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Too dry? - Pastures in the wheat belt:

Perennial Pastures in the Whole Farm System

Scott Chambers

"Glenoria", Gulargambone

By way of a preface: *"Profit permits and encourages survival"* (Giles and Stansfield, 1980).

A farm manager by definition uses the natural elements of climate (rainfall and temperature), soil and vegetation while also using capital (money and plant), livestock and human resources to manufacture a product that is acceptable and profitable when sold in the market place. It is easy to obtain a myopic viewpoint with these natural resources "to have another twelve months" as owners, accountants, bank managers and creditors require their profit or money.

It will be a fundamental skill of the farm manager of tomorrow that they are able to measure the environmental sustainability of their farming system/s and adjust over the medium- to long-term while still maintaining profitability.

Introduction

After nearly fifty years of cropping our soils in the wheat/sheep belt have become degraded both in terms of their structure and chemical fertility. Plough pans, sub soil compaction, poor aggregate stability, low water infiltration rates, low organic matter, low mineralisation of major essential elements (nitrogen, phosphorous and sulphur) are just some of the specific problems arising from this history.

Perennial pastures (both legumes and grasses) have the ability to address these problems if we put them into a technically sound crop rotation/farming system.

Farm Overview

Our properties lie approximately 55 km south east of Coonamble in NSW, back towards the Warrumbungle mountains.

Soil types

There are four major soil types. These include: black earth, brown clay, red loamy sand and sandy loam.

Natural vegetation

On the clay based soils (black earth and brown clay) myall, rosewood and Belah trees are found along with Plains grass (*Stipa spp.*) and Mitchell grass (*Astrebla spp.*) in areas that have not been disturbed by farming.

The lighter well drained loam/sandy soils have kurrajong, white cypress pine, wilga, box and quinine trees. Spear grass (also *Stipa spp.*) is the dominant native grass.

Native perennial pastures including Queensland blue grass (*Dichanthium sericeum*), red grass (*Bothrichloa macra*) and windmill grass (*Enteropogon acicularis*) are becoming more common.

Farm area

The total farm area is 1170ha, of which 81% (948 ha) is arable. All of the black earth and red sandy loam is arable, while only 72% of the brown clay and 35% of the sandy loam is arable respectively.

Farm Enterprises (1997)

Cropping

- 400 ha wheat (zero till).
- 280 ha wheat undersown with lucerne (zero till).
- 40 ha grazing crops (snail medic).

Cattle

- 120 cow herd - objectively measured based on Angus, Hereford and Santa Gertrudis blood lines.
- November 1996 artificially inseminated 90 cows.
- Progeny were taken out to 18 months for feedlot/slaughter.

Prime lambs

- 1200 head, either breed or purchased.
- Lambs either contracted or sold through winter months via Tooraweenah Prime Lamb Marketing Co-op.

Summary

- 720 ha cropping.
- 450 ha grazing.
- 3440 DSE = 7.6 DSE/ha

Matching soil types to rotations and profitability

Black earths/Brown clays

These soils historically (last 20 years) have a high cropping history, they are very profitable to farm and they respond to zero tillage. Our crop rotation is based on 3 years winter active lucerne (cleaned of grasses and broadleaf weeds each winter) and 3-4 years short fallow wheat.

Red Loam Sand

These soils were first farmed on the properties in the 1940s. They are degraded in structure and fertility. Restoration via cropping is expensive but they are responding to zero tillage.

We do not have a proven profitable cropping rotation for these soils. Low ground cover from the lucerne in conjunction with poor infiltration means lucerne is questionable stand alone pasture. A lucerne/buffel grass pasture would be best with these soils.

Sandy loam

This soil type is not profitable for any cropping (including forage crops). It tends to respond well to summer rains (but with spiny burr grass!) and has poor winter production. We have been trying to get American buffel and Green panic established for the last two years. We have not seen a proven annual legume to complement these grasses.

Issues arising from our farming/grazing system

We have increased our farming intensity (moved from long fallow to short fallow and longer cropping phases) from zero tillage. This has come from a better understanding of water use efficiency (WUE) and rainfall patterns for the Coonamble district. Zero tillage has enabled us to maintain and to improve the structure of our soils to capture the high intensity summer rainfall.

Cereal diseases are common and are likely to become more so due to the retention of stubble and the use of longer cropping phases. The replacement of large amounts (up to 100 kg/ha) of nitrogen provides both cash flow and logistical problems during sowing.

On average, crop yields are now 50% higher than in the early 1980's, with gross margins (GM) improving to around $280/ha. With lower long-term GMs/ha for grazing enterprises (prime lambs $90/ha, cattle $60/ha) than cropping we have concentrated on short term profit taking at the expense of soil structure and (to a lesser extent) fertility.

Our direction - Designing the whole farm (cropping/grazing) system

From benchmarked financial data through the Gulargambone Rural Advisory Service (Hassall & Associates) the farmers with the best returns on investment (10 year average) are coming from farms which have:

- 30% of their total area under a cereal crop;
- 20% under lucerne in rotation; and,
- 50% to native/introduced perennial grasses.

The wheat/lucerne rotation allows us to break disease cycles, replace nitrogen removed in the cropping phase, remove compaction and dry out the soil profile. The perennial nature of lucerne allows for a quick growth response after rainfall, which in turn allows for opportunity fattening of store stock.

The perennial grasses along with providing growth after rainfall allows production from livestock during periods of low rainfall when the lucerne drops its leaf.

Questions still requiring some answers

- the economic restoration of degraded black and red soils.
- the dry matter index for lucerne production and relating this to nitrogen input and hence when to come back into a cropping phase.
- localised dry matter production/mm rainfall for various pastures and linking this to theoretical stocking rates.
- clear cut data showing the economic benefits of the pasture phase to the cropping phase to justify lower GMs during the pasture phase.

References

Giles, T. and Stanfield, M. (1980). "The Farmer as Manager" (*George, Allen and Unwin Ltd.*)