NORTHLAND NATURALLY
FIRST REGION OF NEW ZEALAND

Northland Pastoral Extension Research Stocktake

Opportunities for Sheep & Beef Production in Northland

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1.0 Comparison of Autumn/Winter with Spring Pasture for Growing Beef Cattle

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Published in Proceedings of the New Zealand Society of Animal Production, 1986, Vol 46 pp 145 -147

Introduction

Earlier work has suggested that cattle growth rates on autumn pasture was less than that on spring pasture given the same herbage allowance. The differences were assumed to be due to higher digestibility of spring grass compared with autumn pasture. Because Northland experiences relatively high pasture growth rates over the autumn/winter period and lower spring growth relative to elsewhere in the country this trial is particularly relevant to Northland farmers.

Design

The trial was run on the Punakitere Trial Area (10km west of Kaikohe). The trial area was divided into 9 blocks of 2 – 4 ha to accommodate varying dry matter allowances. In each seasonal period, 5 groups of Angus steers were offered allowances ranging from 2.0 – 11.0 kgDM/100kg lwt/day. The same animals were used for both seasons within each year. Between the autumn/winter and spring seasonal periods in each year animals were grazed in a single mob and offered 5 kgDM/100kgLWT/day in 3 – 4 day breaks.

Yr	Season	Months	Duration Days	Mean Initial LWT (kg)	Herbage allowance (kgDM/100kg LWT/day)						
1	Autumn/ Winter	Jun/Jul	64	220	2.0	3.5	5.0	6.5	8.0		
2	Autumn/ Winter	Apr/Jun	68	169	2.0	3.5	5.0	6.5	8.0		
1	Spring	Oct/Nov	52	293			5.0	6.5	8.0	9.5	11.0
2	Spring	Oct/Nov	70	211	2.0	3.5	5.0	6.5	8.0		

Animals were fasted for 18 hours at the start and end of each period. Cattle were orally drenched approximately 3 weekly (Nilverm). Pre and post grazing covers were estimated by calibrated visual estimates. Samples of pasture were cut ahead of the cattle and analysed for *in-vitro* digestibility and N concentration.

Results

Pasture Quality

Results of the pasture analysis:

Year	Season	*In-Vitro* Digestibility (%)	N Concentration (g/kgDM)
1	Autumn/Winter	77.6	31.6
2	Autumn/Winter	69.7	35.0
1	Spring	77.7	26.6
2	Spring	76.3	20.5

Nitrogen concentration was higher in autumn/winter pasture than in spring pasture in both years. Digestibility was lower in autumn/winter of year 2 than in any of the other three periods.

Liveweight Gain

The relationship between daily allowance and liveweight gain showed similar results within the same seasonal period, but daily liveweight gains were much higher in spring than in autumn/winter at the same allowance.

The equations for the 2 curves are:

Autumn/Winter:

LWG = 0.48 - 1.37*$0.65^{allowance}$ (R^2 = 0.95 approx)

Spring:

LWG = 1.09 – 2.82*$0.45^{allowance}$ (R^2 = 0.94 approx)

This table shows the effect of season on liveweight gain at varying drymatter allowances.

	Herbage Allowance (kgDM/100kgLWT/head/d)				
	2	**3.5**	**5**	**6.5**	**8**
Autumn/Winter	-0.01	0.25	0.37	0.43	0.46
Spring	0.52	0.92	1.04	1.07	1.09

These formula indicate that at infinite intake allowance, daily liveweight gain in the spring would be more than double that in the autumn/winter. The predicted allowances required for maintenance in the spring (1.2 kgDM/100kg LWT/d) are half those required for maintenance in the autumn/winter (2.4 kgDM/100kg LWT/d).

Discussion

Explanations have been suggested for this apparent difference in animal performance between the seasons specifically; digestibility and utilisation differences.

In this trial better animal growth on the spring pasture compared with autumn/winter pasture was not associated with differences in *in-vitro* digestibility. Where *in-vitro* digestibility did differ (between autumn/winter in years 1 & 2) the response in liveweight gain to herbage allowance did not differ.
The trial also showed no consistent differences between apparent utilisation in the different seasonal periods.

This trial shows that pasture allowances required for maintenance or for maximum growth rates of beef cattle in the autumn/winter are higher than in the spring period. Maximum animal growth rates during autumn/winter are only half those obtainable in spring.

Consultant Observations:

The trial highlights the difficulty we have in growing cattle in the autumn period and demonstrates that pasture digestibility is not a contributing factor. Farmers need to consider poor autumn growth when setting liveweight targets for all livestock.

2.0 The Effect of Sheep and Cattle Grazing on a Mixed Ryegrass/Kikuyu/White Clover Pasture

G J Gould (Ruakura Soil and Plant Research Station, Hamilton)
Published in Proceedings of the New Zealand Society of Animal Production, 1981, Vol 41 pp 95 - 100

Introduction

High pasture yields have been obtained from mixed swards of kikuyu, ryegrass and white clover, however farmers dislike this combination because of problems associated with species dominance and the belief that nutritive value of kikuyu is low. A five year trial was launched in 1970 at the Dargaville Experimental Farm to compare performance of these pastures under cattle and sheep grazing.

Design

Pastures of kikuyu, perennial ryegrass and white clover (with some annual poa and paspalum) were divided into 24 paddocks and stocked with either Romney wether hoggets or Angus steers. The sheep and cattle were stocked at high and low levels through the year (Table 1) and were maintained on an 18-day rotation in 4 treatment groups. No supplements were fed and treatment groups were replaced each spring. Animals were weighed monthly and fleece weights were recorded.

Table 1: Experimental Stocking Rates (animals/ha)

	Stocking Rate	Oct-May	Jun-Sep	Annual Mean
Cattle	High	12	4	9
	Medium	8	3	6
Sheep	High	60	20	45
	Medium	40	15	30

Results

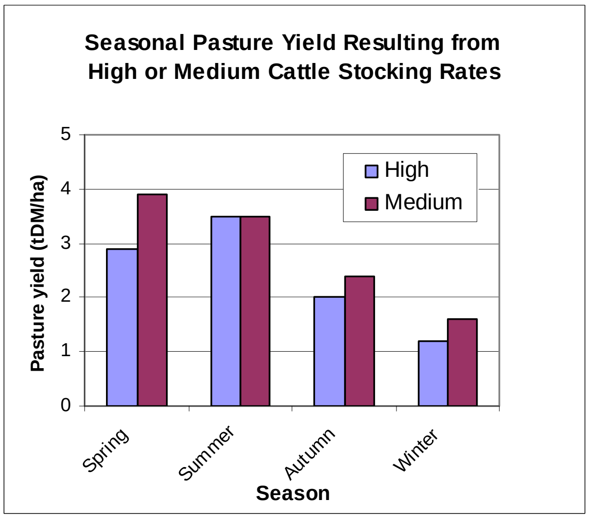
Pasture Production under the cattle treatment was higher yielding than the sheep treatment over the 5 years (18% mean annual advantage). This seasonal advantage occurred in the summer/autumn periods when kikuyu growth was active. Yields in winter and spring were similar for cattle and sheep grazed treatments (Fig 1), although stocking rate had a greater influence on winter yield of sheep grazed pastures than those grazed by cattle (Table 2).

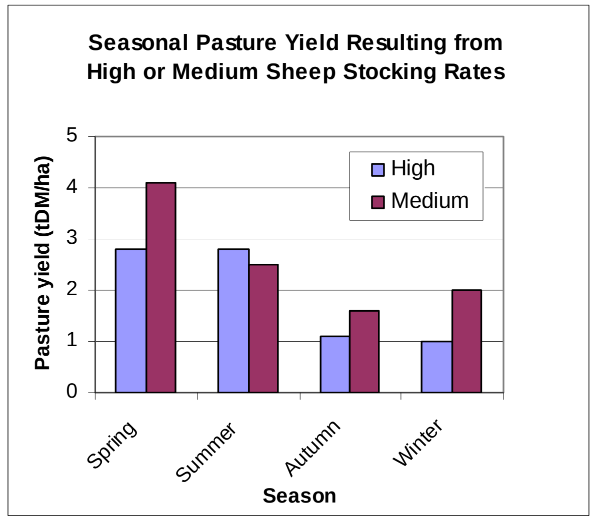
The higher stocking rate was associated with lower pasture yield in all seasons, except summer, reducing the annual yield by around 25%.

Table 2: The seasonal and annual yields of ryegrass/kikuyu pastures grazed by sheep and cattle (means of 5 years data)

	Stocking Rate	Pasture Yield (tDM/ha)				
		Spring	Summer	Autumn	Winter	Total
Cattle	High	2.9	3.5	2.0	1.2	9.6
	Medium	3.9	3.5	2.4	1.6	11.5
Sheep	High	2.8	2.8	1.1	1.0	7.7
	Medium	4.1	2.5	1.6	2.0	10.2

Fig 1: Seasonal Pasture Yield under High or Medium Stocking Rates (sheep or cattle)





Botanical composition in the spring was strongly affected by grazing treatment. Sheep grazing resulted in pastures with a higher component of perennial ryegrass and annual poa but less kikuyu compared with cattle grazing. The increase in ryegrass component occurred within the first year. White clover was variable through the years. Stocking rate had a major impact on the kikuyu and ryegrass component, with the higher stocking rate resulting in more kikuyu and less ryegrass (Table 3)

Table 3: Botanical composition of pastures in spring of year 5 (final year) of experiment (% cover hits)

	Stocking Rate	Pasture Species (%)			
		Ryegrass	Kikuyu	Poa annua	White Clover
Cattle	High	4	24	42	13
	Medium	13	10	45	19
Sheep	High	7	12	57	12
	Medium	22	5	48	13
SE of Diff		3.7	4.4	5.4	4.0

Animal Production has been outlined in Table 4. Animal performance was sharply reduced in the high stocking rate treatment; medium stocked cattle gained 210 kg/hd compared with higher stocked cattle gaining 115 kg/hd (80% less). Sheep performance per head was also reduced by 40% in the high stocking rate treatment (26 kgLW gain/head versus 19 kgLW gain/head). Wool production was depressed at the higher stocking rate. Sheep gained more liveweight per hectare under the higher stocked system, compared with cattle, which gained less liveweight/ha under the higher stocking rate.

