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## A FARM GRAZING SYSTEM IN SOUTHLAND — AN ADVISER'S RECOMMENDATIONS

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### Abstract

Based on farm trials and observations, a management system is recommended that covers three criteria: (a) an above-average stocking rate; (b) high per head performance; (c) very low cost.

The main features of the system are: (a) rotational grazing all year on grass; (b) ewes and hoggets have separate rotations for most of the year; (c) rotation lengths are designed to achieve maximum available feed at times of high animal intake; (d) supplementary feeding is minimal.

The major advantages, cost savings, and limitations are described. Future research needs to optimize this system are discussed.

### INTRODUCTION

ANNUAL statistics have shown that average stocking rates in Southland have increased in the last two decades from 12 to over 16 s.u./ha, with a slight drop again in the last couple of years. Simultaneously, lambing percentage has declined. The average for Southland County was 120% in 1965, dropping to below 100% in most years in the 1970s. This drop is associated with lower ewe liveweights.

However, production of over 130% lambing and 4.5 kg wool per ewe is being achieved by some farmers, and we believe that this can be achieved on more farms in the developed areas of Southland at stocking rates of 16 s.u./ha and above. This paper makes recommendations for achieving this under the important criterion of a low cost system. The principles involved have application for any type of pastoral farming.

In the past, grazing systems for ewes have been suggested without regard for the effect on hoggets. Successful hogget rearing is an integral part of any system, especially when high per head production is required. A minimum target of 60 kg for two-tooth tupping liveweight is set. This can be achieved in the majority of seasons under the management system described below.

The most important feature of the system is that ewes and hoggets are rotationally grazed on grass with limited hay supple-

ment. Under any high producing system a careful balance between feed supply and feed demand is required. This can only be achieved accurately under a rotational system, and recommendations in this paper are designed to give maximum pasture production (feed supply) while achieving optimum feeding levels (feed demand).

## THE SYSTEM

## FEED SUPPLY

One important factor influencing pasture production is the length of spell between grazings. A. J. Harris (pers. comm.), comparing winter rotation lengths at Gore, found that an 84-day interval produced more feed compared with intervals both longer and shorter than this. Recommended spelling intervals at different times of the year are as follows (the rotation lengths other than winter are based on observations in Southland) : winter, 80 to 90 days; spring, 21 reducing to 12 days; summer, 30 increasing to 45 days; autumn, 40 to 45 days.

At any time of the year the grazing period does not extend for more than 3 days.

## FEED DEMAND

Several estimates of feed intake for grazing sheep have been made (Jagusch and Coop, 1971; Milligan and McConnell, 1975). For practical feeding purposes, there is a need for a knowledge of feed allowance (measured in kg DM to ground level) to achieve the required performance. Recent estimates of feed allowances (Rattray, 1977; Rattray and Jagusch, 1978; Thompson and Cooney, 1978) have been modified as additional information has become available from Woodlands Research Station.

The relationship between liveweight gain and feed allowance for lambs in late summer is expressed in Fig. 1, and this relationship for ewes in mid winter, 1978, is presented in Table 1.

TABLE 1: LIVEWEIGHT GAIN/FEED ALLOWANCE  
RELATIONSHIP FOR EWES IN MID WINTER

<i>Feed Allowance</i> (kg DM/day)	<i>Liveweight Change</i> (kg over 40-day period)
0.7	- 2.47
1.2	+ 0.69
1.7	+ 2.28
2.2	+ 3.27

