SEMI ARID LAND USE

M. Brosnan. Paper presented to the New Zealand Grasslands Association Conference Alexandra – 3 to 6 November 1986

Two very different management systems

A CHANGE IN ATTITUDES TO SEMI-ARID LAND USE IN THE HAKATARAMEA VALLEY

Mr. Chairman, Ladies and Gentlemen,

INTRODUCTION

I am often called a “GREENIE” and feel very comfortable with this title. Now, there are two types of greenies: the type that talks about what should be done - often “the teachers.” Then there’s the ones out there with mud on their hands, proving that conservation systems can actually work. Most of the latter, “the doers”, are not good at articulating their valuable knowledge and experience.

This paper outlines an attempt to turn “Riverside”, our farm, into a conservation demonstration property, within the confines of the prevailing economic situation. In other words to SHOW that conservation methods, or working with nature rather than against, actually works and pays.

Encouraged by past Government Policies, the more progressive ones amongst us have pushed production to the limit. Previously, as Meat and Wool Chairman of North Otago, I opposed Government’s policies of encouraging farmers to produce more and more for less and less. In many cases, under these policies we have pushed the land beyond its sustainable limits, especially under dryland conditions.

High stock numbers, shallow rooting grasses and lucerne which gapped out, created ideal conditions for a massive wind blow. This happened during the recent two year drought. It shifted large amounts of the beautiful Hakataramea Valley out to sea (Cover photo). This recently motivated the people of the valley to set us the Kurow-Haka Resource Conservation Committee to address the crisis and the direction of long-term land management.

BACKGROUND TO “RIVERSIDE” LAND USE

For the last 21 years I have been farming 600 hectares on the dry eastern slopes of the Valley. For a few years I had another 100 hectares, which has since beem sold and the capital invested off-farm. On the 600 hectares we ran 3,700 Corriedale ewes and 900 hoggets. The Corriedales have been sold and we have consolidated at 2,000 Merino ewes and 1,400 drys. We are now looking at a farming system of low cost, low labour and self-sustainability, both environmentally and economically, with some extra capital being generated from the off farm investments.

The property involves two levels of river terrace with steep facing in between. Recent and young soils from greywacke alluvium and loess cover nearly 40% of the property. The balance is derived from older more weathered sediments, some of tertiary age with loess accumulations on sheltered sites. Average rainfall is 430 millimeters. When I shifted to “Riverside” it was being cropped for cereals. The light, shallow soils produced poor yields. These areas were soon sown down in permanent lucerne, and produced excellent hay and pasture. Borderdyke irrigated pasture was developed on the one hundred acre lower terrace alongside the river. This guaranteed hay crops and fattening feed for lambs in a dry summer.

Recently the borderdyke irrigation has been upgraded to more water efficient spray irrigation system. Windbreak tree planting was started but establishment was variable. Success has improved recently with better techniques.

On the south facing slopes clover and grasses were established while the sunny faces supported only weed species. The sunny faces produced some green pickings in early spring, but little else. On the poorest stony areas Hieracium has become dominant.

PREVIOUS PASTURE MANAGEMENT

New Zealand farmers are specialists in developing massive monocultures and pastures with very few species. The downlands of the Haka Valley, a very fertile but recognized drought–prone area, have for many years been largely sown out in shallow-rooting grasses and clovers which cannot survive droughts. With every drought, the ground-cover is lost, and the soil exposed and vulnerable. Large areas of lucerne have also been established, and, although a deep-rooting species, the plants thin out over the years. Although weeds establish between the lucerne plants, these are either sprayed out to keep the paddock 'clean', or they die out in a drought, exposing bare ground. Frost heave or overgrazing and trampling during drought periods loosens the soil surface and the westerly winds blow topsoil from the paddocks.

Over the years, the loss of soil and litter has left the lucerne plants pedestalled. But where patches of couch had spread from windbreaks, soil and litter accumulated and earthworms were surviving.

I realized that if the present methods of farming continued in the Valley, in a few decades there would be no topsoil left. Methods such as destocking, irrigation and shelterbelts have been considered to help overcome this problem. However, destocking is economically unviable, irrigation is a costly and continuous high-energy input which does not get to the heart of the problem, (natural low rainfall), but merely compensates for this.