Table 4: Animal production from sheep and cattle grazed on pastures of ryegrass/kikuyu (mean of 5 years)

	Stocking Rate (animals/ha)	Wool kg/ha	Gross Meat (kg LWG/ha)	Growth Rate (kg LWG/head)
Cattle	9	-	1038	115.3
	6	-	1258	209.6
SE of Diff				13.2
Sheep	45	225	837	18.6
	30	175	774	25.8
SE of Diff				1.84

Discussion

This experiment demonstrates how the balance of a perennial rye, kikuyu and white clover pasture can be altered by the type and stocking level of grazing animals. Cattle grazing encourages kikuyu and reduces ryegrass in pasture, especially at higher stocking rates. This change in pasture species gives swards a comparative advantage during summer and autumn and an overall pasture yield advantage of 18% over sheep grazing. It is interesting to note that other trials with an absence of sub-tropical grasses showed higher pasture production from sheep grazing than cattle. To maximise the yield advantage of kikuyu dominant pastures under cattle grazing some management changes, such as later calving, may be appropriate. Stocking rate appeared to have little effect on pasture growth rates over the summer when kikuyu was actively growing, with the high stocking rate actually increasing pasture growth rates over this period. This is thought to be due to increased nutrient cycling, particularly of nitrogen and there may be scope to use nitrogen over the summer months.

The higher sheep production/ha under the high stocking rate suggests that sheep may be able to exert greater grazing pressure on the mixed pastures than cattle. This also demonstrates the high production which can be generated on kikuyu pasture with the ability to vary stocking rate through the year. Farmers need to allow for seasonal trends in livestock prices as well as pasture growth.

3.0 Intensive Beef Systems

Colin Page (Agricultural Consultant, Whangarei)
Published as Final Summary of a Sustainable Farming Fund Project
http://www.maf.govt.nz/sff/about-projects/pastoral-farming /00322-final-report.htm

Introduction

This paper summarises data collected from participating farmers on the relationship between some of the key management variables (such as stocking rate, mob size, frequency of shifting, breed, rearing systems, soil type and soil fertility levels). The paper also summarises best practice management for intensive beef farming and establishment.

Findings

Most Intensive Beef Systems (IBS) have been run with bulls derived from the dairy-beef industry (often Friesian or Friesian cross).

Key findings include:
- A pasture cover of 2000 kgDM/ha in May is needed to achieve a starting weight of 750kg per ha, which allows winter liveweight gains above 0.6 kg/head/day
- Ideally pasture covers should be at their lowest in September to ensure high quality feed for rapid spring liveweight gain
- Good soil fertility levels (Olsen P >30) are essential to maximise winter pasture growth rate of 20-30 kgDM/ha/d
- Application of nitrogen is vital to ensure initial stocking rates are 800 – 1000kg liveweight/ha. 100 kg N/ha is recommended in 2 – 3 applications
- Combining short rotation ryegrass and nitrogen will enable winter pasture growth rates of 30 – 40 kgDM/ha/d giving the potential to achieve 1000 kg LWG per hectare
- Winter rotation length should be maintained at 40 – 50 days, generally longer winter rotations give the best results.
- Most farmers shift stock every second day, but at very high stocking rates daily shifts may be required, especially on wet soils
- Generally higher stocking rates lead to better per hectare performance, even when per head liveweight gains in winter are low (0.4 – 0.5 kg/head/day)
- Keeping bulls in mobs together from rearing allows them to be wintered in larger mobs sizes
- Operating the systems over part of the year (May – Nov/Dec) and moving them onto other areas of the farm provides a long term solution to ensure sustainability
- Sandy soils can be run at higher stocking rates, larger mobs and have less pugging compared with clay soils.

- There has been no difference in total production per ha between the clay soils and sandy soils
- There has been little change in pasture composition with the more intensive systems
- Selling store animals represents an opportunity to carry lighter stock and avoid pugging damage on wet soils
    - Initial stocking rates ranged from 506 – 906 kg LW/ha for rising one year cattle, to 1200 – 1460 kg LW/ha for rising two year cattle. Production from May – mid Feb ranged from 550 – 650 kg LWG/ha. Those systems running for 12 months achieved up to 1000 kgLWG/ha

Practical examples:
System 1: Autumn Born Bulls:

Date	Mob Size	Area (ha)	S.R. (bulls/ha)	LW/head (kg/hd)	LW/ha (kg/ha)	LWG/ha (kg/ha)
7-Jun	42	15.7	2.7	351	936	
24-Sep	42	15.7	2.7	437	1180	244
5-Nov	42	15.7	2.7	483	1292	112
17-Dec	36	15.7	2.3	518	1188	80
6-Feb	21	15.7	1.3	540	722	29

SR = Stocking Rate
LW = Liveweight
LWG/ha = Liveweight Gain per hectare

System 2: Spring Born Bulls:

Date	Mob Size	Area (ha)	S.R. (bulls/ha)	LW/head (kg)	LW/ha (kg/ha)	LWG/ha (kg)	LWG/ha/day (kg/ha/day)
5-Jun	32	8.6	3.7	231	936		
24-Sep	32	8.6	3.7	305	1180	244	2.20
5-Nov	32	8.6	3.7	347	1292	356	2.67
10-Feb	32	8.6	3.7	442	1645	709	3.64
						Overall	2.8

These bulls were removed from the system in February and grazed on other areas of the farm. The area was grazed with other stock classes was then shut up for the next rotation of bulls.

System 3: Tail End Spring Born Bulls:

Date	Mob Size	Area (ha)	S.R. (bulls/ha)	LW/head (kg)	LW/ha (kg/ha)	LWG/ha (kg)	LWG/ha/day (kg/ha/day)
12-Jun	56	13	4.4	161	704		
4-Sep	56	13	4.4	217	949	245	2.9
11-Nov	56	13	4.4	297	1299	595	5.1
31-Jan	36	13	4.4	400	1750	1046	5.6
						Overall	4.5

Winter feed demand was around the same as the other systems, but spring demand was 45 kgDM/ha/day (around 10 kgDM/ha/d higher than the two other systems). This mob gave a better fit to the pasture growth/supply curve. These bulls would be retained as two year olds.

Costings and Return

High Cost Intensive Beef System:

Cost/Benefit Analysis

Area Allocated (ha)	170
Total Liveweight gain in 12 months (kg/ha)	740
Base level of Production (kg/ha)	497
Gain in terms of extra liveweight gain (kg/ha)	243
Equivalent carcass meat/ha (kg/ha)	122
Returns/kg carcass meat	$2.65
Total extra return for 170 ha	$54,735
Less extra costs due to nitrogen used at 120 kgN/ha	$10,200
Net Return	$44,536
Total Capital Cost	$50,400
Ratio of net return to capital cost	0.9

Costing for High Cost System

Item	Number	Cost/item	Total Cost
Troughs 750 litres	25	$210	$5250
Alkathene	25km	$85/100m	$21,250
Posts	1700	$8.50/post	$14,450
Hot Wires	17 km	$160/km	$2,720
Pig Tail Standards	1600	$1.85 each	$2,960
Reels	15	$38/reel	$570
Poly-wire	100	$32/roll	$320
Total Cost			$50,400
Cost/ha			$296

Low Cost Intensive Beef System:

Cost/Benefit Analysis

Area Allocated (ha)	84
Total Liveweight gain in 12 months (kg/ha)	690
Base level of Production (kg/ha)	442
Gain in terms of extra liveweight gain (kg/ha)	248
Equivalent carcass meat/ha (kg/ha)	124
Returns/kg carcass meat	$2.65
Total extra return for 84 ha	$27,602
Less extra costs due to nitrogen used at 120 kgN/ha	$2,100
Net Return	$25,502
Total Capital Cost	$8,379
Ratio of net return to capital cost	3.0

Costing for Low Cost System

Item	Number	Cost/item	Total Cost
Troughs 900 litres	4	$238	$952
Alkathene	500m	$85/100m	$425
Pig Tail Standards	3000	$1.85 each	$5,550
Reels	12	$38/reel	$456
KiwiTech Reels	38	$17 each	$646
Poly-wire			$350
Total Cost			$8,379
Cost/ha			$100

On average the cost of setting up the systems in the project has been $162/ha and the average return has been $340/ha. The average net return is estimated at $30,600 per property. This data was based on the ten year beef schedule of $2.65.

Consultants Comments

The knowledge gained from Intensive Beef Systems continues to increase and since this paper was written farmers have continued to increase stocking rate (LW/ha), performance and profit levels.

The author rightly points out how winter feed covers can be ‘mined’ (in a similar way to utilising conserved feed) and this may account for another R1 beast wintered per hectare. However careful thought should be given to pasture cover relative to pasture quality and pasture growth rate. If covers get too high feed quality deteriorates and pasture growth is reduced when covers are in Phase III of growth.

Probably the biggest opportunity to increasing production and profit, will be through increasing winter pasture production because this will largely determine winter stocking rate. This may be achieved through additional use of nitrogen and/or with improved pasture species. Of interest is that improved cultivars of permanent pasture, at this point in time, afford little extra production compared to old pasture.

It is also important to note that there is little research to support increasing Olsen P levels beyond 20 or pH levels beyond 5.8 with respect to increasing pasture production.

Rotation lengths are talked about a lot and most commentators fail to point out that the key driver of rotation length is in fact pasture growth rate. The trap for farmers (and advisors) is that they concentrate on rotation length where in fact pre-graze pasture cover (other than pasture growth rate) should be the key performance indicator for determining whether covers are increasing or decreasing and whether covers are on target.

