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Matching sheep and beef policies to pasture supply on Northland hill country

C.R. PAGE', R.D. THOMSON' and R.W. WEBBY[2]
[1] *Thomson Page & Associates, PO Box 1880, Whangarei*
[2] *AgResearch, Private Bag 3089, Hamilton*

Abstract

Farm monitoring on sheep and beef cattle farms in Northland has been in operation for the past 8 years. The emphasis has been on monitoring the performance of sheep and beef cattle farms to provide the data to encourage group members to make decisions based on objective measurements. Monitor groups were initially supported by extension and science personnel with more recent groups being operated on a commercial basis. Key biological indices such as animal numbers, weights, weight gain, meat and wool production and pasture production are monitored. Group members are encouraged to use information from the monitor farm to identify opportunities on their own farms for improvement in production and income. Significant gains have been made in production but it can take 3 to 5 years for the full benefit to be realised. Pasture production information has been vital to identify changes in feed supply from year to year during the monitoring programme. Farm monitoring in the future is likely to be the basis on which farmers will be able to meet year-round supply of product based on specifications of weight, date and carcass attributes.

Keywords: beef and cattle, farm monitoring, objective measurement, pasture production, sheep

Introduction

Farm monitoring on sheep and beef farms was initiated in the Waiotira district in May 1988 by MAF Technology consultants in Whangarei and scientists from Whatawhata Research Station. Two properties were monitored from 1988 until 1991. These farms are referred to as the Waiotira High Fertility farm (WHF) and the Waiotira Low Fertility farm (WLF). Following 4 years of monitoring the WHF and WLF farms the Waiotira monitor and discussion group resolved, in 1991, to continue with a monitoring programme on another property which was selected by the group and named the Waiotira Monitor Farm (WMF). The following year farmers in the Maungaturoto district also requested that a monitor farm be established. Monitoring at Maungaturoto began in May 1992 where the farm is known as the Maungaturoto Monitor Farm (MMF). The later two monitoring properties are fully funded by the farmers involved. The collection of pasture production information is funded by Farmer Fertiliser Ltd Whangarei. Thomson Page & Associates are the Consultants that operate these two properties in conjunction with the chairman for each group.

The process

Details of the process of farm monitoring applied in this programme were outlined by Webby & Sheath (1991). The key element in the programme is the involvement of about 20 to 30 farmers that form the monitor group. The farmers with support from the consultants select a group members farm to be the monitor property. The term of the programme is 3 to 4 years. The farm is visited four times during the year, in February, May, August and November.

Pasture production is measured 10 times per year by monthly cage cuts (Radcliffe 1974) from April to December then two 6-weekly cuts. The pasture production data are monitored by aspect and contour on 4 to 6 separate sites. Total farm cover assessments arc made in May and November. Soil fertility is monitored by annual soil testing carried out by Farmer Fertiliser field officers.

Information about animal liveweights and liveweight gains is collected at strategic times as recommended by AgResearch Whatawhata. Total meat and wool production is recorded and adjusted for opening and closing stock numbers and weight. The first year of monitoring is the base year during which the above-mentioned data are collected. The purpose of the group meetings is to look at the farm at the key times of the year to observe, discuss and come to an understanding of the stocking policies and the grazing management systems on the, farm. At the end of the first year the group makes recommendations about changes to the stocking policies and the 'grazing management systems on the monitor farm. These decisions are based on the data collected on the farm. The computer model Stockpol (McCall *et al.* 1991) is used to help analyse the data and to look at the likely results from any changes made.

The recommendations are negotiated with the monitor farmer and a consensus is reached. As part of this process objectives are established with performance indicators so that progress towards achieving the objectives can be measured. For the next 2 to 3 years the measuring and monitoring process continues. Recommendations are reviewed as required.

Description of the monitor farms

Waiotira high fertility farm (WHF)

This property consists of 295 ha in grass with average Olsen P levels of 22 at the start of the programme in 1988. The ratio of easy to steep land was 55:45. The predominant soil type was Waiotira clay an immature gumland soil.

Waiotira low fertility farm (WLF)

This property consists of 250 ha in grass with average Olsen P levels of 11 at the start of the programme in 1988. The ratio of easy to steep land was 48:52. The predominant soil type was Waiotira clay.

