LINCOLN UNIVERSITY DAIRY

PLANTAIN ESTABLISHMENT AND GRAZING

Plantain represents an opportunity for LUDF to drop the nitrogen leaching while maintaining current farm performance and profitability. The research on plantain highlights that a significant reduction in nitrogen leaching is achievable at cow intakes of 30% plantain or higher. Overseer modelling suggests this will drop nitrogen leaching from 35 to 26 kg/Ha of nitrogen.

LUDF will embark on a planting program of plantain to achieve 30%+ intakes of plantain by planting swards of plantain at least 10% of the farm every year.

LUDF has sown plantain in the regrassing program for the past 5 plus years. The aggressive growth of ryegrass has outcompeted the plantain at LUDF. We also experienced a very heavy weed burden , especially with dock. In recent years we have had failures with the regrassing, and have had too abandoned the use of plantain so we can use herbicides to tidy up the weed burden. We note the use of Dicamba is now registered for dock establishment in new pasture.
The research on plantain highlights that a significant reduction and nitrogen leaching is achieve able this cow intakes are 30% plantain or higher. To achieve these intakes at LUDF while maintaining plantain plants, we suggest a pure plantain sward will be required. We have modelled 30 % of the farm being in plantain as a pure crop. Then re-grassed. This will ensure that 30%+ of plantain will be in the diet. We note in the research, intakes were variable due to weed burden and the challenges of pasture management and allocation.

Research completed by Omar Al-Marashdeh at Ashley Deane was used in the Farmax Dairy model to assess the impact on the farm program incorporating plantain. Key points noted in Omar's research that have been applied to the Farmax Dairy model:

- The growth rate of plantain is the same as pasture. This was confirmed in the with back calculations of cow dietary requirements (demand) less supplement fed in each trial and also with the use of plate meters .
- Protein levels of plantain are the same as pasture
- 150 KG/HA of nitrogen was used on the low input replicates which is similar to LUDF. The response to nitrogen for plantain was similar to that of ryegrass,

- Growth rates were maintained for two years at Ashley Deane with plantain.

Research on the persistence of plantain is limited. The Ashley Deane work shows that the production was maintained over 2 years. For the modeling we have assumed a three year life of the crop. It has been noted by agronomists that plantain last 4 years when well treated and grazed with no treading damage. We have modelled drilling tetraploid pasture into the crop we should last another further three to five years. Further research well no doubt show us how long plantain or persist the future years.

1. Farmax Modelling

The baseline Farmax dairy model is the 2020/21 season, revised 30th March. Adjustments made to this model to assess the impact of plantain:

- Regrassing pushed out to March for best results with plantain.
- Nitrogen eased in the late spring, more used in the autumn to cover the regrassing.
- Total nitrogen use is similar.
- Extra silage needed in the autumn to cover the regrassing area. Less was used in the spring due to regrassing time. Total used for the season is the same.

Category	Description	LUDF DSM 202021 Revised Mar	LUDF DSM Plantain 2021 Rev	Difference	
Farm	Effective Area	160	160	0	ha
	Stocking Rate	3.5	3.5	0.0	cows/ha
	Comparative Stocking Rate	76.0	75.9	-0.1	kg Lwt/t DM offered
	Potential Pasture Growth	18.6	18.6	0.0	t DM/ha
	Nitrogen Use per total ha	161	154	-7	kg N/ha
	Feed Conversion Efficiency (offered)	12.6	12.6	0.0	kg DM offered/kg MS
Herd	Cow Numbers (1st July)	556	556	0	cows
	Peak Cows Milked	556	556	0	cows
	Days in Milk	280	280	0	days
	Avg. BCS at calving	5.1	5.1	0.0	BCS
	Liveweight per total ha	1,641	1,641	0	kg/ha
Production	Milk Solids total	274,684	274,851	167	kg
(to Factory)	Milk Solids per total ha	1,717	1,718	1	kg/ha
	Milk Solids per cow	494	494	0	kg/cow
	Peak Milk Solids production	2.30	2.30	0.00	kg/cow/day
	Milk Solids as % of live weight	104.6	104.7	0.0	%
Feeding	Pasture Offered per cow *	4.9	5.0	0.0	t DM/cow
	Supplements Offered per cow *	0.4	0.4	0.0	t DM/cow
	Off-farm Grazing Offered per cow *	0.9	0.9	0.0	t DM/cow
	Total Feed Offered per cow *	6.2	6.2	0.0	t DM/cow
	Pasture Offered per total ha	17.3	17.3	0.0	t DM/ha
	Supplements Offered per total ha	1.7	1.6	0.0	t DM/ha
	Off-farm Grazing Offered per total ha	5.3	5.5	0.2	t DM/ha
	Total Feed Offered per total ha	24.2	24.4	0.2	t DM/ha
	Supplements and Grazing / Feed Offered *	20.4	20.4	0.1	%
	Bought Feed / Feed Offered *	9.6	10.0	0.4	%

