

Future Forage Systems Project

Plantain/clover Hub Notes Warakaia Station, 31st August 2015



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 will consist 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.

The focus at Warakaia Station is to use plantain and clovers in a one year ewe system to achieve early slaughter of ewes and lambs.

1. Plantain/clover - Woolshed

Establish plantain/clover swards on four 2.5 ha blocks of cultivatable hill country, after roundup spraying and direct drilling. These swards are expected to last 2-3 years.

The objective for these blocks is to achieve rapid weight gains in 1 year ewes and lambs and then slaughter all before the schedule drops in November/December.

Treatments

Seed Mix

- 'Tonic' Plantain (6 kg/ha)
- 'Bolta' Balansa clover 3 kg/ha
- Uncertified red clover 4 kg/ha
- Persian clover 1.5 kg/ha
- 'Mainstay' White clover 1.5 kg/ha
- 'Tribute' White clover 1.5 kg/ha

Seed cost \$236 /ha

Fertiliser

Balansaclover – Nil

WinterStar - 70 kg/ha SOA (Sulphate of ammonia)

Measurements

- Dry matter production compared to nearby pasture using trim technique
- Animal weights on and off and number of grazing days

Timeline

- **5 April 2015** – Sown
- **28 May 2015** – Sprayed 1l/ha Headstart (flumetsulam) and 800ml/ha of arrow (clethodim).
- **18 June 2015** – Plant production measured
- **12 August 2015** – Plant production measured

Results:

Weeds. Post emergence spray for weeds and grasses was undertaken on 28 May 2015.

Insects/slugs. None seen and no apparent damage

Plant establishment. Very slow start following sowing of plantain and clovers

Results – Average DM from plantain and pasture in here

2. Balansa annual clover/plantain and WinterStar annual ryegrass – ex squash

Establish an annual clover mix on 10 ha of cropping land. Area will be subdivided with 3 wire electrics and rotationally grazed. And then sprayed out prior to cropping in October.

Seed Mix

- 'Tonic' Plantain 2 kg/ha
- 'Bolta' Balansa clover 4 kg/ha

Seed cost \$74.50 /ha

Timeline

- **5 April 2015** – Sown
- **28 May 2015** – Sprayed 1l/ha Headstart (flumetsulam) and 800ml/ha of arrow (clethodim).

Measurements

- Dry matter production compared to nearby pasture using trim technique.
- Animal weights on and off and number of grazing days

Results:

Weeds. Post emergence spray for weeds and grasses was undertaken on 28 May 2015.

Insects/slugs. None seen and no apparent damage

Plant establishment. Very slow start following sowing of plantain and clovers

Animal performance. For the plantain/clover – 1.5 ha stocked with 23 twinning ewes 5 days before lambing due to commence. 46 lambs docked @14kg, ewes at docking 65kg. Nil lambing deaths.

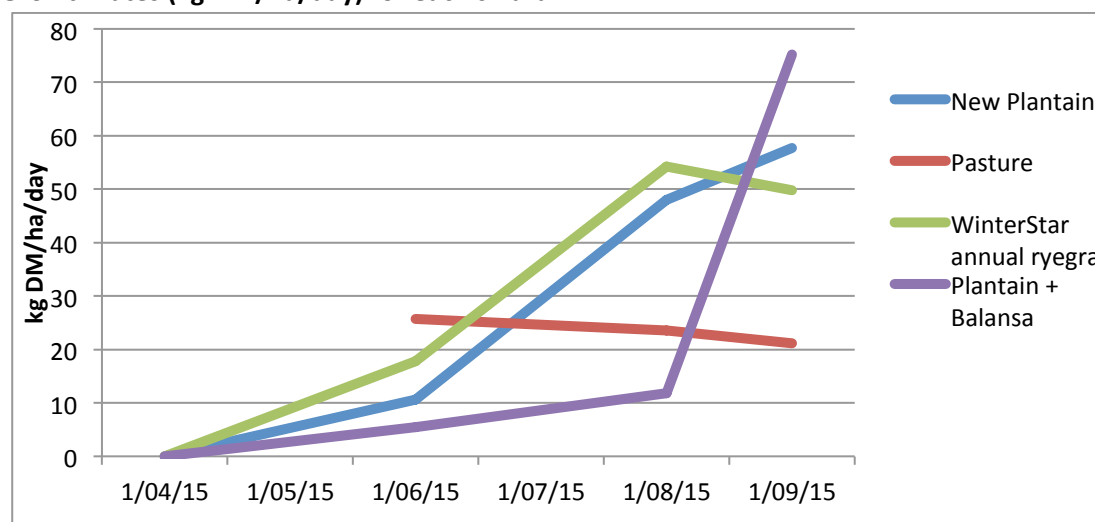
Dry matter production (kg DM/ha) and growth rates (kg DM/ha/day) for each sward

