

ECOLOGICAL IMPLICATIONS OF GRAZING SYSTEMS:

ADAPTING PASTURES AND CROPS TO CHANGING TIMES - SLOPES

Owen Whitaker

"Kimvale", Eurongilly, via Junee, NSW 2663

Abstract. The changing face of agriculture has forced me to re-evaluate my approach to running my properties. The lack of markets, falling prices, increased land degradation and lack of flexibility demand that we change, and change quickly. It seems important to me that we approach farm management in a more holistic way. I have chosen to do this by an integrated approach using tree planting, multi-species pasture mixes, slow-release fertilisers and conservative stocking with cattle. I have noted encouraging changes in our pastures and have gained an appreciation of the value of native grasses, trees and shrubs. Changes to traditional farm management systems could provide benefits by preserving native species for use in agriculture, horticulture and medicine.

Eight years ago I made a fundamental decision to radically change the way I ran my properties. Coming to this decision was a challenging and even frightening experience because it necessitated some critical scrutiny of the way I approached agriculture. This decision was not of the nature that almost every mixed farmer churns over in his mind at least once or twice a week, such as, "Should I run a few more sheep or cattle, or put in an extra paddock of crop?". It is the one we all avoid, push into the background or, dare I say, in some cases don't think about it at all, namely, "What is my relevance to agriculture today?". For too long we have taken for granted that most forms of agriculture have an almost sacred reason for existence. No wonder we ignore the issue. It is a pretty scary one.

Recognising the problem

The main points that impacted on myself were:

- No longer is there always a viable market for all the commodity we produce; *ie.* the old bulk, minimum standard items are harder to sell, at discounts or are not wanted at all.
- In static and real terms, falling commodity prices combined with steadily escalating costs means that to keep in the black one has to either produce more and more per hectare, or get efficiency of scale by accumulating more land.
- Production-associated land degradation such as soil acidity, tree decline and rising water tables, are demanding remedies that are becoming less and less affordable.
- There is lack of control and flexibility as one is pushed into courses of action not considered in the past, such as being locked into a program

because of input costs when that program is no longer profitable.

- As a 4th generation farmer, it is a daunting prospect to consider that continuity of land use is no longer relevant to today's agriculture. That is, the land, though well cared for in its time, can no longer support purchase and/or transfer to the next generation.
- To simply sum it up, a holding that would amply support a large family in the past may simply be no longer viable in the near future.

As I saw it, to maintain viability in conventional terms I would have to go into greater debt to:

1. counter production associated degradation (*eg.* liming); and ,
2. accumulate more land and infrastructure to achieve economy of scale.

Developing solutions

A lifelong interest in sustainable farming, coupled with my current aim to produce specific high quality products enabled me to come to the conclusion that, to be relevant to agriculture today, I needed to more positively manage and benefit from natural fertility and production instead of buying it by the bag, drum or semi-trailer load. At the same time I needed to be producing products that I could sell on my terms, not waiting for a buyer to appear and take what was offering.

One of the biggest hurdles facing alternate sustainable farming, is not so much the limited amount of information available, but the total absence of it, from

official sources anyway. Until recently, it was a matter of working with bits and pieces of hearsay and anecdotal evidence. A big help to me was an acquaintance with some CSIRO researchers working in the fields of soil hydrology and biochemistry. Their scientific knowledge filled a lot of gaps in the jigsaw puzzle. The picture that emerged for me was that although our soils were naturally acid, we were significantly contributing to this acidity and disrupting the natural nutrient recycling process done so effectively by soil organisms, deep rooted native plants and non-intensive grazing animals. Gradually, I formed the conviction that we needed to approach farm management in a more holistic way.

All the problems we were encountering, while seemingly random, were developing interconnecting factors. Therefore any plan to overcome these problems must itself consider the interconnection of all aspects of soil fertility and general farm well-being. What emerged was a self-enhancing system to tap into natural fertility instead of relying on artificial inputs. While a return to pre-European conditions was not feasible, somewhere in-between seemed about right.

Tree planting

Tree establishment was a priority and, with the help of Warren Walker of Wariapendi Trees, we planted shelter belts, concentrating on north-south internal fence lines first, then intersecting those with east-west plots, which doubled as subdivision fences to provide better rotational grazing and management. The tree plots were designed as balanced systems themselves with a central row of dominant eucalyptus and casuarinas with two outer rows of mostly leguminous understorey species, like acacias, melaleucas and tagastaste, or lucerne tree. This formed a community of trees in keeping with their natural diversity, and provided a tapered profile which is more effective as a windbreak.

I did not realise at the time just how quickly we would benefit from these plantations. We obtained a good windbreak effect after 2 to 3 years and shade in 3 to 4 years, as well as the fodder potential of 2000 lucerne trees contained in the plots, providing 3 to 5 months of drought rations when needed without harvest, cartage or storage costs. Our tree program is ongoing with milling species and woodlots a future aim.

