

## MIXED SPECIES PASTURES

### Key points

- Mixed species pastures offer a serious alternative to the traditional ryegrass/white clover pasture.
- Advantages include greater productivity, improved animal health, better drought tolerance, and better resistance to insect attack and weed invasion.
- Mixed species pastures can be clover based or lucerne based.
- Lucerne-based pastures could include lucerne, chicory, timothy, tall fescue, grazing brome, phalaris and cocksfoot.
- Clover based pastures could include red and white clover, chicory, timothy, tall fescue, grazing brome, phalaris, cocksfoot, plantain and yarrow.
- Sow seed at only 1-2 cm deep in early autumn or early spring, and heavy roll immediately afterwards to restore moisture capillary action in the soil.
- Rotationally graze whenever possible, except in the final summer before cropping.

A seminar/field day on mixed species pastures and their influence on animal productivity and soil fertility was held by the Canterbury Organic Growers. Presentations were made by Mike Daly and David Musgrave.

### Mixed species or ryegrass/white clover?

Studies have compared the traditional ryegrass/clover pastures with mixed species pastures. One comparison of 15 paired paddocks on the same farms showed an overall average of 11% higher dry matter production from mixed species pastures compared to ryegrass/white clover<sup>1</sup>.

### Pasture productivity

Many studies have demonstrated increased dry matter production from mixed species pastures.

Mike said that although ryegrass does have high dry matter production, adding legumes gives a boost to productivity because of the nitrogen fixation and high feed quality. Adding herbs (e.g., chicory, plantain, yarrow) adds further productivity and quality because of the variety of minerals they can make available to stock. Mike stressed that mixed species pastures are a serious alternative to the traditional ryegrass/clover pasture on the dry east coast of the South Island.

### Pasture persistence and soil fertility

Farmers identified their persistent pastures and when compared to non-persistent pastures it was found that fertility was a key issue: phosphorus and sulphur levels were much higher in the persistent pastures.

### Limitations of ryegrass/clover pasture

The ryegrass/white clover pasture has shortcomings that affect the whole farming system, including poor drought tolerance, susceptibility to grass grub attack

and weed invasion (especially thistles) and problems with endophytes, the fungi that protects the ryegrass from attack by the Argentine stem weevil. Many alternative species do not have these limitations. Ryegrass also goes to seed very quickly compared to other species. On the plus side, ryegrass tolerates a wide range of management and establishes quickly, especially in cool conditions, and the new novel endophytes are reducing the health problems associated with the old varieties.

### Animal productivity

Many trials show increased animal production on mixed species pastures. A trial that just added red clover to a ryegrass pasture gave an increase of 10% for beef stock<sup>2</sup>, a 24% milk production increase<sup>3</sup> and a 24% weaned lamb growth rate<sup>4</sup>. Other mixed species pasture trials show milk production increases of around 16-23% for cows on mixed species pastures<sup>5</sup>. Much of the increase is attributed to the higher legume content.

### Animal health

Health and production problems associated with grazing of perennial ryegrass with endophytes include reduced weight gain, increased dags, flystrike, heat stress and ryegrass staggers<sup>6</sup>. Studies showing that lambs put on considerably less weight when grazing lush, high endophyte ryegrass pastures compared to timothy, tall fescue, low endophyte ryegrass and lucerne suggest that grazing high endophyte ryegrasses puts them under dietary stress which makes them susceptible to internal parasites<sup>7</sup>.

### Mineral levels

A range of species in a pasture can help to balance the mineral status of the diet. Herbs such as chicory and plantain very effectively increase the mineral content of the pasture which can improve animal

performance and reduce the levels of internal parasites.

### **Weed infestation**

Ryegrass pastures are prone to invasion by weeds, such as thistles, when they became open, e.g., after a dry autumn or after grass grub damage. Mixed species pastures are much more resilient. Chicory appears to limit the invasion of Californian thistles, possibly by breaking up the compacted zone below the level of cultivation.

### **Insect damage**

Species such as tall fescue, phalaris and cocksfoot are little affected by grass grub, even when grass grub numbers are very high, whereas ryegrass pastures can be decimated.

### **Financial considerations**

Comparing the returns from a ryegrass pasture and a mixed species pasture showed a net return of 16-25% higher from the mixed species pastures over a three year period<sup>8</sup>. This comparison took into account cost of seed, thistle control, topping costs and grass grub control.

### **What species to use?**

Grass species worthy of consideration include tall fescues, timothy, grazing brome, phalaris, prairie grass, and cocksfoot. Legumes include red and white clovers, and lucerne. Herbs include chicory, plantain and yarrow.

### **Pasture species**

Deciding on the various proportions of the mix is important and for most situations a clover based mixed pasture will be easier to manage than a lucerne based one and will give good performance even in a dry year. However on lighter soils or drier environments it is worth going to a lucerne-based pasture. It is critical to match the grass cultivars to the lucerne cultivars, so that the growth rhythms are similar. If this is not done you are likely to have either grass or lucerne dominating.

Lucerne-based pastures could include lucerne, chicory, timothy, tall fescue, grazing brome, phalaris and cocksfoot. Clover based pastures could include

red and white clover, chicory, timothy, tall fescue, grazing brome, phalaris, cocksfoot, plantain and yarrow.

### **Soil tests**

Before resowing pasture it is advisable to get a soil test to check that macro and micro elements are at optimum levels or ratios for calcium, magnesium, potassium and sodium levels. It is the ratio that is important rather than the amount in the soil. This is the Cation Exchange Capacity (CEC). Phosphate and sulphur should be near to optimal levels as should the trace elements (boron, cobalt, copper, selenium and zinc).

### **Pasture management**

- Sow before the end of March (for South Island east coast region) or in early spring
- Plant very shallow, only 1-2 cm deep
- Heavy roll immediately, on flat land, to restore moisture capillary action in the soil
- Buy high quality seed
- Top once in the second spring to control thistles if necessary
- Rotationally graze wherever possible
- Allow lucerne to reach early flowering at least once per year
- Set stock in final winter before cropping to kill or reduce vigour of pasture.

### **References**

1. Mike Daly unpublished research, 1994.
2. Cosgrove & Brougham, 1988, in Musgrave & Daly 2004.
- 3, 4. Keogh & Thomson 1996, in Musgrave & Daly 2004.
5. Thom et al. 1998, 2002, in Musgrave & Daly 2004.
6. Fletcher et al. 1999, in Musgrave & Daly 2004.
- 7, 8. Musgrave, DJ. & Daly, MJ. 2004. Assessment of the performance of non-ryegrass pasture mixtures. Proc New Zealand Grassland Assoc 66: 279-284.

*David Musgrave can be contacted at [david@fwf.co.nz](mailto:david@fwf.co.nz) and Mike Daly at [naturefarm@xtra.co.nz](mailto:naturefarm@xtra.co.nz)*