Shelterbelts are effective but only for relatively short distances from the belt. A whole new philosophy is needed, one which works with nature, accepting the natural conditions of the Haka's climate and that uses an understanding of how the land itself works. Farming methods can then be developed to suit this, using nature's technology rather than constantly requiring more sophisticated and expensive modern human technology.

TRIALLING NEW PASTURE MANAGEMENT STRATEGIES

The first remedy was to stop spraying the weeds from the lucerne paddocks. This reduced costs and the species mix was beneficial for stock health. It made sense to replace the weeds with a productive companion plant to complement the lucerne. This prompted a trip with Alistair Shearer, then of Waitaki Catchment Commission, to the Grasslands Conference at Blenheim in 1982. We were so impressed with work done on Wither Hills integrating Phalaris with lucerne and the resultant ground cover that we came home and immediately set up farm scale trials of as many relatively unknown dryland grasses as we could find. In the autumn, the weeds were sprayed from an old ten hectare lucerne paddock and in the spring twelve different species were over drilled in rows across the direction of the wind.

It is an interesting trial, and has been the site for numerous field days concerning wind erosion, conservation tillage and dryland plant species. Maru phalaris, pubescent wheatgrass and tall oat grass are particularly impressive. Barry Wills and John Begg from the Ministry of Works Plant Materials Centre in Alexandra have been collecting production records from the trials and results are presented at this conference. I have also been making palatability assessments and the trials have been extended, with assistance from Peter Aitcheson of Aitcheson Industries, (direct drilling) and David Musgrave of Dalgety agresearch, (herbage).

Details of this trial are outlined in an accompanying paper by Wills, Begg, and myself

We are introducing earthworms into the top terrace paddocks. Together with Alan Haugh a neighbor, we have acquired a machine for this purpose.

Research on dryland shrub species for soil conservation and browse in Central Otago and the Mackenzie, especially in low soil fertility situations, has been carried out by MWD, prior to 1980, with encouraging results. MWD arenow involved trials at Riverside, especially working with Al Shearer of Waitaki Catchment Bd., and Barrie Wills of DSIR.at Ernscleugh.

During 1984, Alistair Shearer visited the USA on a Churchill Fellowship, to study wind erosion, going right back to the dust bowl area, (Steinbeck's "The Grapes of Wrath") and brought back some further interesting ideas. In particular, the productive use of palatable shrub species, and the management of dryland pasture species as a crop to achieve maximum sustainable production. The latter involves removing no more than 50% of growth at any grazing during the growing season, and no more than 70% after the growing season.

This is one of the major aspects of this system, and it ensures:

- Large healthy plants with a large active root mass.
- Rapid leaf regrowth.
- Early green up in spring
- More stable production.
- Ability to withstand drought and weed competition.
- Leaves sufficient dry matter to protect the plant crown and form a mulch on the soil to nutreants from fertilizer etc, which also slows down the filtration through the soil into the water table and on the the waterways.
- Improve moisture penetration.
- Reduce surface runoff.
- Improve soil moisture retention.

SUNNY FACE TREATMENTS

Observing similar climatic areas in natural grasslands throughout the world, we can find natural adaptations to protect the land. Shrubs which are able to tolerate drought are invariably found in association with dryland grasses. They provide:

1. A canopy giving continuous shelter from winds.
2. They trap moisture around their roots and the surrounding soil.
3. Their deep root systems help to transfer nutrients to the topsoil.
4. Grasses and shrubs work together as a team to help and protect one another.

From a farming perspective, this system has many advantages. If one can establish a grass and shrub cover together, one not only integrates feed and shelter, providing them simultaneously, but also radically increases the feed potential by using the shrubs themselves as browsing fodder. Experiments to look at the farming potential of this system have begun at Riverside in conjunction with the Waitaki Catchment Commission and Ministry of Works and Development, Plant Materials Section, Alexandra.