Feed budgeting software like Farmax afford farmers very useful tools in terms of optimising production and profit from their systems.

4.0 Hogget Trials – Investigating Ill-thrift

Author: Research Division, Department of Agriculture
Research Report 40 (NARL Ref 592)

Introduction

Hogget ill thrift and hogget health were an issue on many farms in the Auckland and Northland region in the late 1960's. This paper reviews the trials associated with this issue and identifies the following points:

- Anthelmintics consistently give good liveweight and wool responses
- There did not appear to be differences in the response from different anthelmintics
- Hogget ill-thrift cannot be attributed to trace mineral deficiencies
- Observations suggest enzootic pneumonia is associated with hogget ill-thrift, however trials have not demonstrated this
- Trials indicate that hogget growth is highly variable and generally poor in the March/April period

Many trials were carried out between 1960 – 1967 to identify the cause of autumn ill-thrift in hoggets. Table 1 summarises the results of these trials.

Table 1: Summary of previous New Zealand Department of Agriculture trials

Treatment	Number of Trials	Number of trials showing a significant result	
		Positive response	Depressed Production
Selenium	50	1	0
Cobalt	42	0	1
Anthelmintics	14	13	0

Only one trial showed a positive response to selenium (Awarua clay near Kaikohe) and one trial on Ohaewai loam near Kerikeri showed depressed production following supplementation with cobalt.

Observed hogget growth rates in the Auckland and Northland regions between 1960 – 1967 are outlined in Table 2:

Table 2: Hogget growth rates (NZDA Trials 1960-67)

Year	Trials	Liveweight Gain (g/day)	
		Average	Range
1960	24	45	7 to 91
1961	20	31	-26 to 84
1960 – 1967	52	40	-26 to 91

Further analysis indicated that while typically growth rates are extremely good before weaning and often between weaning and February (>71 g/day). Growth rates show a marked decline after the February/March period. Table 3 outlines the growth rates during autumn. This highlights the low liveweight gains being achieved, which are approximately half the rate regarded as reasonable growth.

Table 3: Average Liveweight Gains – Auckland Hogget Trials

Year	Trials	Period	Average weight gain
1968	2	March – July	17 g/day
1969	12	February – July	15 g/day
1970	5	February - July	15 g/day

Further analysis indicated average liveweight gain between March and May was zero (ranging from losing 51 g/day to gaining 64 g/day). Confirming that farmers have difficulty in maintaining hogget growth rates during March, April and May.

Trace Elements: Many trace element trials have been carried out in Northland since the 1960's, few trials have indicated a response to trace elements. For further information refer to the Mineral Responses in Northland research stocktake.

Anthelmintics: Anthelmintics have consistently shown liveweight gain responses in dosing trials. Table 4 indicates the results of a trial comparing different types of drench:

Table 4: Results of Anthelmintic Drenching Trial 1968

Treatment	Waiuku (19.3.68-8.8.68)		Whitford (21.3.68-22.7.68)	
	Weight Gain kg	Wool Weight kg	Weight Gains kg	Wool Weight kg
Control	1.0 BQ	1.8 BP	1.1 BQ	1.1 BQ
Thiobenazole	3.6 AP	2.0 AP	5.8 AP	1.4 AP
Pyrentalartrate	3.2 AP	2.0 ABP	6.3 AP	1.4 AP
Tetramisole	3.4 AP	2.0 AP	5.6 AP	1.4 AP
	SE = 4.6 CV = 16%		SE = 5.6 CV = 20%	

Means with different letters are significantly different (p<0.01)

This trial confirmed previous findings that drenching produces good liveweight gain and wool production responses. There is no significant difference between drench treatments, although levamisole may be more effective against lungworm.

Another trial compared the frequency of anthelmintic treatment and indicated a small (but not significant) response to monthly drenching compared with drenching every two months.

Discussion

These trials highlight the difficulty growing young stock during the autumn months in Northland. The months of April – June appear to be the most challenging, with many farmers struggling to even maintain liveweight. This paper indicates:

- Trace elements are generally not effective as a tool to increase liveweight gains
- Anthelmintics consistently increased liveweight gains and wool production regardless of drug and frequency:
    - With the emergence of anthelmintic resistance the choice of drench and frequency of drenching is more important, farmers can use a variety of tools to help delay drench resistance
    - While anthelmintic treatment did increase animal growth rates, the hoggets still only gained liveweight at 25 – 50 g/head/day, indicating other factors were affecting hogget growth rates
- Subsequent trials have indicated that autumn ill-thrift is often associated with poor quality feed and parasites, the role of fungal toxins remains unclear.

5.0 Correlating Stock and Pasture Production

Author: P. J. Rumball

Proceedings of the New Zealand Society of Animal Production 40 (1980) 85-91

Overview

This project investigates how to achieve a better fit between pasture supply and demand on Northland farms by changing feed demand patterns. Lambing date was changed on farms and compared with traditional spring lambing. The project also looked at the effect on kikuyu dominant or ryegrass dominant farms. The revised lambing policies increased annual lamb liveweight gain in the kikuyu pasture.

Method

The project was based on the Kaikohe research station on a mixture of podzol and clay soils. Each treatment was made up of 25 ewes and replicated three times. The mobs operated on self-contained plots of 1.2 ha at a stocking rate of 21 ewes /ha and rotated around the plots. Lambing percentage was 116% for Trial 1 and 117% for Trial 2.

Trial 1:
The aim in Trial 1 was to lamb a proportion of the ewes in the winter, early enough to utilise accumulated feed surplus, while delaying half the lambing to avoid the usual September deficit. Trial 1 design is outlined below.

Trial Design – Trial 1:

Lambing Pattern	Pasture	Mean Lambing Date	Weaning Date	Drafting Date
Trial 1 (1976 – 1978)				
100% Spring	Ryegrass	20 Aug	29 Oct	24 Dec
50% Winter 50% Spring	Ryegrass	2nd Aug & 11 Sept	11 Oct & 20 Nov	6 Dec & 15 Jan
50% Winter 50% Spring	Kikuyu			

Liveweights change is presented as four periods for the ewes:

- From the start to July
- Mean Lambing to lamb weaning
- Weaning to drafting
- Drafting to the end of the year

Trial 1 Results:

Table 2: Trial 1 Ewe production, Spring versus Winter & Spring lambing (mean of 2 years)

	Liveweight Gain (kgLW/ewe)					
Treatment	Year	May-Jul	Lambing to weaning	Weaning to Drafting	Drafting to March	Wool Yield
Spring Rye	1.6b	2.8a	-1.8b	0.3a	1.3b	3.92a
Winter/Spring Ryegrass	3.7a	2.2a	0.8a	0.6a	1.7b	3.98a
Winter/Spring Kikuyu	4.1a	3.4a	-1.2ab	0.7a	3.6a	4.01a

- Ewes gained more weight with the winter/spring split lambing
- Ewes on ryegrass under split winter/spring lambing gained more weight during lactation
- Ewes on kikuyu pasture gained more weight after drafting

Table 3: Trial 1 Lamb Production: Spring versus Winter & Spring lambing (mean of 2 years)

	Liveweight (kg/head)		Liveweight Gain (g/head/day)	
Treatment	Birth Weight	Final Weight	Lambing to weaning	Weaning to Drafting
Spring Rye	3.8a	23.7b	183b	126b
Winter/Spring Ryegrass	3.8a	25.3ab	210a	122b
Winter/Spring Kikuyu	3.9a	25.5a	190ab	149a

- Lambs on kikuyu pasture were significantly heavier and gained more weight in the period from Weaning to Drafting
- Lambs on the winter/spring treatment grew significantly faster to weaning than lambs born in the 100% spring treatment

Trial 1 Summary

- Lambing in the winter and spring provides a better fit with Northland pasture
    - Better ewe nutrition during lactation
    - Similar or heavier lambs at drafting

Trial 2:

In Trial 2 the aim was to utilise the autumn feed as it was produced by lambing some ewes in the autumn and carrying less feed forward into the winter.

Trial 2: Farmlet Design

Lambing Pattern	Pasture	Mean Lambing Date	Weaning Date	Drafting Date
Trial 2 (1978-1980)				
100% Spring	Ryegrass	17 Aug	11 Nov	21 Dec
20% Autumn*, 100% Spring	Ryegrass	2nd Sept	15 Mar, 7 Jun & 26 Nov	8 Jan
20% Autumn*, 100% Spring	Kikuyu			

** Autumn lambing simulated*

Trial 2 Results:

Table 4: Trial 2 Ewe production, Spring versus Autumn –Spring lambing (mean of 2 years)

	Liveweight Gain (kgLW/ewe)					
Treatment	Year	May-Jul	Lambing to weaning	Weaning to Drafting	Drafting to March	Wool Yield
Spring Rye	3.2ab	5.4a	-0.9a	1.1a	1.8b	3.56a
Autumn/Spring Ryegrass	1.6b	4.9a	-1.6a	0.6a	1.5b	3.33a
Autumn/Spring Kikuyu	4.2a	4.7a	-1.3a	1.3a	3.3a	3.60a

- All ewes lost weight during lactation
- Ewes on the kikuyu pasture gained more weight after drafting
- No significant difference in ewe liveweight between March – July despite the autumn lambing treatments having 40% increase in stocking rate

Table 5: Trial 2 Lamb Production: Spring versus Autumn –Spring lambing (mean of 2 years)

	Liveweight (kg/head)		Liveweight Gain (g/head/day)	
Treatment	Birth Weight	Final Weight	Lambing to weaning	Weaning to Drafting
Spring Rye	3.7a	22.6b	182a	110b
Autumn/Spring Ryegrass	3.9a	22.2b	174a	109b
Autumn/Spring Kikuyu	3.8a	24.3a	180a	142a

- Lambs on kikuyu pasture were significantly heavier and gained more weight in the period from Weaning to Drafting

Trial 2 Summary

- Ewe liveweight gains were generally similar, despite having a 20% higher stocking rate on the autumn lambing treatments

- The spring lambing treatment carried more autumn grown feed into the winter, but failed to convert this into better efficiency
- Lamb production was better from the kikuyu treatment, especially during the weaning to drafting period.

