Nutrition and management of lactating ewes in New Zealand

SAM PETERSON
International Sheep Research Centre, Institute of Veterinary, Animal and Biomedical Sciences, Massey University, Private Bag 1222, Palmerston North

Abstract

Lactation is the most expensive physiological state and lactating dairy ewes require about five times as much energy as a dry ewe. The ability of the ewe to consume enough feed may limit production so foods with high energy concentration are required for maximum milk yields. International literature regarding ME requirements for lactating ewes is confusing due to different systems and units. ME requirement is the sum of maintenance, lactation, activity and liveweight change. Grazing Romney ewes with twins produce about 2600 g/d of milk and East Friesians produce about 3100 g/d of milk at peak lactation and decline to half of peak values by eight weeks. New Zealand dairy ewes grazing pasture and supplemented with crops and concentrates peak at 2–3 L at about a week and decline to about 1 L by 150–200 days. If concentrates in the form of total mixed rations constitute much or all of the diet, milk yields can exceed 600 litres/year in true dairy breeds (such as EF, Awassi, Lacaune and Assaf). The maintenance requirement of a 70 kg lactating ewe is about 10 MJME/d if on flat land. A lactating ewe with twins of 25 kg at 10 weeks requires 32 MJME/d if the diet contains 11 MJME/kg DM. Thus, the total ME requirement of such ewe and her twin lambs grazing flat land would be 42 MJME/d. These energy requirements can be met using high quality pasture, and forages such as chicory. Lactating sheep, especially dairy sheep and those with multiple lambs, should be fed at luxury levels, offered pasture, lucerne, or herb and legume mixes at over 2000 kg DM/ha with residuals over 1500 kg DM/ha. Addition of concentrates to the diet should be limited to 300 g/d.

Key words: Lactating ewes, dairy sheep, nutrition requirements, pasture lucerne and herbs

Introduction

This paper will consider nutrition of lactating ewes in New Zealand, both sheep raising lambs, and dairy sheep. With increasing lambing percentages, it is now more important than ever that ewes raising lambs are adequately fed. Furthermore, the sheep dairy industry in New Zealand is rapidly expanding (Peterson and Prichard 2015, 2016) so information on nutrition of dairy sheep will be valuable to new operators.

The international literature contains many scholarly articles on nutrition of dairy sheep but that information is complicated by the different nutritional systems used in different countries, by differences in the feedstuffs available, by the different breeds used, and by management and production differences. Current sheep farmers feed their flock almost exclusively on pastures, with strategic use of crops (such as kale, turnips or lucerne) in winter or dry summer areas, although there is increasing use of herb mixes. The few current sheep dairy farmers are using a variety of feeding systems suited to their district, their operations and the availability of feedstuffs; new operators will also follow that route.

My objective is to provide a simplified story that can be applied to sheep dairy farms in New Zealand. I will use the ME system that is already know by many farmers. Because it is expected that grazing pasture will be the major source of food, and since most pastures contain more than adequate protein, this simplified outline will be based upon the energy requirements of the ewes.
and will take no account of the protein requirements. Lactating ewes require a diet containing about 16% crude protein (Campbell and Marshal 2016) and our pastures far exceed that except in dry summers after seeding. Also, I shall concentrate on nutrition during lactation, but it should be remembered that body condition score (BCS) and prepartum nutrition will affect milk yields.

The fundamental aspects that underlie this topic are that lactation is the most expensive physiological state and lactating dairy ewes will require about five times as much energy as a dry ewe. The inability of the ewe to consume enough feed may limit production. Grazing sheep do not receive glucose from digestion so it must be made by gluconeogenesis to provide for lactose synthesis. Particle size of supplements will affect rate of digestion and voluntary intake, and foods with high energy concentration are required for maximum milk yields.

Voluntary feed intake

The correlation between milk yield and feed intake reported in various papers is extremely variable, ranging from 0.2–0.8 since some ewes are unable to consume the amount of feed needed to meet their energy requirements. Avondo and Lutri (2004) reported that a 75kg East Friesian ewe had an expected voluntary feed intake (VFI) of 2.5 kg DM/d and a 73kg Lacaune had a VFI of 2.67 kg/d. This restriction will have a fundamental effect of ration formulation, which will be considered later.

