

Future Forage Systems Project

Plantain & Annual Clovers Field Day Notes Poukawa, 14th November 2013



Future Forage Systems - Background

The East Coast Future Forage Systems Project provides the opportunity to road-test a range of forage technologies such as lucerne, plantain and annual clovers – both as crops and on hill country. Where possible, this consists of on-farm demonstrations where new options are benchmarked against existing farm practice. Once we understand how these alternatives perform locally, we can look at integrating them into farming systems.

Plantain

At Te Aute three 6-7 ha farmlets were sown on 24 March 2012. The full seed mixes were:

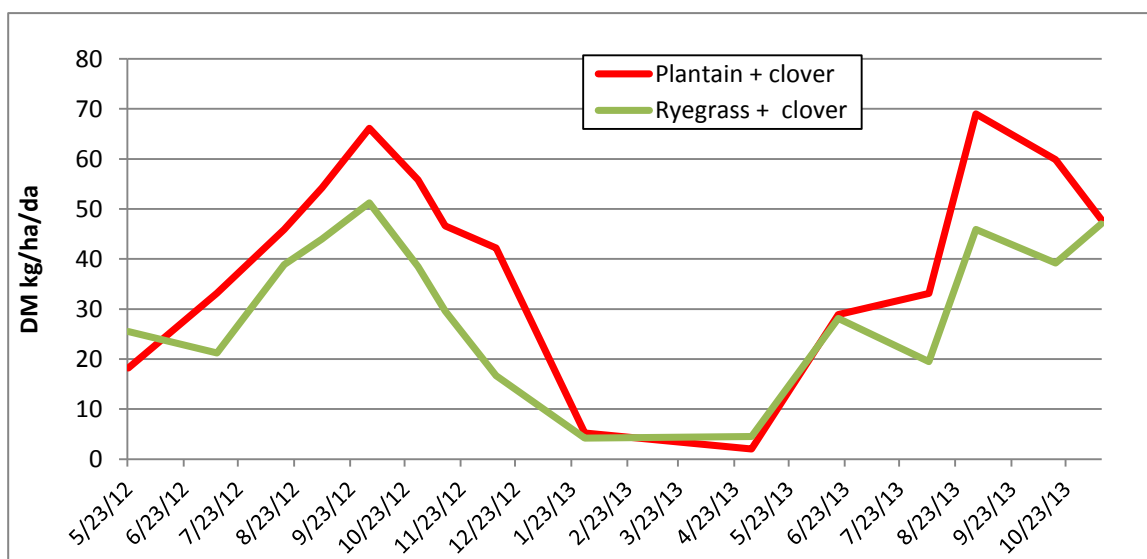
- Plantain/clover - 6 kg/ha 'Tonic' Plantain, 2 kg/ha 'Nomad' White clover, 1 kg/ha 'Tribute' White clover, 2 kg/ha 'Tuscan' Red clover, 6 kg/ha 'Denmark' Sub clover - (Total 17 kg/ha).

- Ryegrass/clover – 20 kg/ha perennial ryegrass ‘Extreme AR37’, 2 kg/ha ‘Nomad’ White clover, 1 kg/ha ‘Tribute’ White clover, 2 kg/ha ‘Tuscan’ Red clover, 6 kg/ha ‘Denmark’ Sub clover- (Total 31 kg/ha).
- Ryegrass/plantain/clover - 20 kg/ha perennial ryegrass ‘Extreme AR37’, 2 kg/ha Tonic Plantain, 2 kg/ha ‘Nomad’ White clover, 1 kg/ha ‘Tribute’ White clover, 2 kg/ha ‘Tuscan’ Red clover, 6 kg/ha ‘Denmark’ Sub clover- (Total 32 kg/ha).

At Te Mahanga, 38 ha was sown on 19th April 2013 with 6 kg/ha Tonic Plantain, 3 kg/ha ‘Tuscan’ Red clover, 3 kg/ha ‘Bolta’ Balansa clover, 3 kg/ha ‘Lightning’ Persian clover, 1.5 kg/ha ‘Nomad’ White clover, 1.5 kg/ha ‘Tribute’ White clover (Total 18 kg). Because of the late sowing, first grazing occurred on 8 August.