Discussion

The ewes under the 100% spring treatment accumulated feed during the autumn, but tended to lose liveweight during lactation. Moving lambing earlier makes the spring deficit even more severe, while moving lambing later penalises lamb performance later in the season.

Trial 1 showed the stress period in September by can be reduced by spreading the lambing; moving feed demand back into July and forward into October. This helped reduce weight loss during lactation, without penalising lamb growth rates. The lambs grew faster from weaning to drafting on the kikuyu pasture.

Trial 2 utilised more feed grown during the autumn increasing demand by 40% through the autumn period. The extra pressure controlled kikuyu and improved the vigour of the associated temperate grasses in the sward.

Changing feed demand to suit our Northland kikuyu pasture growth curve is important if we are to utilise our pasture effectively. This project demonstrates how changing feed demand through spreading lambing dates, either lambing some ewes in the winter or the autumn can provide a better fit with our pasture production curve and results in greater productivity.

6.0 Matching Sheep and Beef Policies to Pasture Supply on Hill Country

Author: CR Page, RD Thomson & RW Webby
Proceedings New Zealand Grassland Association 57 (1996): 207-212

Overview

This paper reviews the successful monitor farm program initiated in Northland and highlights the changes made to provide a better fit between pasture supply and feed demand.

The monitor farm program was initiated in 1988 on two Northland sheep and beef farms located at Waiotira (high fertility and low fertility). The success of this programme resulted other farms becoming monitor farms; one in Waiotira and the other in Mangaturoto.

Farms were supported by local consultants (Thomson, Page & Associates) and science support from AgResearch. Pasture growth was recorded on farms and animal monitoring carried out as appropriate. Between 20 – 30 farmers are associated with each group and visit the farms 4 times per annum, enabling them to understand the farm during different seasons.

The first year is spent collecting data and is regarded as the base year. At the end of the first year the group makes recommendations about changes to the stocking policies, these decisions are based on the data collected with support from the computer model stockpol. The recommendations are negotiated with the monitor farmer, a consensus reached and objectives and performance indicators are developed. The measuring and monitoring continues for the next 2-3 years, with recommendations being reviewed as required.

Changes to the base policy for each of the four farms are highlighted below:

Waiotira High Fertility Farm
The base policy had an emphasis on finishing steers at 27-30 months and surplus heifers at 20-24 months, which increased autumn feed demand, creating feed deficits which led to low pasture covers at the beginning of winter. This contributed to animal growth rates being lower than targeted over the winter.

The revised policy moved to marketing more stock prior to the autumn, and a move from finishing steers at 30 months to finishing bulls at 15 – 17 months. Surplus heifers were sold earlier at 16-18 months as local trade heifers. Some of the progress is outlined in Table 1:

Table 1: Animal production from the Waiotira High Fertility Farm

	88/89	89/90	90/91	91/92	92/93	93/94
Wool/sheep	5.5	4.5	5.2	4.4	5.5	5.7
Sheep meat/SSU[1]	9.6	11.6	10.9	11.6	12.9	16.0
Beef meat/CSU[2]	16.7	17.5	17.2	17.1	22.1	32.0
Total meat/ha	160	171	197	200	195	279

[1] *Sheep Meat per sheep stock unit*
[2] *Beef meat per cattle stock unit*

Waiotira Low Fertility Farm
The biggest issue on this farm was poor utilisation of feed grown. The changes revolved around feed budgeting, rotational grazing and better allocation of feed priorities. Major changes included, a drop in sheep numbers, a move from finishing steers at 27 months to finishing bulls at 15-18 months, breeding cow numbers were increased to improve pasture control during late spring and all lambs were marketed by the 1st March every year.

Table 2: *Animal production from the Waiotira Low Fertility Farm*

	88/89	89/90	90/91	91/92	92/93	93/94
Wool/sheep	4.2	3.6	3.6	3.9	4.2	4.3
Sheep meat/SSU[1]	7.8	8.3	9.7	8.1	9.5	10.1
Beef meat/CSU[2]	19	19	27	26	24	23
Total meat/ha	132	133	165	182	164	165

[1] *Sheep Meat per sheep stock unit*
[2] *Beef meat per cattle stock unit*

Waiotira Monitor Farm
The focus on this farm was improving sheep performance. Some of the objectives for the farm, with key performance indicators are outlined below:

Sheep Objectives:

- Lift weaning percentage from 85% to 100%
  - Weaning weights of ewe lambs at 10 weeks >20 kg LW
  - Ewe hoggets at 31st May >35 kg LW
  - Mixed age ewes and 2 tooths at 31st Dec > 55kg LW
  - Minimum weight for all ewes >45 kgLW
- Lift ewe fleece weights from 4.0 to 4.5 kg/ewe
  - Select rams with high breeding values for fleece weights
- Maintain lamb drafting weights at 15 kg

Cattle Objectives:

- To achieve 95% calving percentage from pregnant cows and heifers
  - Only breed from heifers at 250 kg or heavier by 1st October
  - Mate the heifers for 42 days to calve 3 weeks earlier than the mixed age cows
- Average Weaning Weight of calves of 240 kg and 200 days from mean calving date

    - Cows performance recorded and 15% culled each year on production
    - Selection of terminal sires on performance recording for growth, calving ease and carcass attributes
- Yearling steers to average 380 kg at 400 days
    - Cows to graze pastures with residuals of no less than 1600 kgDM/ha over mating and post-mating to weaning of no less than 1400 kgDM/ha
    - Yearling steers to be wintered to grow 0.7kg liveweight gain per day from 1st May to 1st October

Maungaturoto Monitor Farm
This farm was already performing at a high level, and the goal was to increase production by 20% (meat production/ha)

Farming policies adopted to help the farm achieve their goals include:
- All lambs <18 kgLW at weaning sold store (they would not be killable by February)
- Any lambs >33 kgLW at weaning are sold finished
- Only the top 35% of ewe lambs are retained from weaning
- All cull ewes to be sold at weaning or soon after
- All bulls finished at 220 – 240 kg carcass by the end of February
- All local trade heifers sold by 31st March

Discussion

Some of the key points to come from the first 7 years of the monitor farm program include:
- Changes in stock policy from breeding to finishing and from sheep to cattle make matching feed supply and demand more difficult
- It is difficult to grow young-stock through the late summer and autumn due to poor feed quality
- Feed supply varies between years and can be modified by use of nitrogen fertiliser, forage cropping or supplementary feeding
- Poor feed levels in the autumn and early spring limit growth rates of all young stock
- Lambing and calving dates need to be adjusted to give a better fit of animal feed requirements and pasture growth rates

Recommendations from the farms include:
- Sell any surplus stock before February (i.e. only animals to be wintered should still be on the farm after February)
- Sheep must achieve appropriate liveweight targets to ensure good lambing percentages:
    - Weaning > 20 kg
    - 31st May >35 kg

    - 31st December > 55 kg
- Breeding cows are essential to control surplus spring pasture and utilise dead summer feed
- Bull beef is easier to finish at a younger age and converts grass to meat product more efficiently
- Calving and lambing dates should be based on the ability to match feed demand with feed supply

7.0 Animal Production Research Priorities: 1985

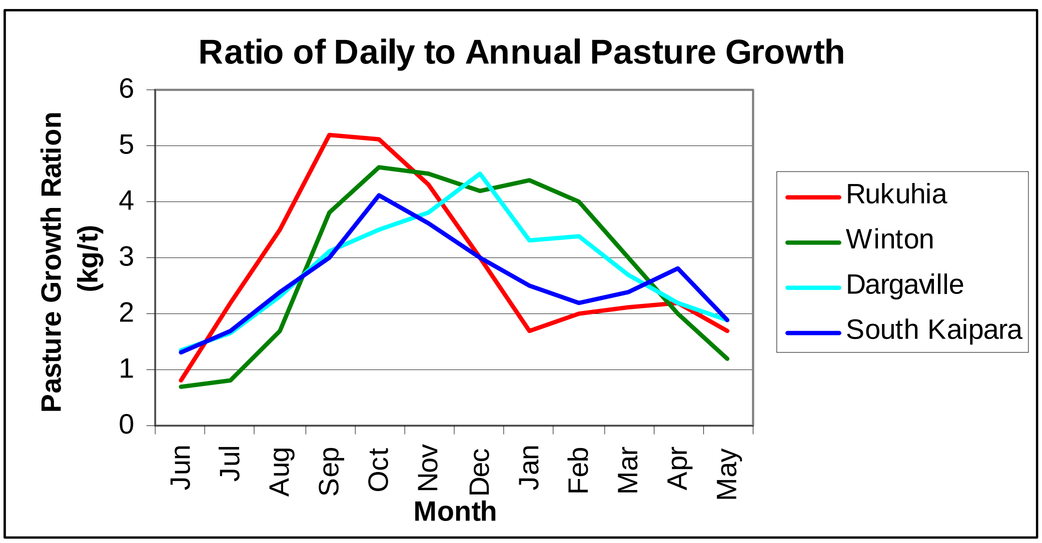
Author: T C Reid
Internal MAF ARD publication

Overview

This paper summarised key factors influencing animal production and provided an insight into potential areas for further research. The key points made included the following comments:

- Pattern of pasture production in Northland is not suited to the concentrated calving/lambing systems seen elsewhere in NZ
- Target liveweights are achieved with cattle, but not with lambs
- Animal research should focus on sheep, aiming to produce maximum numbers and weights during periods good pasture growth
- Specific areas for further study include:
  - Time and spread of lambing
  - Lamb growth rates before and after weaning
  - Effects on carcass composition

Patterns of Pasture Production
The pasture growth curve for two sites in Northland is compared with Rukuhia (Waikato) and Winton (Southland) in the graph below. The graph displays daily pasture growth as a ratio of annual growth to highlight differences between sites of different total production.