Milk yields of ewes

Accurate calculation of feed requirements requires knowledge of the milk yields of the ewes. Cardellino and Benson (2002) reported that during a 63-day lactation, average daily milk production was 2.56 and 2.63 kg, respectively, for one- and two-year-old ewes rearing single lambs, and 2.73 and 3.47 kg, respectively, for one- and two-year-old ewes rearing twins. Furthermore, peak lactation in the two-year-old ewes rearing lambs occurred at about three weeks postpartum. However, the ewes were genetically very different from New Zealand sheep, fed a total mixed ration (TMR) based upon corn, with a good ME content (11.3 MJ ME/kg), and were milked using what I consider to be a large dose of oxytocin (10iu). Their data will be valuable for anyone feeding ewes in a similar fashion, and is valuable for comparison, but for New Zealand pasture-grazing conditions we should use local data.

In my trials at Massey, I milk ewes using 1iu oxytocin and hand stripping, before and after a six-hour separation from their lambs, to estimate milk yields (see Peterson et al. 1990 for the method). All ewes were grazed on ryegrass-white clover pastures with their lambs. In the last eleven seasons I have milked more than 700 ewes, the majority with twins (n=664). Most were Romney (n=602) but there were some East Friesians (EF) (n=99). The mean milk yield on day seven of lactation was 2612±137 g/d (Table 1).

In my experience, in ewes grazing pasture with lambs at foot, milk yields peak about 10–12 days after birth and are not much higher than the value at day seven. Production in ewes with twins generally peaks at around 500 g/d more than those with single lambs (Figure 1), but the absolute value varies significantly among years, and among seasons, presumably due to differences in photoperiod (Peterson et al. 1990), body condition score (BCS), feed quantity and quality. Similarly, within a season, mean milk yield of EF is
about 500g/d higher than that of Romney. In terms of expected peak values, in spring-lambing ewes, I expect 2200g/d for a Romney with one lamb and 2700g/d with twins; add 500g/d more for EF in both cases. By eight weeks, milk yields are about half of peak values (Peterson et al. 2005, 2006) (Figure 1).