Date Cut	Treatment	Days	Total kg DM/ha	Growth rate kg DM/day
18-Jun-15	Pasture control	63	1616	25.7
	New plantain	63	671	10.7
	Plantain/balansa clover	63	346	5.5
	WinterStar annual ryegrass	63	1121	17.8
12-Aug-15	Pasture control	54	1296	23.6
	New plantain	54	2640	48.0
	Plantain/balansa clover	54	637	11.8
	WinterStar annual ryegrass	54	2981	54.2
14-Sep-15	Pasture control	33	695.0	21.1
	New plantain	33	2481.4	75.2
	Plantain/balansa clover	33	1903.9	57.7
	WinterStar annual ryegrass	33	1644.0	49.8

Percentage of grass, clover, plantain, weed and dead for each sward

Date Cut	Treatment	% Grass	% Clover	% Plantain	% Weed	% Dead
14-Sep-15	Pasture control	61.0	22.8	9.8	4.9	1.6
	New plantain	1.9	66.4	31.1	0.0	0.6
	Plantain/balansa clover	0.3	67.3	31.4	0.0	1.0
	WinterStar annual ryegrass	100.0	0.0	0.0	0.0	0.0

Growth rates (kg DM/ha/day) for each sward



Discussion points:

- Cultivation/establishment techniques
- Weed/insect issues
- Weed control and effect of spaying on production
- Crop rotation and role of annual clovers
- Previous experience with Persian and balansa clovers
- Management for optimising animal performance

Annual clovers - Notes on species and cultivars

Arrowleaf clover (*Trifolium vesiculosum*) Originally from the Mediterranean, Arrowleaf clover is developing a reputation for very good growth in late spring and summer. An annual legume, it is suitable for sheep/beef grazing or hay/silage production. Provides valuable high quality feed over late spring/summer. It is relatively new to New Zealand and has been used successfully in Hawke's Bay for lamb fattening and as a late season hay crop. As a single species during November and December it grew at 153kg DM/ha/day in a Lincoln University experiment. 'Arrotas' produced 9,800 kg DM/ha compared with 3,370 kg DM/ha from subterranean and 1,790 kg DM/ha from white clover. It is widely used in temperate Australia and USA where annual rainfall is below 500 mm. Lamb growth rates of 254 g/day on Arrowleaf only pastures for November to January have been reported from dry land Victorian trials. Does not tolerate cold conditions or wet feet.

Balansa clover (*Trifolium michelianum*)

Balansa clover is a self-regenerating annual clover, with most growth occurring over spring in cold climates but winter growth can be quite impressive in warmer parts of the North Island. It has been used as an alternative to subterranean clover where soils are wet in winter. As it seeds above ground, plants need to be spelled or lightly stocked in the first spring to allow enough seed to be set for future regeneration. The seed shed by plants can require more than one year to germinate, so

plants are not always present in the second winter after planting. Requires careful management to ensure re-establishment from seed.

Persian clover (*Trifolium resupinatum* L. var. *majus* Boiss. (ssp. *majus*)) Persian clover is native to wider Persia (Turkey, Afghanistan, Iraq, Iran) and Greece and performs well in temperate dryland pastures of southern Australia. Persian clover is very tolerant of waterlogged soils during winter and has some tolerance to saline conditions. Very softseeded and prone to false strikes.

In a recent trial in Marlborough Persian clover produced the most amount of dry matter of 8 clovers trialled, growing 19,300 kg DM over 250 days. Very good lamb and ewe growth rates have been reported from Hawkes Bay. When grown as a pure stand phytotoxicity has occasionally been reported in ewes in New Zealand.

Gland clover (*Trifolium glanduliferum*)

Little work has been done with Gland clover in New Zealand. Gland clover can be used as a component of long-term pastures or in the pasture phase of cropping rotations to provide high quality fodder for livestock. Very winter active and extremely early flowering. Poor performer in most trials.

Subterranean clover (*Trifolium subterraneum* L.)

Named for its ability to bury its seed, its seed heads bend and are pushed into the soil surface after flowering, so the plant survives the summer as a seed. As an annual, the plant disappears from pastures during summer. The seeds germinate when rainfall resumes, but some can fail during subsequent dry spells (“false strike”). Different cultivars have different amounts of hardseed.

Subclover is useful in dry east coast regions, particularly in situations too dry for white clover, where it can contribute up to 20% of the herbage during the cool season. However, it is important to minimise grazing during flowering to allow maximum seed set and to use cultivars with an appropriate flowering time to ensure it sets seed before the dry summer. Late-flowering cultivars are best suited to NZ.