This graph highlights the differences in pasture production:

- Spring growth in Northland is a lower proportion of annual production and is much slower
- Winter and early spring growth is similar on both sites

- Pasture growth rates remained relatively high through the summer in Dargaville
- Winter pasture growth rates are almost double that of the southern regions

Previous research has shown the following trends in Northland pasture production:

- A rapid decline in pasture nutritive value from early October (especially in dry weather)
- Kikuyu pasture is generally of lower nutritive value than ryegrass/clover at most times of the year

Animal Performance in Northland

Beef are the dominant species in Northland and generally achieve target liveweights:

- Mating target for yearlings of 250 kgLW by November are achieved

Sheep production is an issue in Northland:

- Growth rates on farms were below optimum, only 3 of 14 farms achieved 50 kg target by February/April
- Targets can be achieved with ample pasture and at low stocking rates, but even under these conditions, one farm in five did not reach 50 kg by December
- Few commercial farms are achieving liveweight targets (Figure 1 & Figure 2)
  - Figures 1 & 2 show liveweight change in ewe replacements (average of 10 farms) compared with target
  - Good spring growth rates
  - Poor growth after weaning and in the winter

Figure 1: Liveweight gain in Northland Sheep

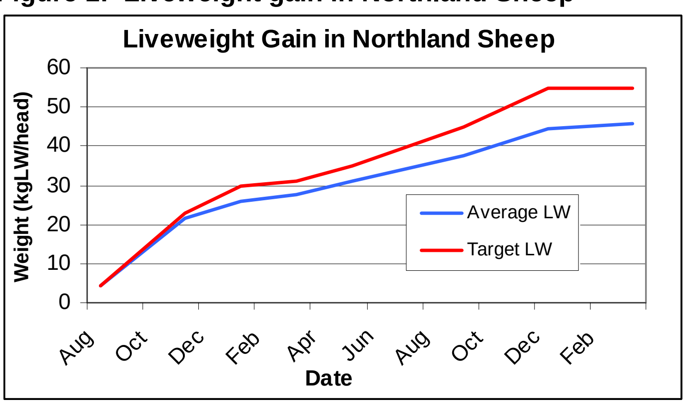
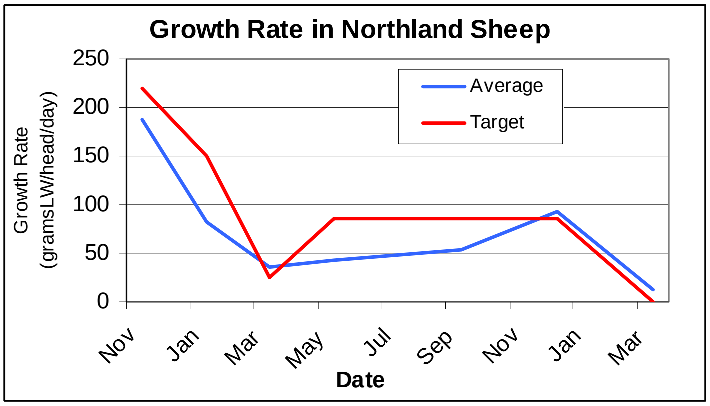


Figure 2: Growth Rate of Northland sheep



Comparing animal requirements with pasture production highlights a mis-match:

- Rapid increase in animal requirement at lambing (mid August)
- Pasture growth slowly increases in the spring
  - This would result in a pasture deficit during early lactation
- 100% autumn lambing shows an even greater feed deficit
- Potential for a combination of some autumn lambing and later spring lambing may help reduce the feed deficit
  - increasing winter requirements
  - Reducing spring requirements
- Target liveweights must be achieved by late spring or early summer due to unreliable growth through the autumn.

Research Objectives

Overall goal is to optimise the amount of lean meat produced per hectare by the End of December to minimise the effects of dry summer

1. Consider three animal components:
   a. Birth dates
   b. Growth birth to slaughter
   c. Reproductive performance of the ewes (target lambing percentage of 110-120%)
2. Compare the impact of various fertiliser rates on animal production
3. Manipulate breeding date to optimise slaughter weights and dates
   a. Beef growth higher on spring pasture than autumn pasture
   b. Potentially better lamb growth from autumn lambing

Research Priorities

- Altering birth date:
  - Investigate autumn lambing/calving
  - Optimising spring lambing/calving date and spread
- Growth Rates:
  - Herbage allowance trials at critical times of the year
  - On farm assessment of pasture utilisation and pasture quality
- Fertiliser for animal production

8.0 The Effect of Grazing Spring Pasture to Different Levels of Residual Dry Matter on the Liveweight Gain of Weaned Autumn Born Lambs

Author: I. P. M. McQueen

Overview

There is little data on the performance of young lambs in relation to grazing systems on spring pasture. This project looks to determine whether hard grazing of spring pasture affects the performance of weaned lambs

Design

Autumn born (May) lambs were randomly allocated into two mobs of 65 and grazed to different post grazing residuals from September to February. The two groups were:

- High residual dry matter (HRDM) – grazed down to 1500 kgDM/ha
- Low residual dry matter (LRDM) – grazed down to 900 kgDM/ha

Liveweights were assessed fortnightly and pasture yields assessed visually and calibrated against pasture cuts. Starting pasture cover was 2000 kgDM/ha

Results

Liveweight gain data from the trial is outlined in Table 1 and pasture details in Table 2:

Table 1: Liveweight Gains of lambs under two grazing regimes

	24th Aug – 22nd Nov		7th Dec – 14th Feb		24th Aug – 14th Feb*	
Grazing Regime	HRDM	LRDM	HRDM	LRDM	HRDM	LRDM
Lambs	65	64	65	64	65	64
Mean LWG (kg/head)	11.3	10.8	8.6	6.1	16.0	12.5
Growth (g/head/day)	125	119	124	88	92	72

** Includes shearing*

Table 2: Pasture Dry Matter and Apparent Uptake

	2nd Sept – 24th Nov		24th Nov – 20th Feb		2nd Sept – 20th Feb	
Grazing Regime	HRDM	LRDM	HRDM	LRDM	HRDM	LRDM
Mean days/paddock	9.2	12.9	8.8	13.7	9.0	13.2
Pre-grazing KgDM/ha	2250	2064	2422	2253	2340	2152
Post-grazing KgDM/ha	1472	921	1579	1243	1528	1070
Herbage removed KgDM/ha	778	1144	843	1010	812	1082
Est. Intake (KgDM/head/day)*	0.47	0.5	0.56	0.45	0.52	0.48

** Estimated intake*

Key Points

Liveweight gain was similar between the two groups until late November

- From November the laxly grazed lambs (HRDM) grew at the same rate but the hard grazed lambs dropped to 88 g/day
  - Pasture quality dropped as the lambs were forced to graze lower
  - Difficulty grazing to low levels during summer
  - Estimated intake was similar between the two groups until the summer when the consumption of the LRDM group tended to be lower than that of the HRDM group
  - Summer pasture growth was good during the trial

Conclusions

- Hard grazing of pastures by weaned lambs had little effect on liveweight gain until the end of November
- From December it was difficult to make lambs graze to low levels of residual dry matter and lamb weight gains were penalised
- It is possible to maintain animal growth rates during summer if lambs are laxly grazed

9.0 Winter Lambing of Aged Perendale Ewes on Northland Farms

Author: A.O Taylor, WGK Andrewes
New Zealand Journal of Experimental Agriculture 1987, Vol 15: 45-50

Overview

Autumn lambing will help reduce feed demand in the spring, allow more efficient use of meat processing facilities and allow farmers to capture early season premiums. This project ran for 2 years and involved farmers mating old ewes and comparing a variety of techniques:

- Priming ewes with progesterone,
- Socialising ewes (running progesterone treated ewes with untreated ewes)
- Not treating any ewes (control).

The results showed progesterone treated ewes had the highest lambing percentage, while the untreated ewes had a lower lambing percentage and tended to conceive to second and subsequent oestrus.

Design

Aged Perendale ewes comprising 15 – 20% of a flock were induced to lamb in June/July on several farms near Ngataki and Kaikohe.

Ewes were selected by farmers as suitable for one further lambing. Average liveweight at mating was 55 kg in 1984 and 54kg in 1985. Ewes were ear-tagged and given improved feeding for 1 – 2 weeks before and during the mating period. Farmers used all available rams to maximise the ram effect, the ram:ewe ratio varied between farms.

Controlled Internal Drug Releasers (CIDR) containing progesterone were inserted for 10 days into some groups of ewes. There were three groups of ewes:

- Ewes treated with CIDRs (primed)
- Ewes not treated with CIDR but run with CIDR treated ewes (social facilitation)
- Control ewes (not treated and with no exposure to treated ewes)

Ewes were run in separate mobs and tallies of ewes and lambs were made at docking.

Results

Progesterone Priming

The lambing performance of progesterone-primed ewes is outlined in Table 1.

Table 1: Lambing Percentage of Progesterone-primed ewes treated at different times. Data is ewes lambing as a percentage of total ewes at lambing.