<table>
<thead>
<tr>
<th>Breed and lambing month</th>
<th>Number of singles and twins</th>
<th>year</th>
<th>MY (g/d)</th>
<th>Age or lactation number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rom</td>
<td>5 and 4</td>
<td>1990</td>
<td>2456 ± 125</td>
<td>ma</td>
</tr>
<tr>
<td>Rom</td>
<td>7 and 3</td>
<td>1990</td>
<td>2083 ± 133</td>
<td>ma</td>
</tr>
<tr>
<td>Rom Aug</td>
<td>5 single</td>
<td>2004</td>
<td>2237 ± 174</td>
<td>ma</td>
</tr>
<tr>
<td>EF Aug</td>
<td>8 twins</td>
<td>2004</td>
<td>2746 ± 214</td>
<td>ma</td>
</tr>
<tr>
<td>EF Aug</td>
<td>13 single</td>
<td>2004</td>
<td>2049 ± 126</td>
<td>ma</td>
</tr>
<tr>
<td>EF Nov</td>
<td>16 Twins</td>
<td>2004</td>
<td>2975 ± 138</td>
<td>ma</td>
</tr>
<tr>
<td>EF Nov</td>
<td>16 single</td>
<td>2004</td>
<td>2671 ± 108</td>
<td>ma</td>
</tr>
<tr>
<td>EF Jan</td>
<td>8 twins</td>
<td>2005</td>
<td>2677 ± 164</td>
<td>ma</td>
</tr>
<tr>
<td>EF Jan</td>
<td>6 single</td>
<td>2005</td>
<td>2221 ± 128</td>
<td>ma</td>
</tr>
<tr>
<td>Rom Jan</td>
<td>4 twins</td>
<td>2005</td>
<td>1996 ± 295</td>
<td>ma</td>
</tr>
<tr>
<td>Rom Jan</td>
<td>5 single</td>
<td>2005</td>
<td>2213 ± 191</td>
<td>ma</td>
</tr>
<tr>
<td>EF Mar</td>
<td>8 twins</td>
<td>2005</td>
<td>2305 ± 160</td>
<td>ma</td>
</tr>
<tr>
<td>EF Mar</td>
<td>8 single</td>
<td>2005</td>
<td>2220 ± 139</td>
<td>ma</td>
</tr>
<tr>
<td>Rom Mar</td>
<td>8 Twin</td>
<td>2005</td>
<td>2373 ± 57</td>
<td>ma</td>
</tr>
<tr>
<td>Rom Mar</td>
<td>8 Single</td>
<td>2005</td>
<td>1833 ± 129</td>
<td>ma</td>
</tr>
<tr>
<td>EF Jun</td>
<td>8 Twin</td>
<td>2005</td>
<td>3013 ± 260</td>
<td>ma</td>
</tr>
<tr>
<td>EF Jun</td>
<td>8 Single</td>
<td>2005</td>
<td>2327 ± 254</td>
<td>ma</td>
</tr>
<tr>
<td>Rom Jun</td>
<td>6 Twin</td>
<td>2005</td>
<td>2613 ± 218</td>
<td>ma</td>
</tr>
<tr>
<td>Rom Jun</td>
<td>7 Single</td>
<td>2005</td>
<td>2017 ± 114</td>
<td>ma</td>
</tr>
<tr>
<td>Rom</td>
<td>71 twins</td>
<td>2007</td>
<td>2730 ± 60</td>
<td>1</td>
</tr>
<tr>
<td>Rom</td>
<td>52 twins</td>
<td>2008</td>
<td>2568 ± 72</td>
<td>2</td>
</tr>
<tr>
<td>Rom</td>
<td>54 twins</td>
<td>2009</td>
<td>3366 ± 101</td>
<td>3</td>
</tr>
<tr>
<td>Rom</td>
<td>42 twins</td>
<td>2009</td>
<td>2019 ± 65</td>
<td>2</td>
</tr>
<tr>
<td>Rom</td>
<td>45 twins</td>
<td>2010</td>
<td>3203 ± 100</td>
<td>4</td>
</tr>
<tr>
<td>Rom</td>
<td>41 twins</td>
<td>2011</td>
<td>3455 ± 85</td>
<td>5</td>
</tr>
<tr>
<td>Rom</td>
<td>34 twins</td>
<td>2012</td>
<td>3488 ± 121</td>
<td>2</td>
</tr>
<tr>
<td>Rom</td>
<td>56 twins</td>
<td>2013</td>
<td>3150 ± 91</td>
<td>3</td>
</tr>
<tr>
<td>Rom</td>
<td>39 twins</td>
<td>2013</td>
<td>2627 ± 97</td>
<td>1</td>
</tr>
<tr>
<td>Rom</td>
<td>77 twins</td>
<td>2014</td>
<td>3542 ± 80</td>
<td>4</td>
</tr>
<tr>
<td>Rom</td>
<td>47 twins</td>
<td>2015</td>
<td>3020 ± 102</td>
<td>5</td>
</tr>
<tr>
<td>Total ewes</td>
<td>701</td>
<td>Mean</td>
<td>2612 ± 137</td>
<td></td>
</tr>
</tbody>
</table>

**Table 1.** Milk yields (g/d mean ± s.e.m) on day 7±1 of lactation in non-dairy Romney (Rom) or East Friesian (EF) ewes milked by machine using the oxytocin method. Ewes were grazed at pasture and suckled single or twin lambs as indicated. Ewes were mixed age (ma) except where lactation number is indicated. Lambing occurred in spring (August or September) unless otherwise indicated.
In contrast to these results in non-dairy ewes, milk yields of current mixed-age dairy ewes grazing pasture and supplemented with crops and concentrates will peak at 2–3L and decline to about 1L by 150–200 days (Gunson and Gunson 2015, 2016, McMillan et al. 2014, Schollens et al. 2016) (Figure 2). Hoggets will not reach the same peak but are more persistent (Figure 2). In agreement with the time of peak lactation that I reported above in non-dairy milked ewes, McMillan et al. (2014) reported that peak milk yield of dairy ewes grazing pasture in Southland occurred at about the end of the first week postpartum. Furthermore, they reported that accumulated milk yield of ewes during one lactation could be over 300L.