Plantain Notes

Establishment and weed control

Plantain should be sown in autumn once sufficient rainfall has occurred. Seed should be sown at a depth of 10 mm at rates of 6-8 kg/ha when sown alone, or 1-3 kg/ha when sown in a mixture (seed size is approx. 500,000/kg). Plantain will also establish when broadcast (followed by rolling) onto a well prepared seedbed. With careful preparation plantain has been successfully oversown into uncultivable hill country, however it is essential that good seed-soil contact occurs and that the existing sward is well controlled or suppressed.

Annual clovers (arrowleaf, balansa and Persian) have been shown to be very compatible with plantain. Larger leaved white clovers should also be considered as they will withstand rotational grazing.

Plantain can be fairly slow to establish and does not compete well with other species with high seedling vigour. A well prepared, weed free seedbed is necessary as post emergence weed control can be difficult. Pre-emergent weed control is important as plantain does not tolerate phenoxy-based herbicides (e.g. 2, 4-D, MCPA, MCPB), diflufenican or flumetsulam, so it can be difficult to control many weed species that may begin to compete with it. Currently there are no labelled recommendations for controlling grasses or weeds in plantain. Good results have been achieved using a mix of Haloxypop-P and Bentazone together with a suitable wetting agent.

Springtails can be a problem as seedlings establish. Careful monitoring (every three days) should be undertaken.

Grazing management

Initial grazing management is critical to maintain plant numbers as the timing and severity of the first grazing after sowing will affect plantain survival and persistence. If plants are only grazed after they have six fully developed leaves (typically 25-30 cm high 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 to support post-grazing regrowth.

Because of its high palatability, plantain will normally be preferentially grazed in mixed pastures. As with lucerne, plantain should be rotationally grazed to prevent damage to the crown and growing points, and to maintain feed quality. Plants should only be grazed down to 8 cm and then left for about 2 – 6 weeks before re-grazing when regrowth should be about 12 - 25 cm high. This translates to pre-grazing herbage levels of 2000/3500 kg DM/ha and post-grazing residuals of 1000/2000 kg DM/ha.

Feed quality and palatability decline with flowering as the proportion of stalk increases. Frequent grazing will minimise the production of seed heads. Animals typically graze the younger, more palatable leaves first. Grazing frequency is a compromise between maximising animal production and allowing plants time to recover from grazing. Frequent grazing (every 2 weeks) down to 8 cm is recommended as a compromise between best production and nutritive value

Persistence: - Few studies have reported contributions of plantain in mixed swards at greater than 15%, 4-5 years after establishment. Plants are lost from the sward through competition from other species and by grazing and damage. If pugging occurs during wet weather, plant populations can be severely reduced. While plantain appears tolerant of hard grazing it must be allowed to recover to 5-7

leaves or 25-30 cm in height, which allows critical root reserves to be replenished. Plantain is very free seeding and, if allowed, seed set over summer can exceed 400 kg/ha. It has been advocated that allowing older, thinner plantain pastures can be rejuvenated by letting them set seed. Bare ground is a requirement for successful reestablishment from seed.

Repeated over grazing and grass invasion are the most common reasons for stand decline. Spraying to remove grasses is generally very successful.

Plantain moth has been a problem in some instances from the second year onwards in the late summer and autumn.. There are no formal recommendations as to when to spray. If many of the newest leaves are being attacked spraying should be considered.

Plantain/grass comparisons

There have been a small number of trials which have compared animal performance on both grass/clover and plantain/clover, these have been summarised below. All have shown an advantage to plantain/clover.

Summary of lamb growth on plantain and pasture

	Lamb growth rate (LWG/day g) on grass	Lamb growth rate (LWG/day g) on plantain	Lamb growth rate LWG/day g advantage to plantain	Lamb growth rate (LWG/day g) on plantain corrected for DO% advantage of 2%	Lamb growth rate (LWG/day g) advantage after DO% correction	No. farms
Lambs on hoggets	229	280	+51 (+22%)	302	+73 (+32%)	3
Lambs on ewes	297	342	+45 (+15%)	364	67 (+22%)	5
Lambs post weaning lambs	190	230	+40 (+21%)	252	62 (+33%)	3

Summary of ewe and hogget performance on plantain and pasture at weaning

	Ewe/hogget weight (kg) off grass	Ewe/hogget weaning weights (kg) off plantain	Ewe/hogget weight advantage (kg) to plantain	Ewe/hogget weight (kg) corrected for DO% advantage of 2%	Ewe/hogget weight advantage (kg) to plantain after correction	No. farms
Hogget at weaning	57.1	61.8	+4.7 (8.2%)	64.5	+7.4 (+13%)	3
Ewe at weaning	66.4	75.3	+8.9 (+13%)	78.6	+12.2 (+18%)	4