Farmer	Ram Introduction	Lambing Cycle		
		1	2	Total
Killen	24 Dec 1984	0	0	0
Nisbet	27 Dec 1984	0	0	0
Holland	20 Jan 1985	53	32	85
Holland	30 Jan 1984	55	34	89
Dobson	30 Jan 1984	55	24	79
Hunt	30 Jan 1984	57	28	85
Dobson	30 Jan 1985	56	24	80
Woodward	10 Feb 1984	73	22	95
Wells	10 Feb 1984	55	23	78
	Mean (Jan & Feb)	58	27	84

- Lambing performance of progesterone primed ewes was strongly influenced by mating date averaging:
  - nil for December mating
  - 84% for January mating (79 – 89%)
  - 87% for February mating (78 – 95%)
- Progesterone priming resulted in half the ewes lambing in the first cycle (most cycled shortly after CIDR withdrawl)

Social Facilitation

Table 2: The lambing performance of control Ewes with ewes untreated, but run with CIDR treated ewes (social facilitation)

Farmer	Ram Introduction	Treatment	Lambing Cycle		
			1	2	3
Hunt	31 Jan	Control	0	83	12
		Social facilitation	0	85	10
Wells	1 Feb	Control	0	43	49
		Social facilitation	0	77	20
Baker	4 Feb	Control	2	44	NR
		Social facilitation	2	67	NR

NR = Not Recorded

- Not priming the ewes with CIDRs resulted in virtually no ewes mated in the first cycle after ram introduction in late January or early February
- The control ewes (un-primed and with no access to treated ewes) were highly variable in mating rates in the second cycle (43 – 83%)

- Ewes not treated but run with treated ewes (social facilitation) resulted in a higher mating percentage to the second cycle (67 – 85%)
- Lambing performance relatively consistent in this trial over two years, but a separate project showed greater variation between farms and between years

Lamb Production

The lambing performance of aged ewes in winter and mixed age ewes in the spring (aged ewes primed and socially facilitated) are outlined in Table 3:

Table 3: Lambing performance of winter versus spring lambing ewes

Year	Lambs Docked/ewe at lambing (%)	
	Winter Lambing	Spring Lambing
1984	106	120
1985	96	121

- Lambs docked from early lambing aged ewes was less than for mixed-age, main flock ewes:
  - Twinning rate was lower
    - For Romney ewes multiple ovulations are low in February, increase in March and peak in April
  - Aged ewes tend to have poorer reproductive and lactation performance
  - Farmers commented that lamb deaths were higher in winter born lambs
- Winter born lambs were weaned in late September
  - First draft at weaning to secure premium of $2/head, remainder marketed by December
  - Killed at relatively low carcass weights (11.9 kg) which was typical in the early 1980's
  - Carcass generally graded lean (<3% overfat)
  - Comparative spring born lambs had a first draft in Mid November and the remainder sold by May
- Farmers consider winter born lambs could be finished over a shorter time than spring born lambs:
  - Fewer multiple births
  - Fewer animal health problems
  - Lambs weaned onto high quality spring pasture
- Cull Ewes were marketed earlier (October) and tended to have higher fat levels than cull ewes lambing in the spring and marketed in the autumn

Conclusions

- Winter lambing ewes is technically feasible in Northland
  - Farmers commented that direct financial return would have the biggest impact on it's acceptance
- In 1985 the cost of CIDR priming treatment was $2.50/ewe plus the cost of reduced lambing percentage

    - Using social facilitation reduces the cost as only half the number of ewes are treated
    - Not treating ewes further reduces lambing performance and gives more variable results
    - The cost effectiveness of early lambing depends on timing and the premium for early season lamb.
- Pre-weaning growth rates are similar for winter and spring born lambs, but winter born lambs have higher growth rates post weaning
- Winter lambing requires good winter growth rates and may not suit kikuyu dominant farms (where winter pasture growth is low)

10.0 Performance of an Autumn Lambing Poll Dorset Flock

Author: W. G. K Andrews
Published in Proceedings of the New Zealand Society of Animal Production, 1983, Vol 43: pp 49-51

Introduction

Lambing a proportion of a flock in the autumn is thought to improve pasture utilisation and reduce the deficit seen in the spring. This paper outlines the development of an autumn lambing flock of Poll Dorset ewes without the use of progesterone priming. Fertility declined as the flock moved to a more compact autumn lambing and lamb growth rates in the winter declined. 84% of lambs reached 30 kg LW by mid November. High faecal egg counts were recorded in April born lambs before weaning

Design

Poll Dorset ewes and rams were purchased from several registered flocks. All ewe lambs were retained as replacements and culling was limited to unsound feet and overshot jaws (i.e. ewes were not culled on reproduction). Feeding management was integrated with a flock of spring lambing Perendale ewes (ratio of spring:autumn lambing ewes was 3:1) with a stocking rate of 18 – 20 SU/ha.

Ewes were initially mated at a ewe:ram ratio of 50:1 decreasing to 20-25:1 later in the trial. Lambing date, lamb survival and a sample of birth-weights were recorded. Lambs were weighed at weaning, then monthly. In 1980 and 1981 the lambs had faecal egg counts at 6 – 7 weeks of age and at weaning.

Results

Ewe liveweights at joining averaged 43 kg in 1979, 53 kg in 1980 and 51 kg in 1981. Liveweight gains during the flushing/mating period (mid Oct-early Dec) varied between 50 – 110g LW/ewe/day. Over the four years lambing became earlier and more concentrated as the mating period was restricted to give a more condensed lambing. The flock breeding performance is outlined in Table 1.

Table 1: Flock breeding performance

Year	Mean Lambing Date	Ewes to ram	Ewes Marked (%)	Ewes Lambing (%)	Lambs born/ewes lambing (%)	Lamb Deaths to weaning (%)	Lambs Weaned/ewes to ram (%)
1979	25 June	87	-	95	129	22	95
1980	24 May	115	80	82	125	17	84
1981	14 April	152	71	47	132	7	57
1982	12 April	134	75	60	120	18	58

The key points from Table 1 include:

- Fertility declined from 95% to 60% as mating became more compact
- Fecundity remained similar despite the drop in fertility
- More than 80% of lamb deaths occurred within 3 days of lambing

After 4 years around 60% of the Poll Dorset ewes were lambing in the autumn period, with 87% of lambings occurring within 27 days after teasing in the spring.

Lamb growth rates are outlined in Table 2:

Table 2: lamb growth rates (ram and ewe lambs)

Year	Lambs	Weaning date	Birth to Weaning		Weaning to 15th Sept		15th Sept to 15 Nov	
			days	g/day	days	g/day	days	g/day
1980	97	21 Aug	89	218	25	144	61	148
1981	86	13 Jul	90	219	64	106	61	123
1982	73	17 Jun	66	205	90	100	61	221

- Lamb growth declined between weaning and early spring, then increased in late spring
- Management factors may have impacted on the variation between years
- 84 – 90% of lambs were greater than 30 kg LW by mid November
- A sample of ram lambs was slaughtered in late October each year with carcass weights averaging between 15 – 17 kg
- Ewe lamb replacements averaged 37 kg by December each year

Lamb faecal egg counts at 6 weeks of age averaged 5500 eggs per gram in 1981 and 4,100 eggs per gram in 1982 indicating a high worm burden and potentially limiting pre-weaning growth rates. There was no clinical facial eczema or fly-strike in autumn lambing ewes and lambs.

Discussion

- Autumn lambing can be achieved without the use of chemicals
- Lambing percentage would be expected to increase with selection for autumn lambing
- Fewer multiple births are desirable for autumn lambing
- Less multiples results in higher lamb growth rates

- Leading to less overlap between spring and autumn lambing periods
  - Better fit with feed demand
- High worm burden in autumn born lambs may be due to the continuous presence of susceptible young animals
  - Potentially impacting on pre-weaning and post weaning growth rates
  - This complicates parasite management
- Autumn lambing made feed management easier:
  - April lambing coincided with the usual May surplus
  - Weaning time flexible depending on winter weather and feed supply
  - Ease of flushing in the late spring period
  - Fits well with spring lambing feed demand
- There are possible advantages to the meat processing industry by reducing seasonality of supply

11.0 Performance Parameters of an Autumn Lambing Ewe Flock

Authors: T.C. Reid, R.M. Sumner & L.D. Wilson
Published in Proceedings of the New Zealand Society of Animal Production, 1988, Vol 48 pp 91-94

Introduction

This paper compares performance parameters of an autumn lambing flock of Poll Dorset X Romney ewes with their spring lambing flock-mates in 1986 &1987. Compared with spring lambing ewes, the autumn lambing ewes lost more liveweight in early lactation, gained weight faster prior to mating, weaned fewer lambs and had better lamb survival. Autumn born lambs were lighter at weaning than spring born lambs.

Design

Autumn lambing ewes were joined with the ram immediately after shearing in late October of 1985 & 1986. In the autumn lambing flock rams were joined for 10 weeks in 1985/86 and 6 weeks in 1986/87. The aim was have 60-65% of the flock lambing in the autumn so to achieve this 70% of MA ewes and 85-100% of 2 tooth ewes were mated. All ewes had exposure to the ram for spring lambing, ensuring those ewes which did not conceive for autumn lambing would be available for spring lambing.

Ewes were rotationally grazed throughout the year, including lambing. The ewes were run as one mob from the end of joining for autumn lambing to just prior to autumn lambing, and from weaning of autumn born lambs until lambing in the spring. Ewes were shorn in October and March.

Results

Autumn lambing ewes lost considerable liveweight between lambing and weaning (approximately 15 kg/head in 1986 and 5 kg/head in 1987). Liveweight gain was rapid following weaning/culling in August and the ewes were back to similar weights by mating. Liveweight changes in spring lambing ewes were much smaller.

The reproductive performance is outlined in Table 1. Ewes mated to lamb in the autumn had a higher proportion of dry ewes than those ewes mated to lamb in the spring. Reducing the joining period for autumn lambing in 1987 to 6 weeks resulted in 10% fewer ewes lambing in the autumn.

