

## MANAGING PASTURES FOR BETTER SOILS:

# USING WINTER PERENNIALS FOR SOIL IMPROVEMENT AND PROFIT

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*Abstract: Despite a complete soil conservation farm plan, soil erosion, caused by growing crops on conventionally cultivated soil, has proved to be devastating on "Gananny" on the northern slopes of the Liverpool plains. To overcome this problem, no-till farming and a pasture phase in the rotation has been adopted. No-till has been successful on new, friable, well-structured soils, but a failure on over-farmed soils that are compacted, low in humus and lack structure. Requirements for establishing winter growing perennial pastures include: sowing a summer crop (eg. sunflowers); grazing the stubble heavily; killing weeds with herbicide before sowing; and sowing pasture on the soil surface in May after the seasonal break. The gross margin for cattle production from the pasture phase was \$222/ha/yr, while that from traditional long-fallow cropping was \$137/ha/yr. Only long-term grass pastures will restore organic matter, structure, fertility and health back into these over-farmed soils.*

## INTRODUCTION

"Gananny" is situated 80 km west of Quirindi on the northern slopes of the Liverpool Ranges. The soils are all basalt based. The country is steep to gently sloping. The native timbers include white box, kurrajong, myall and boonaree. The native grass species comprise wiregrass, Queensland blue grass, wallaby grass and plains grass.

"Gananny" is a mixed cropping and livestock operation covering 3,520 hectares. The structure is as follows:

- 2,270 ha of native grass country
- 605 ha of phalaris, sub clover, lucerne and woolly pod vetch improved pastures
- 285 - 365 ha of lucerne/sub clover pastures
- 285 - 365 ha of wheat country rotated back to lucerne/sub clover when needed.

The mix of livestock enterprises is as follows:

- 250 breeding cows. Steers sold at 18-24 months
- 3,500 self-replacing merino ewes
- 3,000 merino wethers
- Opportunity to fatten between 100 - 200 steers a year.

## PROBLEMS WITH THE FARMING SYSTEM

Despite a complete Soil Conservation Farm Plan, soil erosion still proved to be devastating under conventional tillage. We adopted no-till farming as our next step to minimise soil and nutrient loss.

No-till has been successful on new, friable, well-structured soils, but has failed on over-farmed soils that are compacted, low in humus and lack structure. Symptoms of this failure were poor germination of crops, low yields and massive water-runoff. The consequence was severe gully erosion even where stubble cover was considered adequate. More recently, cropped soils, which have been no-tilled, have resisted and held water-runoff and exhibited far quicker bacterial breakdown of stubble residues.

## SYSTEM DEVELOPED TO ADDRESS PROBLEMS

A pasture phase and soil renovation techniques were the next strategies we incorporated into our farming system. We converted a John Shearer trashworker to a no-till planter for both crop and pasture. This involved developing our own no-till sowing boot along the lines of Lindsay Ward's Connellan Casting. Our conversion is a Ro-Grow boot much narrower and streamlined for minimum disturbance.

Sheep and spray fallow (when needed), have completely replaced conventional cultivation for the last three years.

All pasture seed is metered into a small hopper and then driven by air to eight deflecting plates at the front of the trashworker. The trashworker is immediately behind the tractor with the Napier 700 hydraulically driven airseeder trailing behind. There is no following levelling bar or harrows.

For successful pasture establishment using our system there are three rules:

1. Pasture seed must not be buried too deeply;
2. Roundup® must be used prior to seeding to eliminate weeds; and,

**Table 1: Ideal pasture mix for Bundella basalt soils.**

|               |                                  |
|---------------|----------------------------------|
| 1.5 kg        | Sirosa or Sirolan phalaris       |
| 1 kg          | Clare long-season sub clover     |
| 1 kg          | Seaton Park mid-season subclover |
| 1 kg          | Dalkeith short-season sub clover |
| 1 kg          | Lucerne                          |
| 1 kg          | Woolly pod vetch                 |
| <b>Total:</b> | <b>6.5 kg</b>                    |

3. Timeliness is essential, sowing during any seasonal break in May being perfect.

The cheapest and most effective method of establishing winter perennial pasture is as follows:

1. Grow a properly prepared, early sown summer crop. Sunflowers which can be harvested by the end of March are ideal for this purpose.
2. Use fast crash grazing of the stubble with sheep to reduce weeds up to the end of April. Avoid having sheep on the country if it rains.
3. When the season breaks, spray the weeds with Roundup<sup>®</sup> and then broadcast the pasture seed. If sown in May or early June, there is no need to cultivate or worry about sunflower stubble. The pasture will be well established and well ahead of the volunteer sunflowers which start to grow in August.

Table 1 gives the pasture mix (expressed in kg/ha) we consider to be ideal for Bundella basalt soils. Note that lucerne, Seaton Park and Dalkeith seem to perform best on the chocolate-brown, sloping earths whereas phalaris, Clare, Woolly pod vetch and lucerne perform best on the black alluvial flats.