Waiotira monitor farm (WMF)

This property consists of 520 ha in grass with average Olsen P levels of 10 at the start of the monitoring programme in 1992. The ratio of easy to steep land is 48:52 and the predominant soil type is Waiotira clay.

Maungaturoto monitor farm (MMF)

This property consists of 324 ha in grass and the average Olsen P levels were 18 at the start of the programme in 1993. The ratio of easy to steep land is 51:48 and the predominant soil types are Waiotira clay and Aponga clay which is a more mature gumland soil.

Table 1 Farm details for the Waiotira high fertility farm.

	1988189	1989/90	1990/91	1991192	1992/93	1993194
Breeding ewes	1302	1010	830	800	800	705
Hoggets	809	520	376	321	260	385
Rams	20	20	36	15	15	13
Breeding cows	80	72	130	146	189	125
R 2yrheifers	8	51	77	125	15	
R 1yrHeifers	110	137	183	130	86	97
R 1yrsteers	a2	95	107	30	20	12
R 2yrsteers	55	80	80	84		
R 3yrsteers	44					
R 1yrbulls				58	146	195
Breeding bulls	4	5	2	5	4	3
Total SU	3687	3430	3857	3855	3231	3085
SU/ha	12.2	11.36	12.77	12.27	10.7	10.5
Sheep SU %	55	40	26	43	31	33
Breeding SU %	48	42	42		60	47

Table 2 Farm details for the Waiotira low fertility farm.

	1988/89	1989190	1990191	1991192	1992193	1993/94
Breeding ewes	1178	1071	1110	1067	850	850
Hoggets	690	419	381	200	27	265
Rams	20	20	24	30	79	9
Breeding cows	73	65	67	68		97
R 2yrheifers	36	32	10	11	12	10
R 1yrHeifers	27	24	12	25	51	40
R 1yrsteers	74	55				42
R 2yrsteers	42	56				
R 3yrsteers	5		6			
R 1yrbulls			115	188	155	179
Breeding bulls	2	2	2	2		4
Total SU	2942	2596	2393	2553	244:	2841
SU/ha	11.8	10.4	9.6	10.2	10.2	11.4
Sheep SU %	57	54	58	48	41	37
Breeding SU %	55	56	63	58	54	50
Grassed area	250	250	250	250	238	248

Table 3 Farm details for the Waiotira monitor farm.

	1991/92	1992/93	1993/94	1994195
Breeding ewes	2550	2123	2270	2100
Hoggets	1000	1135	637	600
Rams	40	42	27	30
Breeding cows	214	227	170	200
R 2yrheifers	17	40	36	4
R 1yrHeifers	100	148	125	129
R 1yrsteers	a5	104	88	104
R 2yrsteers		8	2	2
R 3yrsteers			5	4
Breeding bulls	9	11	5	a
Total SU	5494	5681	4887	4802
SU/ha	10.6	10.9	9.4	9.2
Sheep SU %	61	53	57	54
Breeding SU %	70	61	67	69

Table 4 Farm details for the Maungaturoto monitor farm.

	1992/93	1993194	1994/95
Breeding ewes	1212	1007	1185
Hoggets	586	390	372
Rams	20	20	20
Breeding cows	192	172	123
R 2yrheifers		12	25
R 1yrheifers	60	a4	119
R 1yrbulls	220	192	186
Breeding bulls	4	3	5
Total SU	4068	3627	3680
SU/ha	12.5	12.3	12.4
Sheep SU %	41	36	40
Breeding SU %	58	56	52
Grassed area	324	296	296

Recommendations and results

Waiotira high fertility farm (WHF)

Details of the management and stocking policies were recorded by Webby & Sheath (1991) together with the policy and management recommendations. A brief summary of the stocking polices follows together with the results achieved during and after the monitor programme was completed.

During the monitoring period 1989 to 1992 the policies on this farm followed the general trend in Northland of a decline in the sheep to cattle ratio (Table 1). The emphasis in the base policy was on finishing steers at 27-30 months and surplus heifers at 20-24 months. However, by comparing pasture growth rates with animal requirements it become clear that the finishing policies increased the autumn feed demand and created feed deficits which led to low pasture covers at the beginning of the winter. The low pasture covers at the start of winter resulted in animal liveweight gains that were below the target level for the winter period.