Trials have been extended onto a sunny face where shrub species have been space planted. These facings, which at present produce almost nothing, could show a massive lift in production with development of appropriate multi-tiered vegetation. During the recent major drought in the Valley, good grass growth could be found only in the shelter of matagouri, briar or coprosma shrubs.

The revegetation programme involves fencing off all sunny faces to separate them from adjoining flat land and other aspects. Where tractor access is possible on these faces, contour lines are being ripped every 2 metres to assist tree-planting and moisture retention. Trials with shrub planting machines and direct seeding of shrub species have been started. Sowing and planting should be carried out during August or March depending on available soil moisture levels.

A mixture of appropriate legumes, grasses, herbs, palatable shrubs and shelter trees will produce standing ‘hay’ for the August/September feed deficit and provide a warm sheltered site following pre-lamb shearing or for kidding and fawning. The mixed cover will also provide fodder for bees, habitat of wildlife, pest predators (including ladybirds for those aphids), protect the onsite soil and provide offsite protection by allowing the adjacent terrace lucerne paddocks to be destocked during the critical spring windblow danger period. The amount of cover will also inhibit rabbit populations. This factor seems to have been overlooked in the current rabbit control debate.

Towards the top of the slope, taller trees such as Eucalyptus and Acacia species are being planted to provide shelter on the adjacent flat terraces. Throughout the slopes, mountain mahogany (cicocarpous montanis) tree lucerne (Tagastaste), tree medic and saltbush shrubs (Atriplex halimus) are being planted at approximately 2 x 3 metre spacings. We are currently obtaining very good growth rates from the saltbush. It is frost-hardy and its growth form is ideal for browsing. Despite these promising factors, we are continuing to try as many different shrub species as we can find (Appendix 1) . A year after establishment of the shrubs, selected seeds and fertilizer are being flown on by helicopter. This delay is considered important to allow establishment of the shrubs without competition from these vigorous plants.

Immediately prior to sowing, a large mob of sheep is used to bare the ground and cultivate the soil surface with their hooves. Suitable mixture of legumes, herbs and grasses will be over sown onto the block. Promising plants identified to date include lucerne, birdsfoot trefoil, yellow sweet clover, canary clover, sheeps burnet, tall oat grass, wheatgrass and cocksfoot. Following oversowing, a mob of sheep will be used again to trample the seed into the soil.

The area will receive only limited grazing for one to two years. Following this, grazing will be determined by seasonal growth rates and will be carefully monitored and controlled to avoid permanent damage to plants. It has been proven that control of rabbits and hares is necessary in the establishment period.

Landscape values are an important consideration in the program. We are trying to incorporate both the planting and fencing patterns with the general flow of the land.

Land Form Fencing : Here I think I need to elaborate on this, a term we have had to make up, as with many of the systems on Riverside. The whole farm is being fenced up into all the different land uses. As I say, a lot of the wind erosion in dry land comes from sheep feeding on the fertile flats, and camping on the sunny faces, transferring the fertility, baring off the face, hence the NW wind arises and fertility and soil is blown out to sea. Also sheep don't like the dark south faces, and the fencing can control them onto this with good growth results. A good example of land form fencing management is an article I cut out of the press recently (Refer: Page : 15)

In relation to the article, we have had up to 100% stipa for twenty years on one large sunny face, and because of the land form fencing, were able to manage it with dry stock or cattle and make money from "this terrible weed." (I mostly don't use the word "weed") Also we could stop it seeding, which contained it within that block. Just another plus from sitting back and studying nature!

SUMMARY

During the recent drought in the Kurow area, shallow rooting grasses, clovers and weeds died, pastures were overgrazed and massive wind erosion problems occurred. Based on my work with the Waitaki Catchment Commission and the Ministry of Works and Development, I have since over drilled more than 100 hectares of lucerne with several drought-tolerant grasses, including wheatgrass, Phalaris, cocksfoot, prairie grass and tall fescue. With assistance from the Waitaki Catchment Commission, more than 2,000 hectares of drought and erosion damaged pasture in the Hakataramea area have been direct drilled with dryland species.

Grazing management has changed. Last spring I started fencing and planting the sunny faces with shrubs, and eventually intend to space-plant the shady faces with multi-use, high value timber species. Land form fencing is an important component of the system. I have cut stock numbers a little to implement this system. We are proving already though, under this changed system that in fact more stock can be run.