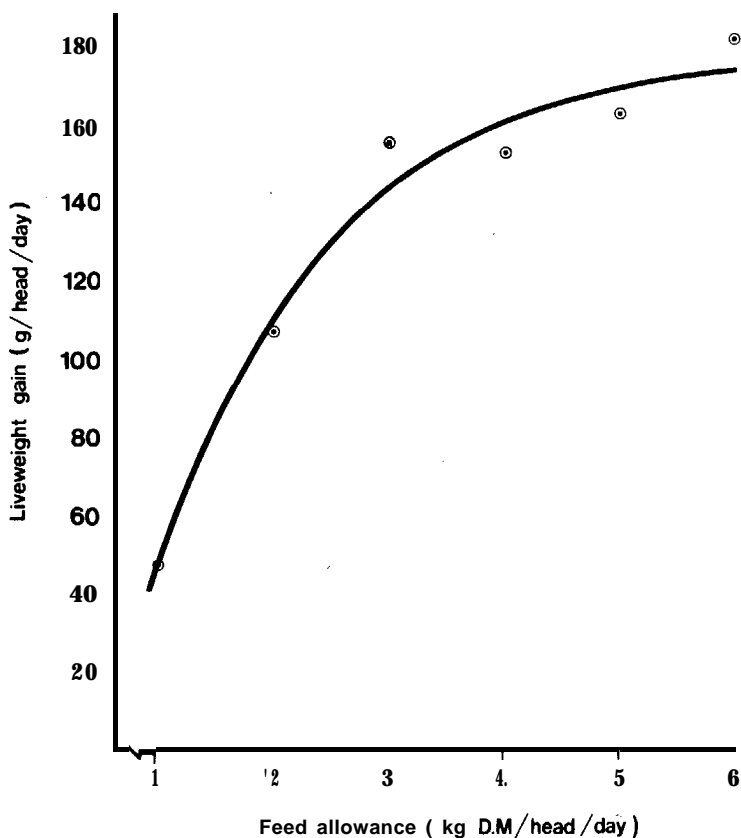


FIG. 1: *Summer liveweight gain of lambs.*

The feed allowances for grazing sheep (kg DM/day) currently being used by advisers and research workers in Southland are as follows :

Ewes:

Mating	4.0
Winter maintenance	1.1
Late pregnancy	2.0
Lactation	3.0 - 5.0
Summer maintenance	2.5

Lambs:

Spring and summer	2.0
Winter	1.0 - 1.5

Hoggets:

Spring and summer	3.0 - 6.0
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An allowance of 1.1 kg DM/day will maintain a ewe in mid pregnancy. The increased allowance before lambing and during lactation is common and sound farm management practice (Coop, 1964). The allowance of 2.5 kg DM in summer is a tentative recommendation, and is dependent on the amount of dead material in the sward.

For hoggets, a growth rate of 80 g/day is required from weaning to winter. This is achieved with a pasture allowance of 2 kg DM/day. At this feeding level, lamb intake will be about 0.9 kg DM/day, and therefore utilization is less than 50%.

Drew et al. (1973) demonstrated that the level of winter feeding of hoggets had no effect on two-tooth reproductive performance, provided spring-summer nutrition was high. From rough field measurements a feed allowance of 1.0 to 1.5 kg DM/day during winter allows hoggets to maintain themselves and allows a little growth. During spring-summer an allowance of 3.0 to 6.0 kg DM/day can give a growth rate greater than 200 g/day.

The most important feature of this spring-summer feeding, and of any feeding requiring growth, is the relationship between the utilization at any grazing and the subsequent animal growth. The lower the utilization percentage the higher the growth rate, up to utilization percentages of 20 to 30%. This is best shown in Fig. 1.

The following system demonstrates application of the principles and how timing can be altered without problem.

#### MATING TO LAMBING

##### *Ewes*

Table 2 gives the recommendations for ewes. The 35-day rotation at the start is designed to give a good livkweight gain and flushing effect during mating. In Southland, mating is very concentrated, 85 to 95% of ewes being successfully mated in the first 17 days. This is the reason for starting the gradual cutbacks after only 21 days.

The optimum winter rotation is 90 days on maintenance or below, and 21 days of a build-up for lambing, all on one rotation if possible. This allows the optimum spelling interval to be achieved on most of the farm.

In early winter, ewes at good bodyweights can lose weight without any detrimental effect. This is achieved with a feed allowance of 0.9 kg DM/day. In the month before lambing, feeding levels need to be raised, and a good balance between feeding too

TABLE 2: WINTER EWE MANAGEMENT  
(Overall stocking rate: 16 to 20 ewes/ha)

Starting Date	Rotation Length (days)		Feed Offered* (kg DM/day)	Stocking Rate (ewes/ha)
Apr. 5	21	} 34 total	4.0	340 - 420 900 - 1100
Apr. 26	13			
Mar. 10	25	} 110 total	} 1.1 0.9 1.1 2.0	1450 - 1800  <b>500 - 1000</b>
	30			
	30			
	25			

\*Includes 0 to 1 bales hay fed only at the maintenance or sub-maintenance level.

much and too little has been found at 2.0 kg DM/day, which has been satisfactory for mobs with high per head performance. It can be reduced for lower producing ewes.

#### Observations

The frequency of shifting of ewes is relatively unimportant in the context of the overall system, but a daily shift appears to be favoured. The advantages include the ease of planning the rotation, less hay being fed because of better pasture utilization, and treading damage being kept to a minimum. An important advantage of a frequent shift is good animal health with even rationing each day. Death rates are minimal under this system. There is no reason why two-tooths cannot be run in the mob. They will in most cases lose more weight than the mixed-age ewes, but if the difference is large it is probably a reflection of the overall feeding of the mob. The same applies to removing thin sheep from the mob. While there are always a few thinner ewes, if these are causing real concern it is likely to be a reflection of the overall feeding.

