types and use of Pasture Cropping on organically managed land..

## PERENNIAL PASTURES

Much of the attraction to the early settlers in farming communities in Australia was the rich luxuriant and diverse pasture grass species that existed.

These were, in the main, Australian native perennial grasses that have been lost in pastures because they cannot tolerate the European farming methods that have been applied since settle-

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ment. Some farmers even today do not understand the complex structure of Australian native perennial pastures.

Having said that, Pasture Cropping performs better in Australian native perennial pastures than it does in introduced perennial species.

These native pastures have many advantages for grazing and cropping (most of which have been overlooked for decades) over introduced species. Some of these advantages include:

- Drought tolerance;
- Minimal fertiliser requirements;
- Many are acid soil tolerant;
- Good producers of litter;
- Provide good ground cover;
- Managed correctly they can be very productive;
- Their diversity can provide production year round, and
- Managed correctly they will enhance soil health.

## ADVANTAGES OF PASTURE CROPPING

- Greater profit from combining pasture and cropping production rather than managing as two separate enterprises.
- Maintain existing stock numbers while cropping.
- Improved soil health.
- Improved ground cover with the potential for eliminating soil erosion.
- Improved diversity of the pasture species and the number of perennial grasses in the pasture.
- More efficient use of rainfall and groundwater, which has potential for controlling salinity.
- More efficient use of soil nutrients, especially excess nitrogen, which means that Pasture Cropping has the potential for managing acid soils.
- Improved soil structure.
- Less plant diseases.
- Flexibility and low risk.
- It is a regenerative farming process.

## DISADVANTAGES OF PASTURE CROPPING

- Conventional thinking and training is challenged.
- The need to change,
- Crop yields can be lower, especially in the beginning.
- Initially crops may be more prone to attack by insects.
- The need to change or modify machinery (though this can be offset by selling machinery no longer needed).

## MACHINERY

Never, never, never use a plough. It is very damaging to soil structure and soil biological health. A plough will also kill the very perennial grass species that need to be preserved.

Never use tillage equipment with wide points. These cause too much ground disturbance, destroying perennial grass species and encouraging weed growth.

Most zero till machinery that is used for sowing of crops can be used for Pasture Cropping. The cost of new zero till seeders can be prohibitive but this can be offset in some ways.

Because Pasture Cropping uses minimal machinery (usually a tractor and seeder) old machinery like ploughs scarifiers and cultivators can be sold and the money gained from their sale used to purchase zero till machinery.

Converting existing combines to zero till can be achieved with most combines. The cost of the conversion can range from \$1,500 to \$10,000 depending on whether a complete undercarriage is needed and if press wheels are required.

## THE USE OF SOWING POINTS ON SOWING EQUIPMENT

Sowing points are attached to the end of the tine and are used to create a small seedbed for the seed. Zero tillage points are not designed to invert soil or control weeds but to open a slot and loosen the soil to give sufficient tillage for germination.

The selection of sowing points to be used for Pasture Cropping is very important and can vary depending on the amount of perennial grass present in the pasture and soil type



**LEFT: Colin's son James in a Pasture-Cropped paddock of Yidda oats at "Winona". The crop yielded 2.5 ton/ha having been grazed twice in 2005.**

mum for most soils. This compares with most combines having a kgf of less than 50kgf and most scarifiers at around 130 kgf.

## IN CONCLUSION

Pasture Cropping, like most new management practices, requires some trial and error to find out exactly what techniques work best for what soil type, climate and production purpose.

Since its introduction in 1992 in Australia, Pasture Cropping has been shown to have great benefits way beyond short-term crop yields.

Cost savings and increased incomes have provided significant financial benefits to producers and our environment has benefited from the reduced use of conventional inputs and a healthier and resilient ecosystem.

In addition, the compatibility of cropping with native perennial pastures has led to the rediscovery of the many benefits that Australian native grasses have in agriculture.

More than 1500 people are now farming using pasture cropping methods throughout most states in Australia. More than in organic operations, the Pasture Cropping technique has been employed by conventional landholders who have gradually been able to reduce chemical inputs to zero or near zero levels.

Pasture cropping can therefore provide a more sustainable conversion method or stepping-stone to becoming certified organic in the future.

While organic management practices have been effective in improving the structure and biological health of soils, the practice of ploughing to manage weeds is destroying much of this good work and is a step backwards to achieving quality yields and produce.

When Pasture Cropping on organically managed land, the aim should be to produce as much litter as possible with the principle of using mulch to manage weeds. The best way to achieve this is by cropping in native perennial pastures.

The Pasture Cropping concept, developed by Colin Seis, is special to Australia and is now being employed in some states in America and in Scandinavia. ■

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**The full series on Pasture Cropping will be available soon to download at <www.bfa.com.au> from the Australian Organic Journal archives.**

and structure.

Soil with poor soil structure or with a hard pan will need a point that is more aggressive to improve the soil structure and allow water penetration.

Soil, which is in good condition, will require a point that will not greatly disturb the soil or alternatively sowing discs could be used. As a generalisation, a point that will penetrate deep if necessary (such as a 100 to 125 millimetre knifepoint), yet the width will disturb the soil very little, is suitable for many soil types.

It is important to be aware that the seed being sown should be placed at the correct depth – usually 50mm and not at the bottom of the sowing trench.

## SOWING TINES

The horizontal force required to first move a tine backward as it is passing through the soil is known as breakout force and is measured in kilograms force (kgf).

Sowing tines on conventional combines have been developed to sow into ploughed seedbeds and usually do not have adequate breakout force to sow into pastures.

When combines are being converted for Pasture Cropping it is critical that correct tines are used in conjunction with correct points.

If the tine being used is not adequate for the operation, poor soil tillage and seed placement will result, with the ultimate outcome being poor crop germination and poor yields or even crop failures.

Tine breakout force requirement varies with soil type and condition but a force of 100kgf is usually regarded as the mini-

## ORGANIC CASE STUDY: PASTURE CROPPING ON 'LAKEVIEW'

An A-grade certified organic producer with ACO in the Northern Tablelands region of NSW purchased a block of land in 2001. Extensive soil testing on the property identified low organic matter and very poor levels of soil biology as a major limiting factor to pasture quality and quantity. A program to improve soil biology was implemented with the aim to:

1. Grow some winter oats for feed
2. Increase plant biodiversity – plant 3 grasses, 2 clovers and 2 herbs
3. Increase soil biology – inoculated oats seed with bugs and food
4. Physically aerate the soil with the tynes

Pasture Cropping was used as one of the measures in achieving these aims. Unfortunately as Pasture Cropping

was only part of the treatment; it is hard to quantify the effects of this technique alone. However, while the extent of increased species diversity varied from different sites, it was apparent that Pasture Cropping had a positive influence. According to the property owner

"The combined effects of Pasture Cropping, grazing management and strategic organic fertilizer application have resulted in improvements in all aspects of soil health and condition that have been measured". He also notes "in areas like the tablelands I believe that the Pasture Cropping concept has a lot of merit compared to the conventional planting system with cultivation or chemical application where there is a loss of production for quite a period prior to and after planting as well as a considerable amount of bare ground left between rows".