Dry Matter Production – In the first year at Te Aute, plantain/clover pastures produced 29% more dry matter than the ryegrass based pastures (10660 vs 8216 kg DM/ha) (Figure 1). The plantain farmlet consistently had more clover. In Year 2, the plantain/clover farmlet has continued to out-produce ryegrass/clover by 16% (9102 kg DM/ha vs 5789 kg DM/ha). In both years, winter growth from the plantain/clover was greater than ryegrass/clover. Production peaked at 70 kg DM/ha/day in September in both years.

Figure 1. Te Aute Dry Matter production (23/5/2012 – 11/11/2013)



At Te Mahanga, plantain/clover growth rates have been between 70 – 85 kg DM/ha/day since early September, producing 8510 kg DM/ha of utilisable feed. Clover content was 19% in August and 45% in October.

Animal Performance - At Te Mahanga, grazing commenced on 8th August 2013. Two mobs of lambs have been moved quickly through the blocks. Some paddocks were skipped due to wet conditions underfoot. As feed on offer increased during spring, additional lambs were added to the mobs. Up until 11 November, 4716 lambs (79,880 lamb grazing days) had been finished on this 38.2 block. Lamb growth rates on the plantain/clover have ranged between 243 and 310 g/day (Table 1). As of 14th November 2013 there are still 880 lambs grazing the block. Dressing-out percentages have consistently been 1-2% higher than lambs grazed on grass (Moata).

Table 1. Te Mahanga - Animal performance and dressing out percentages

	Te Aute (2012)		Te Mahanga (2013)
	Ryegrass/ clover	Plantain/ clover	Plantain/clover
Grazing days/ha	1734	1722	2056
Lamb growth rate g/day	233	273	298
Total lamb LWG kg/ha	403	471	613
Dressing out %	45.0	47.2	48.4
Carcass value/ha (@\$6.00/kg)	\$1,088	\$1,334	\$1,780

Grazing Management for Persistence. Grazing management is critical to maintain plant numbers - timing and severity of first grazing will affect both plantain survival and persistence. When plants are grazed after they have six fully developed leaves (30 cm with Tonic) plant losses are generally less than 10%. Grazing earlier than this increases plant losses and reduces pasture persistence as root reserves will not have built up enough to support post grazing regrowth. As with lucerne, plantain should be rotationally grazed to prevent damage to the crown and to maintain feed quality. Grazing frequency is a compromise between maximising animal production and allowing plants to recover from grazing.

Key Points:

- Graze when plantain has 6 or 7 true leaves. True leaves must be fully or very near full expansion. The first grazing should remove no more than 2/3 of the existing herbage. Leave 6-8 cm behind.
- Grazing should be done to minimise pugging as plantain crowns are very susceptible to damage when ground is wet.
- **Do not set stock plantain**, this will deplete plant reserves and will thin the sward rapidly
- **Learn to graze for residuals.** Frequent grazing (every 2 weeks) from 8 cm down to 5 cm is recommended for best production and nutritive value. Highest lamb live weight gains likely to be achieved when grazing at 8 cm. A rule of thumb that has been used is to graze from top of Redbands to beer can height (not a squashed beer can).

Plantain Summary

- High sowing rates of ryegrass suppress both plantain and clover. In a mixed pasture, the challenge is to establish the optimum mix of grass and plantain so that plantain and clover are not suppressed.
- Apart from a short period during the establishment phase and during extreme summer dry plantain based pastures produced more DM at each cut with a definite winter advantage.
- The growth habit of plantain appears to allow the growth of clovers (this includes red, white, Persian and Balansa clovers)
- At Te Aute, in spite of producing more DM and having higher clover contents, stocking rates were similar. The higher production and quality of plantain/clover simply enabled higher feed intakes and better liveweight gains.

- As well as having higher liveweight gains, lambs on plantain dominant pastures had a higher dressing out percentage, resulting in extra carcass weight per ha. This double whammy of better liveweight gain and a better dressing out percentage meant a \$290/ha advantage over a 75 day spring grazing period at Te Aute. At Te Mahanga, output per ha was even higher probably due to a combination of flat land and annual clovers in the mix.
- With plantain, the big unknown is on-going productivity and persistence. It requires a change in thinking around grazing management and weed control.