#### Hoggets

The hogget system is working well on a number of farms. Table 3 summarizes the feeding.

No hay is required when feed levels can be maintained at over 1.0 kg DM/day. This can usually be done with ease. Also, hoggets eat only about 75% of the hay offered them (Thompson, unpubl.). Apart from economics, this remaining hay can inhibit regrowth by shading.

TABLE 3: HOGGET WINTER MANAGEMENT  
(Overall stocking rate: 25 hoggets/ha)

<i>Starting Date</i>	<i>Rotation Length (days)</i>	<i>Feed Offered (kg DM/day)</i>	<i>Stocking Rate (hoggets/ha)</i>
Apr. 5	50	1.5	1250
May 25	50	1.5	1250
Jul 15	30	1.5	750
Aug. 15	20	1.5	500

**LAMBING TO WEANING**

Lambing is carried on as usual, and this is the only time when the ewe and her lambs may be set-stocked to ensure that there is no chance of mismothering. This should take 4 days.

Table 4 summarizes the feeding during the period from lambing to weaning.

TABLE 4: EWE SPRING MANAGEMENT\*  
(Overall stocking rate: 16 to 20 ewes/ha with 130+ % of lambs)

<i>Starting Date</i>	<i>Rotation Length (days)</i>	<i>Feed Offered (kg DM/day)</i>	<i>Stocking Rate (ewes/ha at 3 days/paddock)</i>
Sep. 20	21	2.0 - 5.0	110 - 140/ha
Oct. 12	10-20	3.0-5.0	60 - 130/ha

\*This system is carried on until weaning.

The rotation should be started when the lambs are young - any time after they are 4 days old but before they are 10 days old. The early start has two advantages:

- (1) At the start of some rotations there is sometimes a period of low nutrition for the ewes. Coop et al. (1972) and Jagusch et al. (1972) have shown that restricting the ewe's intake for 7 to 10 days after lambing had only a marginal effect on lamb weaning weights, and this effect was mainly on twins. A check given later will have an effect on subsequent growth.
- (2) The early start enables the accumulation of feed reserves before the lambs start eating grass. This ensures that feed allowances have reached a high level 4 to 5 weeks after the start.

The initial stages of the rotation are made easy if 2 to 4 ha can be set aside for 3 weeks during lambing. At the start of the rota-

tion, 200 to 300 ewes and their lambs are stocked on the area for 3 to 5 days, and they then start a rotation of up to 21 days, at the time increasing the mob size. The optimum mob size appears to be 500 to 700 ewes and their lambs.

There is some work involved in setting up the rotation, but once it is established the work load on the whole farm is reduced. Any stock movement work, such as tailing and weaning, are made easy. Mismothering is not a problem.

### Hoggets

The hoggets have the ability to make very impressive growth rates at this time of the year. It is imperative that the recommended feed allowance of 3.0 to 6.0 kg DM/day is maintained even when there appears to be a high residual, because with that type of grazing growth rates of over 200 g/day have been achieved. Even 35 to 40 kg hoggets at the end of the winter can be grown into 60 kg two-tooths with that growth.

Table 5 summarizes the hogget rotation, the length of which is adjusted to allow the required feed allowances to be continually offered.

TABLE 5: HOGGETS  
(Starting at 25/ha)

<i>Starting Date</i>	<i>Rotation Length (days)</i>	<i>Feed Offered (kg DM/day)</i>	<i>Stocking Rate (hoggets/ha)</i>
Sep. 6	20	1.5 - 3.0	500
Sep. 26	15-20	3.0-6.0	375 - 500
Oct. 15	10-15	3.0-6.0	250 - 500

### WEANING TO MATING

At weaning in November or December when lambs are 8 to 12 weeks old, the rate of pasture growth is near maximum and will slowly decline throughout the summer and autumn (Radcliffe, 1974). Management objectives are to enable lambs to grow at over 80 g/day, to have two-tooths continue growing until mating, to maintain or build up ewe liveweights in preparation for shearing and the next mating, and to build up a reserve of high quality grass for mating and for wintering.

Lambs should be weaned on to the area that two-tooths have used during the spring. This area will have the lowest level of intestinal parasite infection and a good feed level. Lambs should be stocked at 50/ha, and with a 28-day rotation a feed allowance of over 2 kg DM/day is possible. As hay paddocks or new grass

paddocks become available, they should also be included in the lamb rotation.

It is common practice to have ewes in a rotation eating lower quality pastures and removing seed heads.' With an intensive rotation and a maximum of 3 days on any break, and with ewes at stocking concentrations of between 400 and 1200/ha, efficient control is possible. This is achieved by slowing down the ewe rotation from 21 days in December to 35 days in January and having two 42-day rotations before tupping.