As a result of the monitoring programme changes were made to stock disposal times from January to August to a complete reversal of August to January. Also there was a move from finishing steers at 30 months to a bull finishing policy at 15-17 months. Surplus heifers were sold sooner for local trade at 16–18 months. The completion of the policy changes took place after the monitoring programme finished on this farm at the end of the 1991/92 season. Table 5 show the details of the production achieved as a result of the recommendations made.

Waiotira low fertility farm (WLF)

Details of the management and stocking policies were recorded by Webby & Sheath (1991) together with the recommendations that were made. The monitoring programme identified that the single biggest constraint to production was inadequate utilisation of the feed grown. Improvements to the feed management system by feed budgeting, rotational grazing and better allocation of feed priorities was implemented. Table 6 gives the details of the production achieved as a result of the recommendations made.

The stocking policy changed on this farm as listed in Table 2. This table illustrates that sheep numbers declined and the cattle policy changed from finishing steers at 27 months to finishing bulls at 15-l 8 months. Pasture control in November was inadequate, resulting in a recommendation to increase breeding cow numbers so that improved pasture control during the late spring would improve pasture composition for the summer and autumn period. Lamb disposal was changed so that all surplus lambs were sold by 1 March each year.

Table 5 Animal production from the WHF farm.

	88/89	89190		90/91	91/92	92/93	93/94
Wool/Sheep SU	5.5	**4.5**	**5.2**	**4.4**	5.5	**5.7**
Sheep meat/SSU	9.6	11.6	10.9	11.6	**12.9**	16.0
Beef meat/CSU	**16.7**	**17.5**	**17.2**	**17.1**	**22.1**	**32.0**
Total meat/ha	**160**	**171**	197	**200**	195	279

Table 6 Animal production from the WLF farm.

	88/89	89190	90191	91192	92/93	93/94
Wool/Sheep SU	4.16	3.60	3.64	3.9	4.15	4.25
Sheep meat/SSU	**7.8**	**8.3**	9.7	**8.1**	9.5	10.1
Beef meat/CSU	19	19	27	26	24	23
Total meat/ha	132	133	**165**	**182**	**164**	**165**

Waiotira monitor farm (WMF)

The monitoring programme started in August 1992. The group placed an emphasis on policies that would improve the performance of existing polices, with a special emphasis on improving sheep performance. The reason for a change in emphasis was attributed to previous monitor programmes achieving most of the gains in production by improvements in cattle performance. The WMF cattle policy was based on breeding cows, with the steer offspring sold as yearlings on the spring market in October. All the heifer calves were wintered, with the lighter ones sold in October as yearlings and the balance finished at 20-24 months at 200 kg carcass weight. The herd consisted of Friesian-cross-Hereford cows mated to a Charolais terminal sire.

The objectives and performance indicators established by the group during the first year were as follows.

Sheep

To lift the weaning percentage from 85% to 100% survival to weaning

- weaning weights of ewe lambs at 10 weeks 20 kg
- ewe hoggets at 31 May 35 kg
- mixed age ewes and two-tooths at 31 December 55 kg
- minimum weight for all ewes 45 kg

To lift ewe fleece weights from 4.0 to 4.5 kgper ewe

- select rams with high breeding value fleece weights

To maintain lamb drafting weights at 15.0 kg

Cattle

To achieve 95% calving percentage from pregnant cows and heifers

- only breed from heifers at 250 kg or heavier by 1 October
- mate the heifers for 42 days to calve 3 weeks before the mixed age cows

Average weaning weight of calves of 240 kg at 200 days from mean calving date

- cows' performance recorded and 15% culled each year for low 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 kg/ha over mating and post-mating to weaning of no less than 1400 kg/ha
- yearling steers to be wintered to grow 0.7 kg liveweight gain per day from 1 May to 1 October

Table 7 Annual production from the WMF farm.