New Annual Clovers

These clover species Arrowleaf (*Trifolium versiculorum*), Balansa (*T. michelianum*), gland (*T. glanduliferum*) and Persian (*T. resupinatum*), originate from areas of the Mediterranean and Persia. They are relatively new to New Zealand and are currently being used in a limited way here. They appear to be promising in summer dry areas where white clover does not persist, this is where they are widely used in Australia and the USA. They have very different growth habits to current clovers in New Zealand, this poses management challenges. They have been used across a whole range of dryland, from flats to steep hill country. While some sowings have been successful, most others have failed. There are many questions about these clovers that we do not yet have all the answers for, including:

- Regional, site and soil suitability
- How best to establish these clovers in direct drilling, cultivation and oversowing situations
- Herbicide and insecticide recommendations
- How to best integrate into farming systems
- Should they be treated as an annual with regular re-sowing or can re-establishment from re-seeding be successful

Annual Clovers – Key Points

- **These are niche plants** – Trial small areas before committing to large ones.
- Broadcasting clovers and plantain on to a prepared seedbed, followed by light rolling is very effective in establishing both clovers and plantain.
- During establishment examine seedlings weekly, as competition from weeds and pests can be a significant issue. Spray as required.
- Expect slow establishment during winter with first grazing 120-150 days after sowing. This may affect winter feed supply. Can be successfully grown when sown each year. However, because they are aerial seeders, reseeding is a challenge with stock grazing. Because no-one has specifically let these clovers seed, no successful reseeding seen on the East Coast to date.
- It is not yet known at what date each clover should be closed to enable seed flowering and achieve successful seed set.

Yield and Animal Performance

- Over two years at Poukawa, Persian clover has produced around 8 Tonne of high quality feed in spring (growth rates are 70-90 kg DM/ha/day from August to November). We have

measured yields in excess of 8 Tonne/ha with Arrowleaf at Tom Lowry's Okawa property.

- Lambs on hoggget grew at 294 g/d in 2012 and the hoggets themselves were 13 kg heavier at weaning than their counterparts on ryegrass.

Annual Clover Summary

This is the current state of knowledge when using new annual clovers in East Coast dryland situations.

	Arrowleaf clover	Balansa clover	Gland clover	Persian clover
Tolerance to water logging	Very poor	Good	Unknown	Good
Tolerance to cool/cold winters	Poor	Poor	Poor	Poor
Maturity	Late flowering cultivars should be used	Early flowering limits growth into summer	Very early flowering and maturing – limits usefulness	Late flowering cultivars should be used
Recovery from grazing	Good provided stem extension has not occurred	Very good	Unknown	Very good
Grazing management	Prefers rotational grazing, may tolerate some set stocking	Prefers rotational grazing, may tolerate set stocking	Requires rotational grazing. Do not set stock.	Responds well to rotational grazing. Do not set stock.
Suitability for conservation	Has been successfully used for hay	Unknown	Unknown	Has been successfully used for hay
Growth habit	Weakly crowning, maintains rosette until stem extension if grazed	Scrambling much branched	Erect, weakly branching	Weakly crowning under grazing, erect large leave on long petioles
Companion species	Used successfully with very low rates of annual ryegrass	Used successfully with plantain	Unknown	Used successfully with plantain
Seed set and hardseededness	Unknown	Unknown	Unknown	Unknown
Bloat	Mostly bloat safe as contains high levels of tannins – be cautious	Not bloat safe	Not bloat safe	Not bloat safe

Seed bed preparation: Broadcasting onto a well prepared fine seedbed followed by rolling is the preferred method. If drilled, drill no deeper than 5 mm.

Time of sowing: Sow in early autumn once adequate rainfall has occurred. Note - to achieve late winter production early autumn sowing is required.

Inoculation: All clovers must be inoculated when being introduced into soils that have not supported that clover species before.

Competition at establishment: All are very susceptible to completion during establishment. Good seedbed preparation will reduce the need for post emergence spraying.

Pests: All species are susceptible to a wide range of insect and predator attacks after germination. Persian clover is very susceptible to slugs. Careful and regular monitoring is a requirement along with rapid intervention if required.

Palatability: All annual clovers are very palatable and are preferentially grazed by sheep, this makes them very vulnerable during set stocking.