At all times the ewes should be getting a feed allowance that allows for at least maintenance. In a dry season this may include a supplement.

#### DISCUSSION

All-grass wintering of ewes (Halford, 1972; Brown and Harris, 1972) has been suggested and readily adopted in Southland. The recommendations we have advocated extend the principles to hogget wintering and spring and summer management.

Rotational grazing at any time of the year is likely to increase pasture production. Thompson (unpubl.) has measured winter pasture growth of 15 to 22 kg DM/day on paddocks grazed by hoggets on a 42-day rotation, while under traditional management at the same time pasture growth was 6 to 10 kg DM/day. Current pasture production information (Radcliffe, 1974) has been collected on pastures traditionally managed, and the performance of intensively managed, rotationally grazed pastures is much improved.

In winter there are other areas where research is needed. These include the fact that the maintenance figure used for ewes (1.1 kg DM/day) has been calculated using grass and hay. It appears that this figure can also be used for grass alone, but this needs to be confirmed. There is a need to quantify the advantages (if any) of the daily shift over 2- or 3-day shifts on grass. One aspect not previously mentioned is the possibility of running the ewes and hoggets in one mob. This appears to be working on some farms with each sheep being offered 1.1 kg DM/day. This has obvious management advantages. The immediate pre-lamb recommendation of 2.0 kg DM/day can be increased or decreased depending on the expected lambing percentage, but it should be no lower than 1.6 kg DM/day and should always be in the form of a low-bulk, high-energy feed.

The main feature of this high producing system is the spring rotations. Animals will achieve good growth rates with high pasture production.

In the 1978 season, results in one trial at Woodlands Research Station gave an average advantage of 6 kg liveweight to ewes and 0.2 kg wool weight to the rotationally grazed ewes and lambs over set-stocked ewes and lambs. Lamb weights were the same, with high lambing percentages being associated with lighter lamb weights. There was about 30% more dry matter on the rotationally grazed area. These results supported farm weighings done where there was always an advantage to the ewes and the pasture under rotationally grazing, but only an advantage to the lambs under high stocking rates. These results support those of Lambourne (1953) and Wallace (1963) .

Rotational grazing under this system in the spring will have a beneficial effect on clover growth and on long-term pasture production. Kissick (1966) found that rotational grazing all year round gave advantages in ewe bodyweight of 4.5 to 6.8 kg, which led to 10% greater wool production and 7 to 15% better lambing percentages.

The system described will allow, in a normal season, a large surplus of feed. There are many options of how this feed can be turned into income. A traditional approach is to make maximum quantities of hay. This excessive conservation has left many farmers wondering why they cannot fatten lambs and why their lambing percentages are below average.

The *maximum* hay requirement for the system advocated is 1 bale per sheep (20 kg DM). Many farmers on efficient systems are using well under 0.5 bales per sheeep. When excess hay is made, there are a number of likely adverse effects:

- (1) Pasture regrowth on hay paddocks is affected, often until late winter. This means not only less summer and autumn feed, but more hay having to be fed in the winter.
- (2) The extra hay area has a detrimental effect on both lamb and ewe weights, and therefore a subsequent depression in lambing percentage and wool weights.
- (3) Hay is usually fed in winter, a time of the year that has not only become easy to manage but also has only minor effect on income. Wool growth is at a low level, lamb drop has already been decided, and unless feeding is grossly high or low there is little effect on production.

The first priority for use of surplus summer feed must be to maintain high ewe and lamb liveweights. After this, hay can be made for *minimum* requirements.

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These comments concerning conservation give rise to a research need to quantify some facts concerning the regrowth on hay paddocks. There is also a need over the summer period for more feed allowance data for maintenance of ewes taking into account different percentages of dead matter in the pasture. More information is also needed on optimum spelling intervals in pasture, especially in summer and autumn.

Feeding lambs and hoggets at the levels described will give satisfactory growth rates. However, there is a need for further study in Southland on integrating the grazing management with the principles of intestinal parasite control.

As a result of dry autumns in Southland, grain-feeding has become more common. There appears to be a notable lack of information on the response to feeding grain at or before tupping. Traditionally it is fed in winter or just before lambing. It would appear to have a much better economic use at tupping, but there is a need to quantify this.

For the system advocated to be successful, farmers and extension workers have to be able to assess dry matter levels and check at regular intervals what weight gains or losses have been made. Until these skills have been gained, farmers attempting to use all or part of the system should do so at more conventional stocking rates. Once there is an obvious feed surplus the stocking rate can be reviewed.

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