Table 1: Reproductive performance of ewes lambing in autumn or in spring

Parameter	Autumn		Spring	
	1986	1987	1986	1987
Ewes Joined	252	328	142	146
Ewes Culled/died	6	10	10	4
Dry Ewes	46[1]	92[1]	7	12
Ewes Lambed	200	226	125	130
EL/EJ[2]	0.79	0.69	0.88	0.89
Lambs Born	219	226	182	156
Lambs Weaned	201	239	153	125
LB/EJ[2]	0.87	0.81	1.28	1.06
LB/EL[2]	1.10	1.18	1.46	1.2
LW/EJ[2]	0.8	0.73	1.08	0.86
LW/EL[2]	1.01	1.06	1.22	0.96
LW/LB[2]	0.92	0.9	0.84	0.8

[1] *Ewes dry each autumn included those joined to lamb in spring*
[2] *EJ = Ewes Joined, EL = Ewes Lambing, LB = Lambs Born, LW = Lambs Weaned*

Key Points

- In 1986 more lambs were born per ewe lambed (LB/EL) for ewes lambed in the spring, but in 1987 the numbers were similar
    - o Ewe liveweight of spring lambing ewes at mating was low in 1987 (~45kg)
- Lambs born in the autumn had higher survival compared with lambs born in the spring – even in 1987 when lambing percentage was similar
- Ewes lambing per ewe joined (EL/EJ) is higher than previous studies have achieved.
- Lambing performance in the spring lambing ewes was higher than the average for Northland (90-95%) in 1986/87
- 2 tooth ewes showed slower onset of mating for autumn lambing

The lamb growth data is outlined in Table 2:

Table 2: Birth and Growth data for lambs born in autumn or in spring

Parameter	Autumn		Spring	
	1986	1987	1986	1987
Mean Birth date	20 Apr	24 Apr	20 Aug	6 Sep
Range	15 Mar–25 May	3 Apr-16 May	5 Aug-2 Sep	2 Aug-24 Sep
Birth Weight (kg)	4.0	4.0	4.4	4.4
Weaning date	23 Jun, 14 Jul	23 Jun, 21 Jul	23 Oct, 19 Nov	10 Nov
Weaning Weight (kg)	14.4	17.2	19.3	19.7
Growth to weaning (g/day)	151	182	210[1]	237
Weaning Age (days)	72	75	71	64

[1] *Note: original paper showed an incorrect figure of 314 g/day*

Key Points

- Autumn lambing became more compact in 1987
- Spring born lambs were heavier at birth and grew faster to weaning than autumn born lambs
  - This is a reflection of low feeding levels during early lactation impacting on autumn born lambs
- Spring lambing was delayed in 1987 to better fit pasture growth, which resulted in higher lamb growth rates
- Lamb growth rates can be very high in September and October, enabling the lambs to reach 'heavy weight' lambs to be available for killing in October & November.

Greasy fleece weight was higher in autumn lambing ewes at all three shearing events. Autumn lambing ewes were able to maintain wool growth while losing liveweight and lactating

Discussion

- Using a cross-breeding flock avoids the necessity for chemical priming
- Liveweight change through the year is much greater in autumn than in spring lambing ewes
  - Weight loss during lactation
  - Rapid weight gain prior to and during mating
- Autumn lambing ewes had higher wool yields than spring lambing ewes
- Autumn lambing ewes produced fewer and lighter lambs at weaning
- Autumn lambing allows for lambs to grow quickly through the spring months and means ewe lamb replacements are heavier for mating to lamb in the spring
- A proportion of spring lambing ewes must be mated as autumn lambing ewes to ensure autumn lambing ewe numbers remain constant

12.0 Effect of different shearing policies on sheep production in Northland

Authors: R.M.W Sumner & D Armstrong
Published in Proceedings of the New Zealand Society of Animal Production, 1987, Vol 47 pp 107-110

Introduction

Northland farmers have moved toward twice yearly shearing for easier management such as ease of mustering and shepherding, less dagging and crutching, improved control of fly-strike, fewer cast ewes and improved cashflow. This paper compares the effect of twice yearly shearing with annual shearing on four Northland farms. Twice yearly shearing resulted in greater clean wool production, less decolouration and less revenue from wool. There was no effect on ewe survival, reproduction rate or lamb weaning weight.

Design

Four farms near Kaiwaka each randomly allocated 400 ewes into two mobs to be shorn either once yearly (1/S) or twice yearly (2/S). The 2/S treatment was shorn at the normal shearing time for each farm (as outlined in Table 1). The two treatments were grazed with the main flock for most of the year, but separated between lambing and weaning for the collection of lambing data. Ewes were weighed at 6 monthly intervals and wool yield recorded. Wool was sampled for objective measurement and assessed for New Zealand Wool Board type number. The project ran for 3 years

Table 1: Breed and shearing time on each farm

Farm	Breed	Shearing Treatment	
		Twice-Yearly	Once-Yearly
1	Coopworth	Feb/Oct	Oct
2	Romney	May/Nov	Nov
3	Coopworth	Oct/Feb	Feb
4	Romney	Dec/Jun	Jun

Results

Mean annual rainfall in the Kaiwaka area is 1500±200mm. In the summer of 1982/83 rainfall was 70% below normal, while in the summer and autumn of 1984/85 rainfall was 75% higher than normal. Pasture production in the region reflected these changes in the rainfall pattern.

Mean differences (2/S – 1/S) for ewe and lamb production are outlined in Table 2 and net wool returns are outlined in Table 3.

Table 2: Mean differences (2/S – 1/S) and SE in ewe and lamb production between twice yearly and once yearly shorn ewes on each farm.

Parameter	Farm			
	1	2	3	4
Liveweight (kg)				
Pre-second shear	-0.8±0.6	0.3±0.6	0.1±0.6	0.6±0.8
Post-main Shear	-0.9±0.5	0.7±0.6	1.4±0.6*	-0.2±0.6
Fleece Weight (kg)				
Total Greasy	0.04±0.06	0.23±0.08***	0.25±0.05***	-0.03±0.6
Total Clean	0.21±0.06***	0.44±0.08***	0.33±0.05***	0.21±0.06***
Ewe Survival				
Summer (EPM/EPL)[1]	-0.03±0.06	0.03±0.05	-0.01±0.05	0.04±0.05
Winter (EPL/EPM)[1]	0.02±0.05	0.0±0.05	0.0±0.05	0.0±0.05
Reproduction Rate LW/EPM[1]	0.02±0.04	0.01±0.04	0.05±0.04	-0.03±0.04
Lamb Wean Weight (kg)	-0.5±0.5	0.4±0.5	-0.5±0.5	-0.6±0.5

[1] EPM Ewes present at mating; EPL Ewes present at lambing; ELP Ewes present earlier lambing; LW Lambs Weaned

Table 3: Mean difference in net wool returns ($/head) between twice yearly (2/S) and once-yearly (1/S) shorn ewes on each farm

Base Wool Price	Farm			
	1	2	3	4
NZ Seasonal Average	-0.45	-0.05	-0.24	-0.48
Auckland Monthly average for month after sale	-1.15	-0.14	-0.68	-1.64

Key Points

- Farm 3 showed a slight increase in ewe liveweight associated with twice annual shearing
    - Farmer commented this was probably due to heat stress in the single shear ewes reducing feed intake over the summer
- All farms showed a significant increase in clean fleece weight in ewes shorn twice per year
- There was no effect on reproduction rate or weaning weight over the three years
- There was no impact on ewe survival, lambing percentage or lamb weaning weight
- Staple length was affected by shearing frequency; more frequent shearing resulted in greater cumulative staple length
    - Variation between farms is a result of farm management differences
- Colour measurement showed 2/S wools to be brighter and less yellow
    - Wools shorn between May and October were brighter and less yellow than wools shorn between November and February
- Wools shorn between October and December were finer than wools shorn between February and June

- Once yearly shearing increases net wool returns compared with twice yearly shearing due to the price of the longer wool (Table 3)
    - Average net wool return for the four farms was $11.57/head
    - All the farmers chose to remain with twice yearly shearing because of management advantages
- Farmers did not observe a difference in the proportion of cast ewes between shearing treatments
- Total ewe deaths were unaffected by shearing treatment

Summary

Most farmers still continue to favour twice yearly shearing for management advantages. With the current wool prices and increase in shearing costs, some farmers may look at annual shearing to help reduce costs.

13.0 A Comparison of Two Times of Weaning on Winter-Born Lamb and Ewe Performance

Authors: IPM McQueen
Internal MAF Report (NARL Ref 316)

Introduction

Winter born lambs have the potential to achieve good growth rates on high quality, leafy pasture during the spring, potentially reaching slaughter targets by November. This experiment looks at the impact of early weaning (53 versus 83 days) on lamb and ewe performance. Early weaned lambs suffered a greater post weaning growth check than later weaned lambs.

Design

The treatment areas were each five paddocks totalling around 8.5 effective hectares at the Kaikohe demonstration farm. Soils were Wharekohe silt loam, around 60% of each area was flat and the remainder sloping.

Ewes were allocated into two treatment groups of 125 ewes and separated onto treatment areas as signs of lambing developed (from 6th June – 1st July 1980). Ewes and lambs were set stocked until early weaning.

Lambs were weighed and tagged within 24 hours of birth, and weighed again at docking (6th August). Ram lambs were left entire. The early weaning lambs were weaned and drenched on the 27th August, the later weaning treatment was drenched and weighed, then returned to the ewes. All lambs were weighed and drenched again on the 26th September, when the later weaned lambs were weaned.

Following weaning, early weaned ewes were rotationally grazed on 1.2 ha and the lambs set stocked on 5 ha. The later weaned lambs remained set-stocked until weaning, when all lambs were mobbed up and rotationally grazed and ewes were removed from the trial area.

Results

The liveweight change results are summarised in Table 1 (lambs) and Table 2 (ewes).

Lambs grew at similar rates in both treatments until docking (August 6th), between docking and early weaning the early weaning group grew faster than the late weaning group. The early weaned lambs suffered a severe growth check compared with the lambs not weaned. The later weaned lambs suffered no growth check following weaning and the earlier weaned lambs recovered, with growth rates similar to the later weaned lambs.