To estimate the feed requirements of lactating ewes with lambs, one can use the milk yields given above, but the feed requirement of the lambs themselves must be added. In the case of dairy ewes, which have had their lambs removed, machine milking will increase the demand, and hence, increase yields, thus, increasing the potential milk yields.
yield and feed requirements. Furthermore, if concentrates are added to the diet, dry matter intake (DMI) can be increased and, hence, metabolisable energy (ME) intake and total milk yield, can also be increased. Ultimately, if concentrates in the form of total mixed rations substitute for much or all of the fibre-based diet, milk yields can exceed 600 litres/year in true dairy breeds (such as EF, Awassi, Lacaune and Assaf). An average Assaf ewe kept under an intensive management regimen was found to produce 334 L of milk during a 173-day lactation (Pollott and Gootwine 2004). However, under Israeli conditions in which ewes have approximately three lambings in two years, the annual milk yield of the Assaf can be 650 litres. Similarly, EF at a case farm in UK averaged 650 litres in a 300-day lactation (Griffiths 2014).

Energy requirements of lactating ewes

The amount of energy required by a lactating ewe is calculated by adding the requirements for maintenance, milk production, grazing activity, and for live weight (LWT) change.

Energy required (MJME) = Maintenance + lactation + activity + LWT change

Cant et al. (2001) published good equations but they worked in calories and pounds, which is frustrating. Nevertheless, if you are willing to make the conversions, there formulae work well to approximate other sources. More complicated formulae are available from MPI (2012) and in OVERSEER® but are not generally necessary.

Maintenance requirement of lactating ewes

According to Nicol and Brookes (2007) the maintenance requirement of a 70kg ewe grazing flat land is 10 MJME/d and 11 MJME/d if on easy hill country. The maintenance requirement of a lactating ewe is about 30–50% higher (Pearl 1982) than that of a dry ewe housed indoors due to the extra tissues (mammary gland, heart, digestive tract, liver) that must be maintained and the extra work of grazing and digestion and heat loss due to climatic stress. NRC (1985) gave no values for maintenance during lactation but gave estimates of energy required for ewes of different weights with singles or twins at various stages of lactation. In the case of a 70kg ewe in the first six to eight weeks of lactation, losing 60g/d, suckling twins, and consuming 2.8kg DM (4% LWT) of a diet containing 10 MJME/kg DM (e.g. 35% concentrate 65% forage 15% CP), the ME requirement given was 27.6 MJ/d. This compares favourably with the value of 24.6 MJ/d for a 70kg ewe producing 2kg milk given by Jordan (2001).

The energy requirements of a lactating ewe (in addition to maintenance and activity) and her lambs given by Nicol and Brookes (2007) depends upon the weight of lambs at weaning and stage of lactation, e.g. a ewe with twins of 25kg at 10 weeks requires 32 MJME/d if the diet contains 11 MJME/kg DM. Thus, the total ME requirement of such ewe and her twin lambs grazing flat land would be 42 MJME/d.

Israeli small-ruminant consultant and lecturer Haim Lebovitz stated (Sheep Milk NZ Conference 2016) that a high-yielding 80kg dairy ewe producing more than 3kg/d must eat 3.05kg DM/day containing 35.2 MJME (8.4 Mcal). The diet is a total mixed ration (TMR).
Calculating feed requirements

Sheep rations usually are formulated by first selecting a major feed energy source, such as pasture, or silage. Next, determine what nutrients the source provides and compare these values with the calculated requirements. Finally determine the composition and amount of supplement that must be fed with the pasture or silage to compensate for nutrient shortages (NRC 1985). The DairyNZ website is a handy source for energy values in New Zealand feeds.