	91/92	92/93	93/94	94195	95196
Sheep					
Weaning %	85	81	94	77	108
Ewe fleece weight	3.9	3.93	4.28	5.15	
Av lamb weight	15.0	15.65	14.95	15.1	
Cattle					
Weaning %	96	73	93	91	91
Av weaning weight 200 days					
Yearling steer weight 400 days	344	306	330	334	
Total meat/ha	147	96	116	106	
Wool wt /sheep SU	4.22	4.27	5.15	6.34	

There has been good progress, with improvements in wool weights and lambing percentage. The lambing percentages are expressed as lambs docked to ewes joined. The mixed-aged ewes were 55.5 kg and the two-tooths 52 kg for the 1994 mating. The ewes were scanned by ultra-sound and a 100% lambing was predicted. However, at lambing 14% of the ewes were diagnosed not pregnant and another 12% were subsequently assessed as having lost lambs at or near birth. The reasons for this poor response were not found and the lesson learnt was that a more comprehensive animal health monitoring programme was needed. However, with the 1995 lamb docking result the programme is on target to meet all goals. Performance indicators for sheep have been achieved by meeting liveweight targets by due date.

The winter of 1992 (before the initiation of the farm monitoring programme) was severe, resulting in high cow deaths and a low calving percentage. The carry-over effect was expressed in a spread out calving pattern the following season. However, since then the calving pattern has improved and for the 1994 calving 80% of cows and heifers calved in 3 weeks and all cows calved in 6 weeks. The calving pattern in 1995 is similar, all cows calving within the 6-week target. Another carry-over effect from the 1992 winter was a reduction in stock numbers the following year due to 80 (36%) empty cows. Total meat production per ha has declined as a result.

The overall objective was to increase production within existing policies. However, as the pasture growth information has come to hand it has become clear that the feed demand for the existing cattle policy does not fit with the pattern of feed supply. Selling yearling steers on a volatile spring store market in October has also proved to be very unpredictable in terms of financial returns. The main concern has been reduced spring–early summer feed demand, which has led to a surplus of feed on the farm during the late spring and summer period with an accumulation of low quality feed on the farm which is not suitable as a production ration. The ramifications of poor spring and early summer feed control resulting in poor subsequent autumn and spring growth have been reported by Sheath ***et al.*** (1984). Production and financial comparisons with other farms within the two monitor groups analysis clearly indicate that stocking policies that give a better fit with feed supply are also more profitable.

Maungaturoto monitor farm (MMF)

The monitoring programme started in May 1994 on a property that had been operating at a high level of performance, The base level of production during 1991 to 1993 was an average of 193 kg meat/ha and 50 kg wool/sheep SU/ha and an average lambing of 107%. The overall objective set by the monitor group in August 1995 was for a 20% lift in production as expressed in meat production per ha by 31 July 1998. The goals are to achieve a 120% lambing (lambs docked to ewes mated), 230 kg meat per ha and 60 kg wool/sheep SU/ha. The sheep policy is currently Border Leicester rams over Romney ewes with resultant offspring mated back to Romney rams, Emphasis in selection has been on production and facial eczema tolerance. The breeding cows are Friesian-cross-Hereford mated to a Maine Anjou terminal sires, with the bull calves kept entire and the heifer calves sold to local trade. Friesian bull calves are reared to add to the number of bulls carried .

The farming policies that have been adopted to achieve the goals were as follows:

- At lamb weaning all lambs less than 18 kg liveweight are sold store. These were lambs that would not reach killable weights (13.5 kg carcass) by the end of February. Any male lambs at weaning over 33 kg are sold to the works. Only the top 35% of ewe lambs are retained from weaning.
- All cull ewes to be sold at weaning or soon after.
- All bulls to be finished at 220-240 kg by the end of February.
- All local trade heifer sold by 31 March.

Discussion

The accumulated experience on the four properties over 7 years has resulted in the identification of some key issues that have been common to all four properties.

- Changes in stock policy from breeding to finishing and from sheep to cattle have increased the difficulty in matching feed demand with feed supply.
- There is difficulty in growing young stock through late summer and autumn due to the lack of feed quality in conventional pasture.
- Feed supply varies between years and may be modified by the use of nitrogen fertilisers, forage cropping or supplementary feeding.
- Inadequate feed levels on the farm in autumn and early spring limit growth rates of all young animals, both sheep and cattle.
- Lambing and calving dates need to be adjusted to give a better fit of animal feed requirements with pasture growth rates.