Pastures and fertilisers

Earlier on, I used the word diversity. This sums up our pasture program, the key to the restoration of our soils. We replaced the clover-dominant annuals with a multi-species mixture of cocksfoot, phalaris, lucerne and rye, plus anything else that wanted to grow naturally and was not noxious. These were sown in the autumn under a cover crop, using a slow release reac-

tive phosphatic rock fertiliser in a dolomite base. The same fertiliser was used in previous crop rotations to build up a non-leaching slow release of phosphates, as well as the calcium and magnesium so essential for plant and animal health and previously depleted by 80 years of farming.

While this fertiliser was low in analysis (less than single super) and lacked water solubility, it produced results that indicated we were on the right track. The formulation of this fertiliser was after soil testing for pH, main nutrients, minerals and trace elements. Among other things, zinc and magnesium were found to be deficient.

The decision to establish the perennial dominant pasture mix was made for several reasons:

1. To provide a balance of nutrient release and uptake, with the grasses utilising the nitrogen of the legumes.
2. To bring up the nutrients leached from the topsoil zone and out of reach of the shallow rooted annuals.
3. To halt and begin to reverse soil acidity by drying up the soil profile and preventing nitrate leaching.
4. Hold the soil surface together, preventing wind and water erosion and stock pugging in winter.
5. Close the green feed gap in summer months.
6. Take advantage of summer rain to provide green pick, instead of cursing the loss of dry feed.
7. Provide biological control by competition with shallow rooted weeds.

Our water problem was tackled by construction of a large dam on our most reliable watercourse and pumping (with solar power) to a tank on high ground, then gravity reticulating to a network of troughs. This gained us self sufficiency in water and, apart from maintenance, eliminated another input cost.

Livestock

The decision to use cattle as our major livestock enterprise was based on much more than personal preference. In fact, cattle have the ability to be the 'front line troops' in sustainable agriculture. They are by far the least intensive grazing animals, leaving a good ground cover to counter erosion while insulating the ground from temperature extremes, enhancing soil biological life and facilitating water permeation and retention.

They are great re-cyclers, randomly spreading ma-

nure instead of concentrating it around camps as with sheep. This increased ground cover and re-cycling of organic material was exactly what our soils needed to increase humus, biological life and, ultimately, topsoil. Some people are of the opinion that you cannot make new topsoil but, if conventional landuse is depleting it at the alarming rate official research indicates, we have to find a way of replacing it, and cattle grazing may be part of the process.

Ecological benefits

My other property is a good example of this theory. Set in foothills, its past grazing history has been moderate to heavy stocking rates, mainly with sheep, in which time it has become overgrazed and somewhat unproductive after just 4 years. During this time it was totally burnt out by the Bethungra bushfires. This property responded amazingly well to moderate stocking rates with cattle only, including strategic "lock up" periods in late spring and early summer.

There has been a noticeable increase in ground cover, with previously bare areas covered through natural regeneration of native perennial grasses, as well as trees and shrubs. I will exclude the trees and shrubs from grazing for a couple of years with temporary electric fencing until they can fend for themselves.

These native grasses and plants have been quite impressive for the feed value they offer considering the place, to my knowledge, has never been supered. While they may not have sufficient protein alone to fatten calves, they really grow out weaners and keep breeding stock fit and healthy. I have produced some handy steers and bullocks from these pastures - one in particular last autumn, which at 30 months dressed 460 kg and returned \$940. General animal health has been excellent with virtually nil mortality, I have regu-

larly calved heifers on these pastures unassisted.

During last spring the diversity of native plants was quite amazing, only several weeks after destocking and following a tough autumn and winter with heavy cattle numbers being run right through. This prompted me to enlist the help of Jeff Burrows, a botanist at Charles Sturt University with a great knowledge of native plant species. He kindly took an inventory, finding no less than 100 species, seventy of which were native, and some of which according to Jeff are rarely found in nearby national parks. Earlier this summer we collected seed from 8 species of native grasses that may have merit for cattle pastures, with the view to reintroducing them to our main property in some specific areas that would suit them.

At this point it is interesting to note that our main property, with a background of intensive cropping and sheep grazing is completely devoid of any of these species, save a few small areas around the house reserved for the milking cow. Whenever ecological degradation makes the headlines it invariably focuses on threatened extinction of animals and birds. During the last 200 years of land use in Australia 12 mammals and 1 bird species have become extinct, compared with 72 plant species, while presently about 64 vertebrates are on the endangered species list compared with some 2,206 native plants.

Conclusions

From my observations, beef cattle production with conservative stocking rates and strategic grazing periods could go a long way towards successful management of our endangered Australian plant species and their dependent ecosystems. This could provide benefits by both preserving our native heritage and an untapped and known treasure of use to the agricultural, horticultural and medical sectors.