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Setting up to succeed

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Many of us cannot decide if we love or loathe the dry period. We may get there tired, empty and with foreboding of the impending season. On the other hand it is a time of opportunity to plan, prepare and re-energise.

This country is fortunate in having a relatively long dry period, when average days in milk might be 270 days against an international benchmark of 305 days. Considerable debate has raged on the length of the dry period. Some US research has advocated a dry period of no longer than four weeks, keeping cows on the same type and plane of nutrition to avoid changing diet (same kind of TMR) in preparing for drying off, through the dry period and starting the new lactation. This work ignores some fundamental understandings of mammary gland biology. Studies in many countries over decades all produced the same findings [1, 2, 3]. Involution, the change in state from milk producing to completely non secretory, takes about 21 days. Another 21 days is required for the mammary gland tissue to differentiate and change through colostrogenesis (producing colostrum) to lactogenesis (milk secreting). These 21 days allow development of the maximum amount of secretory tissue and, if cows are fed properly, maximum milk secretory activity. Add a 'rest' period and a dry period of 7-8 weeks is a good compromise. Further, when the New Zealand feed is predominantly pasture dietary change is not a huge issue.

The dry period becomes an opportunity to prepare the farm for the coming season. Existing staff get a break; new staff can get training in techniques, technologies and protocols. All staff can be involved in planning both on-farm and with the various consultants involved throughout the year.

The dry period is also overhaul time for the farm system. Machinery repairs and maintenance get done. Farm stores get replenished, after the planning has been done. Finally the shed needs to be prepared. This might be a 12-monthly service (not often enough, but it will do) with a change of all the tubes and hoses. Liners need to be changed every 2500 cow milkings[4] (see MilkSmart[5], on how to calculate change intervals). The long milk tubes and especially the short pulse tubes (often holed at the spigot) suffer a huge amount of wear. Replacement tubes need to be of the correct type and length. Getting this right will improve both milking efficiency and teat health.

The dry period is the tune-up time for cows as they enter the most challenging time of the year. At calving, cows are subjected to maximum stress, from not getting enough feed to health challenges such as mastitis, metritis and too wet feed (check when your vet bills are highest). You can prepare cows, starting with a herd health plan developed with the vet and your staff. It will include predetermined approaches to any veterinary problems, allowing you to have the prescriptions already filled. Other simple cow stuff is trimming tails, trimming feet and trimming treatment times by ensuring good teat and udder health – proper use of dry cow intramammary treatment or teat sealants and teat spraying for three weeks before calving. They do work [6, 7, 8].

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Feeding cows before calving – does it need to be complicated?

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Key messages

- Cows must achieve a body condition score (BCS) of 5.0 at calving, with heifers and second calvers achieving a BCS of 5.5. This should be non-negotiable
- Although cows require the equivalent of approximately 20% of their live-weight as metabolisable energy intake every day pre-calving to maintain BCS, there is increasing evidence that cows are healthier at calving if they are slightly feed restricted in the month pre-calving
- Grazing cows do not eat less dry matter in the month pre-calving as has been reported for cows fed TMR
- Energy type is not important pre-calving
- Straw is only needed if the remainder of the diet is high in sugar (swedes) or low in effective fibre (palm kernel). Straw is not necessary to "stretch" the rumen.

The period of transition between late pregnancy and early lactation represents an enormous metabolic challenge to the high yielding dairy cow[1]. Failure of the cow to meet this challenge can result in a range of early lactation health problems (e.g. milk fever, ketosis), reduced milk production and poorer reproduction[2,3].

Background

There are dramatic changes in nutrient demands from pre-calving to post-calving, and these make the transition period a metabolic challenge for the dairy cow. For example, the metabolic rate of the foetus during late pregnancy is twice that of the cow[1,4] and the energy requirements for pregnancy alone are equal to cow maintenance[5]. In addition to this increasing foetal drain on energy, mammary uptake of glucose from blood increases four-fold in the days before calving[1]. Such rapid changes in energy requirements demand almost immediate increases in glucose production by the cow's liver and a reduction in the use of glucose by muscle and other tissues.

As selection for milk production has intensified, pressure on the cow during this calving period has further increased. Bell[1] estimated that mammary uptake of glucose, amino acids, and fatty acids would be approximately 1.8, 1.4, and 1.2 kg/day, respectively, by four days post-calving for a cow destined to produce approximately 2 kg milksolids/day. In comparison, foetal requirements before calving were estimated to be less than 10% of this.

The cow is, therefore, under immense physiological pressure during this period. She adapts by rapidly increasing the size and absorptive capacity of her intestine and the size of her liver, by increasing dry matter intake (DMI), by mobilising stores of energy and protein (losing body condition score: BCS) and by altering the sensitivity of many of her organs and tissues to circulating hormones.

In recognition of the importance of this transition, the management and associated physiology of the pre-calving cow has been a significant research focal point for the last two decades[5,6,7,8]. Despite this, there continues to be confusion about what cows should be fed during the period before calving. This article aims to clarify the research results and their applicability to New Zealand pasture-based systems.

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Body condition score

Cows should calve at BCS 5.0, with heifers and second calvers achieving 5.5. Although fatter cows will likely cycle earlier after calving and produce slightly more milk, they will also mobilise more BCS in early lactation, and are at an increased risk of metabolic disorders (e.g. milk fever, ketosis). Therefore, the recommended targets for calving BCS are a compromise between maximising milk production and minimising animal health issues. A recent review of the international literature[9] confirms that these BCS targets are still appropriate – computer modelling results suggest that operating profit in herds calving at BCS 5.0 can be $270/ha greater than in herds where cows calve at BCS 4.25.