Stocking policies

All four monitored properties have breeding cows and breeding ewes. While one farmer sells yearling steers the others finish all surplus stock but have a component of bull beef as well.

On all four properties it is clear that there is a conflict between having finishing stock on the farm during the autumn and the need to increase pasture covers. During the years 1988 to 1994 there were a number of dry summers where the dry conditions extended into the autumn and the usual autumn flush of feed did not occur. As the ratio of cattle to sheep increases or the ratio of finishing stock to breeding stock increases the requirement for a higher pasture cover in May also increases. This was accentuated on the monitor farms where cattle numbers increased at the expense of sheep. Likewise when the number of finishing animals increased relative to breeding animals autumn pasture covers were reduced. These experiences have also been reported by Webby (1993) who also emphasised the need to analyse the biological feasibility of a stock policy before it is adopted. To overcome this conflict recommendations have been made to have stock disposal policies which do not conflict with the goal to have adequate autumn pasture cover. Current policies aim to achieve the winter carrying capacity by the end of February.

The spring feed demand declined as the number of breeding animals as a portion of total stock numbers declined. This was due to the fact that there were fewer lactating animals to control the spring growth. Hence the recommendation to increase the number of breeding cows carried on both the WHF and WLF farms. For the same reason the WMF increased ewe numbers in 1995 to help control spring surpluses. The monitor group now recognise that a change in the cattle policy on the WMF is needed and the sale of yearling steers in the spring needs to be reviewed. On the MMF monitor farm the current stocking rate and farm policy results in very good pasture control throughout the year.

The feed budgeting on all the monitor properties over the past 7 years has attempted to allocate feed to achieve target production levels for each class of stock. To obtain these targets the feed on offer and the residual left after grazing are important. The feed budgets consistently indicate the **need** for a pasture cover on the farm by the 1 May of at least **1500** kg per ha with the sheep to cattle ratios indicated. When the required pasture cover was achieved the winter liveweight gains for hoggets and finishing cattle were realised. The carry-over effect was that stock disposal was possible before the summer dry spell and there were fewer finishing stock still on the farm in the autumn.

Recommendations

The experiences of the Northland monitor farm programme have lead to the following recommendations.

1. Stock on the farm by the end of February should be the stock that are to be wintered.
2. To improve lambing percentages emphasis must be placed on achieving target weights for replacements, e.g.,

Weaning	**20** kg
31 May	**35** kg
31 December	**55** kg

3. A breeding cow component is essential for the control of surplus spring feed and the utilisation of stalky dead summer feed.
4. Finishing cattle at an earlier age (less than 2 years) This will be aided by a component of bull beef and will result in a more efficient conversion of grass to meat production.
5. The onset of calving and lambing should be based on the ability to match feed demand with feed supply

so that the lactating ewe and cows feed requirements are met.

Future directions

Sheep and beef farm monitoring has proved to be a positive influence in the performance of the monitor farms. Although some participating farmers claim to have adopted similar policies and practices to the monitor farm, until recently there has been no real evidence of this. The introduction of production and financial analysis to group members has revealed that the top three farms based on production and financial performance have in fact adopted similar policies to that recommended to the WLF, WHF and MFM farms. Tables l-4 show the important differences in stock numbers and stock classes which reflect stock policy plus performance levels. Attention should also be given to the fact that the high performing farms average 55% of their stock units in breeding stock.

Three important areas should be further explored and developed through farm monitoring. The first opportunity is with the development of systems to monitor pasture production more efficiently. It is suggested that with knowledge of contour, aspect, fertility, strategic pasture covers and with reference to a centrally located site (where actual pasture measures are taken), annual pasture production could be simulated. A system as suggested would be less expensive and more available to all members of the monitor group.

The second opportunity is with the expansion of production and financial analysis, Presently only 24 farms have been effectively analysed. It is suggested that a minimum of 50 farms be analysed so that a significant number of farms within policy type or fertility level (for example) could be compared.

The third area for development is in product quality. Currently farming systems depend on marketing product to an average-based payment system. Future opportunities will depend on a value-based payment system whereby product is specified at time of kill and valued according to quality (Pleasants pers comm.; Canning 1995).

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