The revegetation plan is consistent with the aims of the Resource Conservation Committee which are:

1. To promote a more sustainable land use system.
2. To produce a greater diversity of products.
3. Make the beautiful Haka Valley a better place for animals and people to live, now and in the future.

This form of integrated farming and "working with nature" leads the way to a more sustainable farming system which not only protects the land for today but nourishes it for generations to come.

Thank you for your attention.

Spring 1986

APPENDIX 1

Shrubs under trial at Riverside

Saltbush	Atriplex halimus
Tagasaste	Chamaecytisus palmensis
Mountain Mahogany	Cercocarpus Montana
Tree medick	Medicago arborea
Ceanothus	Ceanothus spp.
Blue bush	Kochia spp.
Canary clover	Dorycrium spp.

Dryland pasture plants under trial at Riverside

Luna Pubescent Wheatgrass	Agropyron trichophorum
Tall Oat Grass	Arrhenatherus elatius
Matua Prairie Grass	Bronus wildenowii
Apanui Cocksfoot	Dactylis glomerats
Wana Cocksfoot	Dactylis glomerata
Roa Tall Fescue	Festuca arundinacea
S170 Tall Fescue	Festuca arundinacea
Granger Birdsfoot Trefoil	Lotus corniculatus
Cascade Birdsfoot Trefoil	Lotus corniculatus
Israel Sweet Clover	Melilotus officinalis
Rere lucerne	Medicago sativa
Maru Phalaris	Phalaris aquatica
Sheeps Burnett	Sanguisorba minor
Pawera Red Clover	Trifolium pratense
Perennial Ryecorn	
Droughtmaster Ryegrass	

STOCK NUMBERS

Year	Corriedales	Merino Wethers	Marino Ewes	Marino Ewe Hoggets	Total
1965	1000				1000
1969	3000				3000
1975	3500				3500
					5000
1980					5000
1982	4000	1000			5000
1984		2400	1000		3400
1985		1000			1000
1987		1500	2000		3500
1988			2650	1000	3650
1989		100	2500	1100	3700

AGRICULTURE 3-11-11

'Worst' pest grass defies eradication

Tim Cronshaw

A South American overstayer is resisting the best attempts of authorities to have it removed from the upper South Island.

Chilean needle grass, a plant pest rated worse than nassella tussock, has bunkered down over 3500 hectares in Marlborough and, at this stage, is restricted to an 80ha property near Cheviot in North Canterbury.

Pest authorities have described the difficult-to-identify scourge as the worst pest plant in New Zealand.

For much of the year the needle grass looks like other pasture species – until October to February, when it sends up seed heads. The corkscrew-shaped seeds can penetrate the skin and eyes of sheep, causing pain and blindness and destroying pelt and meat value.

An infestation north of Cheviot in 2008 on former sheep land which is now a vineyard was the first reported sighting south of Marlborough. Environment Canterbury biosecurity team leader Laurence Smith said other sites could exist in Canterbury.

"There is a strong possibility it could be elsewhere in North Canterbury.

"It was quite widespread in the vineyard then and there have been sheep on the property before it was a vineyard, and we estimate it has been there for at least 10 years."

He said the needle grass was difficult to detect because for long periods of the year it looked like grass, and kept coming up after spraying.

Sneaky seeds: Chilean needle grass is hard to detect because it looks like ordinary grass for most of the year.

"The fortunate thing for us is it has been found in a vineyard and we have been able to preclude stock as sheep are one of the biggest movers of needle grass next to people."

ECan has had some success containing the weed, mostly from glyphosate spraying, and is relying on mowing strips in vineyard rows because chemical use is limited next to grapes. Workers check clothing each time they leave the property and vehicles are washed down.

Models by AgResearch show needle grass has invaded only 0.5 per cent of 15 million hectares of climatically suitable land in New Zealand. AgResearch weed science team leader, Dr Graeme Bourdot, said the weed had occupied only a small part of its potential range, including 1.2 million hectares in Canterbury. Now was the time to act before it spread.

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