All lucerne and subclover pastures are sown under a wheat crop. Undersowing phalaris to a winter cereal is a very patchy and sometimes a disappointing exercise, especially if wild oats are abundant.

## ECONOMIC RESULTS AT "GANANNY"

### Established Winter Perennial Pasture

*Unit:* Steer Fattening - 810 ha

*Criteria:*

- No deaths accounted for.
- Stocking rate at one beast per 0.8 ha for nine months of the year, in a rotational grazing system.
- Average weight gain, 0.8 kg/beast/day. Therefore 216 kg gain per beast per year.
- Buy and sell price @ \$1.25 per kg.
- Labour costs are not included.

*Analysis:*

(a) Buy/sell

|                              |          |
|------------------------------|----------|
| Buy at 300 kg @ \$1.25.....  | \$375.00 |
| Sell at 516 kg @ \$1.25..... | \$645.00 |

|   |                 |
|---|-----------------|
| <b>Therefore gross income:</b>                        | <b>\$270.00</b> |
| (b) Costs per head;                                   |                 |
| Interest @ 0.75% x 16% x \$375.....                   | \$45.00         |
| Animal Health.....                                    | \$5.00          |
| Freight at \$10/trip (sold on farm).....              | \$10.00         |
| Commission, levy and yard dues<br>(5% of 645.00)..... | \$32.00         |
| <b>Total cost per beast:</b>                          | <b>\$92.00</b>  |
| <b>Gross margin / beast:</b>                          | <b>\$178.00</b> |
| <b>Gross margin / ha:</b>                             | <b>\$222.00</b> |

### Traditional Long Fallow Cropping Regime

*Unit:* 810 ha, wheat - sorghum rotation

*Criteria:*

- No weather or insect loss accounted for except hail insurance for wheat.
- No header or trucks owned.
- Rotation consists of two crops in three years, *ie.* wheat (long fallow), sorghum (long fallow), wheat *etc.*
- Assume \$100,000 worth of machinery is owned over and above the steer fattening unit.
- Prices are on-farm prices.
- Labour not included and obviously far greater in this system than the steer fattening unit.
- No value placed here on the environmental cost of soil erosion and continual chemical application.

*Analysis:*

(a) In 3 years

|                                   |                 |
|-----------------------------------|-----------------|
| 3.7 tonne wheat @ \$140.00.....   | \$518.00        |
| 3.7 tonne sorghum @ \$130.00..... | \$481.00        |
| <b>Gross Income (in 3 years):</b> | <b>\$999.00</b> |

(b) Costs per ha for 3 years

|  |          |
|--|----------|
| Harvesting; 7.4 tonne @ \$12.0/tonne.....  | \$88.80  |
| Four sprays @ \$37.00/spray.....   | \$148.00 |
| Eight workings @ \$12.35/working.....  | \$98.80  |
| Fertiliser @ \$37.00/crop (urea).....  | \$74.10  |
| Cartage @ \$6.00/tonne.....  | \$44.40  |
| Insurance; wheat @ 8%<br>(8% of \$518.00).....   | \$41.44  |
| Opportunity interest on \$100,000<br>worth of farming plant for 3 years -<br>\$100,000 x 3 x 16% = \$48,000<br>over 810 ha = Per ha/ cost..... | \$59.26  |
| Seed: \$19.76 for sorghum/ha and \$12.35<br>for wheat/ha.....  | \$32.11  |



|                                |          |
|--------------------------------|----------|
| Total costs:                   | \$586.91 |
| Gross margin for 3 years / ha: | \$412.00 |
| Gross margin for one year / ha | \$137.00 |

### CONCLUSION

In conclusion, I quote Mike Blockey (Veterinary Officer from Victoria) who has made these observations. Consider two extremely different farming systems, that of New Zealand as David and that of the USA as Goliath. New Zealand grazing management adjusts to the seasonal constraints with fodder conservation and fluctuating stocking rates. The end product is dominantly grass-fed, leaner meat.

The USA, or Goliath, system involves very capital intensive and environmentally threatening, large scale grain growing and feedlotting. The end product is fatty, less

healthy marbled meat. There is no doubt that feedlots have an invaluable role, providing meat with factory-like regularity, but we should not follow this path totally.

For a long-term sustainable system, which is more cost effective and less resource hungry, the New Zealand, or David, system of agriculture keeps more soil and water on your property. This is the system which is evolving economically and giving the most satisfaction at "Gananny".

To remedy some of the destruction we have seen on the Liverpool slopes and plains, farmers must consider a legume based pasture phase in their crop rotation. Such a pasture phase will create somewhat of a sponge effect slowing the floodwaters, as the plains grass used to do.

Meanwhile only a long-term grass based pasture will restore organic matter, structure, fertility and health back into these over-farmed soils.