Non-dairy ewe feed requirement

If the ME requirement for a 70kg ewe grazing (producing 2L of milk per day) with twins on flat land is 42MJME/d and spring pasture contains 12MJME/kg DM, the ewe and her lambs will be required to consume 3.5kg of pasture DM per day. Assuming she could eat 3.6% of LWT, or 2.5kg DM, her ME intake would be 30MJME/d, far more than her requirements of 24 MJME/d. However, if the pasture is poor, say 9MJME/kg DM, she would receive only 22.5MJME, i.e. below her requirement. Alternatively part or all of the pasture could be replaced by a diet with higher energy, e.g. if a pure chicory (13.5MJME/kg DM) sward were grazed, she could obtain her ME requirement from 1.8kg DM.

Dairy ewe feed requirement

For the 80kg dairy ewe in the example above (given by Haim Lebovitz), if she can eat 3.6% of LWT (2.9kg) of pasture with 12MJME/kg she will barely meet her requirements. However, if fed chicory she would need to eat only 2.7kg DM/d. It might be assumed that increasing the concentrate proportion of the diet will continue to increase the milk yield, however, Clement (2002) compared three levels of concentrate feeding, 0.5lb per ewe per day, 1.5lbs per ewe per day, and 2.5lbs per ewe per day and found that there were no significant differences in milk yield or milk composition, or animal condition score among the three treatments.

Forage: herbage mass and quality

The key points to consider for pastured dairy ewes are daily forage intake and forage quality. The ability of the ewe to consume enough feed may limit production (even though sufficient food is supplied) because of the physical capacity of the digestive tract and the rate of digestion. Thus, foods with high energy concentration are required for maximum milk yields. Also, sheep are naturally selective browsers and limiting their food source to a grass-based pasture my limit their DMI. Furthermore, particle size of supplements will affect rate of digestion and voluntary intake. Thus, to enable high milk yields, ewes must be offered large amounts of high quality (high ME content), highly palatable feeds. Because of the relatively high cost of concentrate diets or TMR in New Zealand, and because of our climate and expertise in growing forage, most New Zealand farmers will try to meet the major dietary requirements of high-producing sheep with pasture, lucerne, or herb and clover mixes.

A herb and legume sward mix (chicory, plantain, and red and white clover) increased ewe milk production and ewe and lamb live weight gain to weaning compared to a ryegrass dominant sward when fed to ewes with twins and triplets. Milk yields were 3237g versus 2428g respectively at day 21 (Hutton et al. 2011). Corner-Thomas et
al. (2012) investigated the use of the same mix of the herbs, or lucerne, to increase lactational performance in ewes bred as lambs (less than one year of age). These plants all have high digestibility and ME content (>13MJME/kg DM). During lactation in both years of the study, ewe lambs fed the herb mix or lucerne were heavier than those offered pasture, and their progeny were also heavier than those born onto ryegrass white clover pasture.

Condensed tannins are plant compounds which prevent bloat and increase protein utilisation. In ewes suckling twin lambs and grazing birdsfoot trefoil (*L. corniculatus*), the action of condensed tannins increased milk yield (21%) and the secretion rates of protein (14%) and lactose (12%) without affecting VFI, thereby increasing the efficiency of milk production (Wang *et al.* 1996). *Sulla (Hedysarum coronarium)* is another plant containing condensed tannins which has a high feeding value and high annual DM production (Douglas *et al.* 1998) suitable for sheep.

Andy and Kat Gunson, established sheep dairy farmers at Waiwhare in Hawkes Bay, use clover and plantain for lambing, and lucerne and chicory for lactation.

### Endophytes

Ryegrasses containing endophytes were reported by Fletcher and Barrell (1984) to reduce liveweight gains and serum prolactin levels in hoggets. I would avoid anything that reduces prolactin concentrations in lactating sheep.

### Supplements

When the maximum voluntary feed intake (VFI) is reached (at around 3.5% of LWT), the limitation is the bulk of the feed and the rate at which it is digested. To further increase ME intake, the quality of the diet must be increased. Quality in this respect relates to the ME concentration and the digestibility, which in turn is related to the starch and fibre content and the particle size. High-energy supplements, i.e. those with high starch content will be required to substitute for a portion of the diet to attain desired production. Barley grain (13MJME/kg DM) and maize grain (13.6MJME/kg DM) are suitable. Sheep like whole grain. However, remember the lack of response to additional concentrate reported by Clement and consider that green crops such as chicory (13–13.5MJME/kg DM) are viable alternatives.