Table 1: Liveweight Gains in Winter Born Lambs (mean of ram and ewe lambs)

	No. Lambs	Birth wt	Docking wt	Early Weaning	Late Weaning	End
Date		6/7	6/8	27/8	26/9	14/11
Age (days)		0	32	53	83	132
Early Weaned						
Liveweight (kg)	118	4.3	11.3	15.1	17.7	24.2
Growth (g/day)	118		223	179	88	132
Late Weaned						
Liveweight (kg)	124	4.3	11.3	14.5	18.7	25.5
Growth (g/day)	124		221	148	141	139

Winter born lambs grow slightly slower than the spring born lambs during lactation; winter born lambs averaging 174 grams/day from birth to 80 days of age, while spring born lambs grew at 185 grams/day.

There was little difference in the final liveweight of ewes between the different treatments (Table 2).

Table 2: Ewe Liveweights

Weaning Treatment	No. Lambs	Mean Liveweight (kg/hd)		
		Docking: 6/6	Early Wean 27/8	Late Wean 26/9
Early 53 days	116	54.6	55.1	50.9
Late 83 days	116	54.3	53.4	51.4

Pasture covers reached a low point in both treatments during late September of around 1,100 kgDM. The early weaned lambs had estimated covers of >1300 kgDM/ha between 27th August and 26th September.

Discussion

- Despite having ample feed, early weaned lambs showed a severe reduction in growth rates after weaning
- Feed quality may not have been appropriate for young lambs as a sole diet
- Subsequent improvements in growth rate of the early weaned lambs may be associated with improved pasture quality and the lambs adjusting to the solely pasture based diet
- Early weaning had little advantage on ewe liveweight due to the need to restrict ewe intake to maximise feed availability for lambs
- Early weaning winter lambs will impact on lamb growth rates
- No advantage in early weaning winter born lambs.

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14.0 Responses in Young Sheep to Fungicides Applied to Grazed Pasture

Internal MAF Report Number 65, August 1973

Introduction

Hogget enzootic pneumonia was widespread and may be associated with hogget ill-thrift and poor growth rates. The fungus *Myrothecium* will kill sheep in large doses, while small doses may increase susceptibility to pneumonia. Laboratory analysis suggests a dose of 1ppm benomyl inhibits growth of *Myrothecium* spp and that applying benomyl to pasture will limit the growth of the fungi. A trial was set up to monitor the effect of spraying benomyl on pasture grazed by hoggets. The trial showed a significant reduction in signs of ill health (scouring and runny noses) but no consistent effect on liveweight gain.

Design

Four trials were run in total, sites were Pukekawa in 1972 and 1973 and Wharapapa in 1973. All plots received an application of thiabendazole (0.3 kg/ha) in an attempt to prevent facial eczema. Benomyl was applied to treatment plots at 0.56 kg/ha in January and March. The control plots received only the thiabendazole. All plots were stocked with hoggets at a heavy rate, with the hoggets weighed regularly and kept free of parasites. Drought conditions affected all trials in both years and facial eczema symptoms were noted on Trial 1 in 1972.

Tests indicated *Myrothecium* spp was present in the pasture samples. It was not possible to determine whether benomyl treatment reduced the incidence of toxic *Myrothecium* strains

Results

Liveweight changes of hoggets are shown in Table 1 and scouring symptoms are shown in Table 2. Trial 1 showed a response, but this may have been complicated due to cases of facial eczema. Trial 4 showed a liveweight difference which just achieved significance.

Table 1: Liveweight Changes of Hoggets (kg/head)*

Treatment	Trial 1 Jan-Mar 1972	Trial 2 Mar-May 1972	Trial 3 Jan-May 1973	Trial 4 Feb-May 1973
Control	3.6*bA*	8.4*a*	0.5*a*	1.1*aA*
Benomyl	5.2*aA*	8.5*a*	0.3*a*	0.3*bA*
MSD	1.8 (1%)	1.2 (5%)	1.0 (5%)	0.7 (5%)

** Values with different letters indicate significant differences (a,b = 5%, A,B = 1%)*

Table 2: Scouring symptoms (1972 trials)

	Trial 1		Trial 2	
	Scouring	Not Scouring	Scouring	Not Scouring
Control	20	20	13	27
Benomyl	7	33	3	36

There was a significant reduction (1%) in scouring symptoms associated with the benomyl treatment. Scouring and 'runny noses' did not occur in the 1973 trial

Conclusions

1. Laboratory studies have shown that benomyl will inhibit growth of *Myrthecium* spp.
2. Spraying benomyl onto pastures grazed by hoggets reduced the incidence of 'runny nose' symptoms in two trials, but has not shown any consistent effect on liveweight change.
3. The role of pasture fungi in stock health during the autumn needs further investigation.

Reviewer Comment:

The role of facial eczema in this project could have had a significant effect on both stock health and liveweight gain. Later trials have shown that the main cause of autumn ill-thrift is low pasture quality and parasites. The role of mycotoxins and fungi in stock health has not been clearly defined.

15.0 Ryegrass Endophyte and Cattle Growth

Author: H.S. Easton & J.N. Couchman
Grasslands Research And Practice Series No 7 57-62 1999

Introduction

Ryegrass endophyte is thought to be implicated in episodes of poor animal performance, especially during autumn. Heat stress caused by ergovaline is associated with ryegrass infected with endophyte. This project looked to establish the different in cattle performance between animals grazing ryegrass pasture infected with endophyte and animals grazing pasture without endophyte.

Design

A farm in Kaeo was used for this project. Pastures were managed to reduce the formation of seed-head in the preceeding spring, in April 1996 the old pasture was sprayed out and re-sown with Nui ryegrass, with and without the wild-type endophyte. The new pastures established well and were managed as normal. An insecticide (2 kg/ha isazophos) was applied regularly to keep the endophyte sward free of insect attack. The insecticide has a 21 day with-holding period, which presented issues with grazing management in some situations.

Yearling heifers were grazed across the treatment areas for approximately one month during several periods of the year:

- 4th November to 4th December 1996
- 13th January to 10th February 1997
- 10th March to 10th April 1997

Stock numbers were adjusted to ensure intake remained constant. Weaner bulls were grazed from 8th January to 4th February 1998. Liveweights, rectal temperatures and blood samples were taken regularly along with observations of respiration rates.

Results

Ambient temperatures were recorded and seldom rose above 30^{0}C. Pasture analysis indicated 91% of endophyte treatment samples were infected with endophyte, while none of the endophyte-free samples were infected. Endophyte treatment ryegrass was also shown to have higher levels of ergovaline (0.4 – 0.8 ppm).

The pasture contained a very high component of ryegrass early in the season, however by early March the ryegrass component had fallen to 60% with other C4 grasses making up 30% of the pasture. By late March the C4 grass growth had slowed and ryegrass once again accounted for more than 90% of green leaf. Clover made little contribution to pasture during this trial.

Ryegrass staggers was observed in a few animals grazing endophyte infected ryegrass in the summer and autumn of 1997. In February 1997 between 20 – 50% of heifers were recorded as suffering ryegrass staggers. Few animals in the non-endophyte infected ryegrass showed symptoms of ryegrass staggers. Heat stress was also recorded in heifers (salivation).

At no time during the trial were differences in rectal or vaginal temperatures recorded between treatments. Respiration rates recorded in the summer and autumn of 1997 showed no significant difference between treatments. In February 1998 weaner bulls grazing endophyte infected ryegrass had significantly (p=0.01) higher respiration rate than bulls grazing endophyte free ryegrass.

Blood analysis indicated heifers grazing the endophyte free ryegrass had significantly (p=0.01) higher mean serum prolactin levels (86 ng/ml) than heifers grazing the endophyte infected ryegrass (46 ng/ml). Ergovaline is thought to inhibit an increase in prolactin levels, which is a normal response to an increase in ambient temperature.

Liveweight gain differences are outlined in Table 1.

Table 1: Animal mean unfasted liveweight (kg/head) at the start, middle and end of each grazing sequence.

Period	*Treatment*	*Liveweight (kg/head)*			*Liveweight Change (kg)*
		Start	*Mid*	*End*	
Spring 1996	+ Endophyte	314		343	29±2.3
	- Endophyte	318		349	31±1.5
Summer 1997	+ Endophyte	374	392	392	18±1.8
	- Endophyte	374	389	389	15±1.6
Autumn 1997	+ Endophyte	403	436	425	22±2.1
	- Endophyte	405	431	421	16±1.7
Summer 1998	+ Endophyte	190	197	201	11±1.4
	- Endophyte	194	198	203	9±1.3

Cattle gained weight significantly faster (p=0.01) on endophyte-free ryegrass in autumn 1997. In summer 1997 and summer 1998 there were small advantages to the endophyte-free treatment, which were not significant. The cumulative trend over the three grazing treatments was significant (p=0.03). The animals tended to gain weight early in the period, then hold or lose weight during the latter part of the grazing period.

Discussion:

- Endophyte free pasture established successfully in the first year, but despite regular insecticide application, the pasture failed to persist and had to be re-sown in the second year
    - Establishment in the second year was much poorer, with ingression from volunteer ryegrass
- Animals grazing endophyte free ryegrass gained more weight than heifers grazing infected ryegrass for a two week period in autumn 1997
- Combining the three grazing sequences together shows animals grazing endophyte free ryegrass gained more weight than animals grazing ryegrass infected with endophyte
- The difference between endophyte treatments was greatest when the animals were pasture quality was highest
- This trial is consistent with other liveweight gain trials comparing ryegrass with and without endophyte.
- Bulls were observed panting 35% faster on endophyte infected ryegrass, indicating heat stress is a factor on Northland farms.

Contactors Comment:

This project was undertaken prior to the release of AR1 and more recently AR37. AR37 offers the benefits of insect resistance without the negative effects on animals production. Early results indicate AR37 is well suited to the Northland environment, growing more pasture than standard endophyte growth. This trial highlights the danger of poor pasture persistence with low endophyte ryegrass.