			LUDF DSM 202021 Revised Mar	LUDF DSM Plantain 2021 Rev	Difference
Revenue	Stock	Net Milk Sales - this season	1,830,450	1,831,563	1,113
		Net Livestock Sales	87,388	87,513	126
		Total	1,917,838	1,919,077	1,239
	Crop & Feed	Capital Value Change	-3,200	0	3,200
		Total	-3,200	0	3,200
	Total Revenue		**1,914,638**	**1,919,077**	4,439
Expenses	Wages	Wages	160,080	160,080	0
		Management Wage	46,920	46,920	0
	Stock	Animal Health	71,760	71,760	0
		Breeding	27,600	27,600	0
		Farm Dairy	9,936	9,936	0
		Electricity	22,356	22,356	0
	Feed/Crop	Feed Crop	8,640	14,640	6,000
		Bought Feed	69,789	74,765	4,976
		Calf Feed	3,514	3,514	0
	Grazing	Grazing	272,558	272,558	0
	Other Farm Working	Fertiliser (Excl. N)	35,680	35,680	0
		Nitrogen	42,400	40,643	-1,758
		Irrigation	64,000	64,000	0
		Weed & Pest Control	3,840	3,840	0
		Vehicle Expenses	12,800	12,800	0
		Fuel	12,800	12,800	0
		R&M Land/Buildings	59,200	59,200	0
		Freight & Cartage	1,600	1,600	0
	Overheads	Administration Expenses	24,000	24,000	0
		Insurance	16,000	16,000	0
		ACC Levies	4,800	4,800	0
		Rates	12,800	12,800	0
	Total Farm Working Expenses		**983,073**	**992,292**	9,219
	Depreciation		0	0	0
	Total Farm Expenses		**983,073**	**992,292**	9,219
Economic Farm Surplus (EFS)			**931,565**	**926,785**	-4,780
Farm Profit before Tax			**931,565**	**926,785**	-4,780
Farm Profit per ha before Tax			**5,822**	**5,792**	-30

2. Planting Program

The target is to plant 10% of the farm a year in plantain every year. Planting of the crop will be in approximately 8 Ha areas (depending on paddock size). The first paddock planted as soon as pasture growth exceeds demand (approx. 15th October). The 2nd paddock will be planted as soon as the 1st paddock is contributing to the feed growth on farm, (2,000 kgDM/Ha or higher). The planting program:

1. Paddock Selection, avoid the high Dock population paddocks.
2. Soil temperatures, 10 degrees and rising.
3. Spray paddocks with high rates of Glyphosate (5 l/Ha) + 900 mls Starraine Extra + pulse.
4. 2 week plant back.
5. 2 l/Ha Glyphosate the day of planting.
    - Direct Drill:

Ecotain plantain 10 kg/Ha

Medium leaf White clover 2 kg/HA

Slug bait used if high risk / Trash evidence of slugs with slug board placed after first spray.

- Herbicide to tidy up Dock seedlings, @ 4-6 true leaf plantain.

  Dicamba 400 mls/Ha "Kamba 750 Nufarm"

  28 day plant back.

IF dicamba used, will be prepared to re-establish clover.

Or T-Max (not preferred) – last resort, also good for Californian thistles.

1 Year plant back for clover.

- Graze when plant is established and not pulling.

Agronomy for LUDF supported by Agricom.

3. Planting Plan

- Aiming for 30% of daily diet.

1st 3 years.

- Will plant 10% of farm as pure sward pa.
- Another 3-5%. 2-3 paddocks

Pure stand, may not get the plant effect from plantain to the plant's full potential (science to be confirmed).

- Will plant 13-15 % of farm per annumn in plantain / clover.
- IF lasts 3 years, will be 40-45 % of farm in plantain/clover, which should guarantee the 30%.

End of 3 years. Will review, ease back on planting area based on composition of plantain/clover mix and persistence of sward.

4. Grazing Plan

The aim is to get in excess of 30 % of the cows diet in plantain to achieve the environmental outcomes from Ecotain. With 10% of the farm being planted every year, this will take three seasons to get cows upto 30% of their intake. The grazing plan will require approximately 8 hours a day for cows to be in the plantain paddock.