### Drying off

When drying off high-producing dairy ewes, and when weaning lambs from ewes, feed offered, and hence, DMI, should be reduced over a two-week period. Concentrate supplements should be eliminated and about 1.3kg DM of a low-energy (5–6MJME/kg DM), low-protein (~7% CP) diet should be offered. In late summer or autumn, this may be the natural state of the pasture.

### Pregnancy

During pregnancy, the diet should be initially changed to a maintenance diet (1.5kg; 9MJME; 9.3% CP) then increased in the last month of pregnancy to 2.1kg DM;
We have shown that feeding at maintenance during early pregnancy has advantages for milk yield and lamb growth rates in succeeding generations (Peterson et al. 2014) due to developmental programming of the foetus.

Lamb-rearing systems affect milk yield and profitability

What do sheep dairy farmers do with the lambs? The advantage of sheep dairy over goat dairy is that there is a good market for the offspring. However, as with any dairy system, if lambs are left to suckle their mothers until weaning much, if not most, of the milk is lost from dairy to lamb growth. So what are the options? The first method is to leave the lamb with the mother until weaning at a standard age of around three months of age; the second is the same, but to wean at an early age (4–6 weeks). A third system is ‘share milking’ or ‘mixed’, in which lambs are removed from their dams for the night and allowed to suckle during the day, and the fourth system is to remove the lambs a day or two after birth and raise them artificially.

Naturally, these systems require progressively more feed for the lambs and associated costs of rearing. In New Zealand we have examples of some different systems, so I shall outline each briefly.

Normal weaning age

Miles and Janet King at Masterton did not start milking until lambs were weaned at three months of age, except that those with only one lamb, which were milked from one week. Recently they have adopted earlier weaning and trialled the mixed system as part of an AgResearch research program. The results have not yet been published, but anecdotal comments suggest that biting of teats by hungry lambs was a problem. Wait for the next episode.

Early weaning (4–6 weeks)

Andy and Kat Gunson, dairy farming at Waikare Hawkes Bay, keep lambs with ewes on clover and plantain until weaning onto plantain at six to seven weeks of age when they are sent to the first store lamb sale at 23–24kg for good prices. This eliminates the costs of rearing them to prime grades and avoids other problems such as internal parasites. At the end of the first week of September, milking begins in their first flock, which is milked until about 9 December. At this stage, milk composition is changing in a way which adversely affects cheese making, so the second flock progressively enters whilst the first flock is progressively dried off. The second flock is milked until yields get down to about 1 L/d around 1 February (Gunson and Gunson 2016). So whilst they loose on average six to seven weeks of lactation, they incur no lamb raising costs. Their system allows a total milking period of 142 days (over two flocks) yielding an average daily milk yield of 1650g/d.
Mixed

This system involves removing the lambs for a 15-hour period overnight and leaving them with their dams during the day. McKusick et al. (2001) found that the mixed system was most profitable because overall financial returns for milk and lamb sales were greatest due to the increase in marketable milk during the first 30 days of lactation compared with a 30-day weaning system and because of acceptable 120-day lamb weights without the expenses of artificial rearing compared with the day-1 weaning system. Furthermore, milking the ewe during the first 30 days increased milk yield by 27% compared to not milking for the first 30 days. This effect continues throughout the lactation due to increase in mammary epithelial cell number and activity.

Weaning very early

Removing the lambs 24 hour after birth is the option chosen by Spring Sheep Dairy and Maui Milk, the biggest dairy sheep farmers in the North Island. Weaning earlier results in inadequate colostrum intake by the lamb and subsequent health problems (especially scouring). Weaning very early has the benefit that no milk is lost to the lamb and that maximal milk yields can be stimulated by multiple machine milkings. The downside of course is that lambs must be reared artificially. Automatic lamb feeders are enable lambs to be fed ad libitum. The potential for losses due to infectious disease among large numbers of housed lambs is high. The management of such large numbers of artificially reared lambs is a learning curve for New Zealand farmers and the subject of ongoing research and is outside the purview of this review. There is potential for traditional sheep farmers to remove some of the lambs from ewes with multiples and rear them in the same systems as those being developed for sheep dairy. Perhaps we will see the evolution of specialist lamb-rearing contractors. Welfare and behaviour of the lambs is an issue that must be considered in light of the recent furore regarding mistreatment of bobby calves.

Whatever the lamb-rearing system, replacements should not be grown too fast. Excessively fast growth around the time of puberty (personal communication Haim Lebovitz) reduces lifetime milk yield in ewes as it does in heifers (Sejrsen and Purup 1997).

Discussion and conclusion

For a high-yielding 80kg ewe (dairy or with multiple lambs) producing more than 3kg of milk per day, her VFI of a high-energy diet must be near 3kg DM per day, otherwise she will enter negative energy balance (NEB) or reduce milk production. New Zealand’s traditional sheep are not likely to sustain NEB for long; our meat and dual purpose breeds were selected for more than half a century to produce ‘fat lambs’ for the Smithfield market in London at Christmas. Unsurprisingly in retrospect, the result was a small, early maturing sheep that produced a lot of milk for a short period and that did not mobilise fat easily. Despite the change to selection for large, late-maturing animals, there has been no selection in our national sheep flock for persistence in milk production. Thus, our traditional sheep breeds will tend to reduce milk yield steadily after an early peak, and put on body condition during lactation even when well fed. Underfeeding will simply result in reduced yields in most ewes, though there are some that will ‘milk off their back’.
Lactating sheep, especially dairy sheep and those with multiple lambs, should be fed at luxury levels, offered pasture, lucerne, or herb and legume mixes at over 2000kgDM/ha with residuals over 1500kg DM/ha. Supplementary crops with high ME content chosen to suit local soils and climate should be used to fill gaps in feed supply. These may be fed fresh or conserved. Forages such as chicory have ME content similar to barley and maize grain, so are viable alternatives, although they will take longer to eat and digest. Hence, starch-based concentrates (around 300g/d but not more) should be fed to dairy ewes in the shed, both as an aid to management and as a nutritional strategy to increase ME intake.

References

For formatting purposes, all original long URLs have been condensed using the bit.ly format.


Campbell JR, Marshall RT. Dairy Production and processing; the science of milk and milk products. Waveland Press 2016


Corner-Thomas RA, Kemp PD, Morris ST, Kenyon PR. Grazing alternative herbagens in lactation increases the liveweight of both ewe lambs and their progeny at weaning. Animal Production Science 54, 1741–1746, 2014


Fletcher LR, Barrell GK. Reduced liveweight gains and serum prolactin levels in hoggets grazing ryegrasses containing lolium endophyte. New Zealand Veterinary Journal 32, 139–140, 1984

Griffiths L. Business plan for the NZ sheep dairy industry. Nuffield report 2014

Gunson AJ, Gunson KM. Performance 2015–16 season. Sheep Milk NZ Conference, Palmerston North, 2016 (Personal communication; not published)

Hutton PG, Kenyon PR, Bedi MK, Kemp PG, Stafford KJ, West DM, Morris ST. A herb and legume sward mix increased ewe milk production and ewe and lamb live weight gain to weaning compared to a ryegrass dominant sward. Animal Feed Science and Technology 164, 1–7 2011

Jordan RM. Nutrient requirements and way to feed sheep being machine milked. Website: www.ansci.wisc.edu Link: bit.ly/1Uk2hiE (accessed 12 March 2016)
Lactation curves for milk yield and components in dairy sheep using random regression models. Sheep Milk NZ Conference, Palmerston North, 2016. (Personal communication; not published)


MPI. Evaluation of the energy equations used by the National Enteric Methane Inventory MPI Technical Paper No: 2013/06 NZ Govt 2013


Peterson SW, Kenyon PR, Morris ST. Do ewes with twin and triplet lambs produce different yields of milk and does the grazing behaviour of their lambs differ? *Proceedings of the New Zealand Society of Animal Production* 66, 444–449, 2006