Does dry matter intake decline pre-calving?

Research results from the USA indicate that cow DMI declines by 30 to 40% during the month prior to calving[10], placing the cow under greater pressure as her energy requirements increase. However, this decline in DMI appears to be dependent on what the cows are fed, with DMI decreasing when starch-based feeds (e.g. maize grain, maize silage, tapioca) are offered, but not when forages are offered[11, 12]. Research undertaken on springing cows fed pasture and pasture hay prior to calving (Figure 1) supports this, indicating only a very small decrease in DMI until the onset of calving[13].

How much energy do cows need pre-calving?

New Zealand research defined the energy requirements of the cow in the month pre-calving to be 20% of the non-pregnant live-weight in metabolisable energy (ME)[5]. Therefore, to maintain BCS in the month prior to calving, Jersey cows weighing 425 kg require 85 MJME/day or 7.5 kgDM pasture/day, Crossbred cows require 90-95 MJME/day or 8.5 kgDM pasture/day, and Holstein-Friesian cows require between 100 and 110 MJME/day or 9-10 kgDM pasture/day.

Recommendation: Pasture-based cows require approximately 20% of their live-weight in ME every day before calving if they are to maintain BCS.

How much should I feed my springers?

It has traditionally been recommended that cows be fed as much as they can eat during the month prior to calving. This was because research 20 years ago[10] suggested that post-calving DMI and some indicators of cow health were improved in cows eating more pre-calving. This was also consistent with research undertaken in New Zealand in the early 1970s[14].

The effect of feeding level in the month prior to calving was investigated by DairyNZ during a recent transition cow research project[5,7]. Cows were offered between 50 and 120% of their energy requirements daily during the month prior to calving. Restricted cows were thinner at calving than fully fed cows (0.4 BCS units) but produced only 5 kg less milksolids. Blood measurements during the colostrum period suggested that cows restricted pre-calving might be healthier and less likely to get milk fever than cows that had been over fed. Recent research in the USA confirms these results, suggesting that cows restricted to 80% of their requirements in the month before calving are healthier than over fed cows[15,16].

Recommendations: Ideally, cows should be at BCS 5.25 one month pre-calving and restricted to 80% of their requirements during the month before calving. **Note:** cows thinner than BCS 5.0 should not be restricted during the month before calving.

Does the type of feed a cow is fed pre-calving matter?

Because energy requirements increase dramatically in the weeks before calving and, in particular, the amount of glucose that the cow requires increases by 400%, many nutritionists have argued that springer cows should be supplemented with starch- (e.g. maize silage, grain, tapioca) or sugar- (e.g. molasses) based supplements. Although this may sound logical, results from experiments designed to answer this question do not agree[8,17]. These experiments, which replaced a portion of the fibre in the diet with starch but maintained energy intake reported no difference in BCS, milk production, or reproduction post-calving.

Recommendations: The type of energy being fed to springer cows is not important.

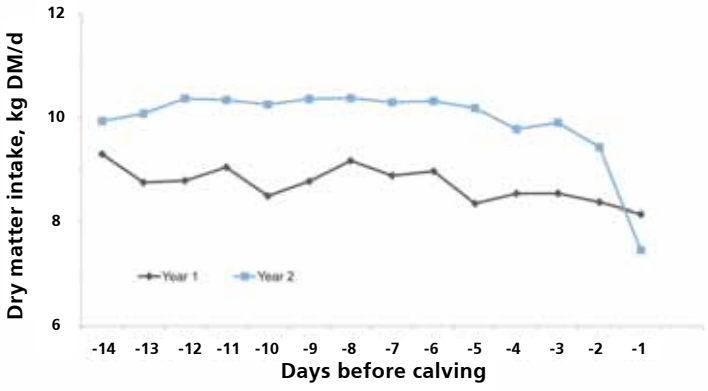

Figure 1. Dry matter intake of springing cows fed pasture and pasture hay.

Note: *there is only a small decline in daily DMI (0.05-0.10 kg/day) during the two weeks before calving[13].*

Should I feed straw to my springers?

The answer to this question is dependent on what else the cows are being fed. There is no nutritional basis for feeding straw to springing cows when the remainder of their diet is pasture, pasture silage or maize silage, other than to reduce their energy intake (see above). However, if the remainder of the diet is palm kernel extract or swedes, long chop fibre (e.g. hay, silage, straw) will be needed. Pasture silage or maize silage are better value feeds than straw. However, if these are not available or they are too costly, straw can be used to ensure cows maintain rumen function.

However, it is not necessary to feed straw to cows to "stretch" the rumen.

Is there a risk to feeding too much fat pre-calving?

There has been very little research done on feeding pasture-based dairy cows a supplement high in fat during the transition period. In a DairyNZ experiment, where cows were fed 600 g fat/day[18] before calving, there were no evident ill effects on either metabolic measures of health around calving or milk production post-calving. This rate of fat supplementation is equivalent to feeding 5 to 6 kgDM palm kernel extract/cow per day.

Recommendation: Feeding cows a supplement high in fat pre-calving is unlikely to affect health or production post-calving.

Conclusion

The transition period, when a cow goes from pregnant and dry to lactation is a very demanding time. However, nutrition does not have to be complex.

Cows should achieve a BCS of 5.0 to 5.25 a month before calving (heifers and second calvers should be 5.5) and be offered 80% of their energy requirements during the month prior to calving.

If you have not achieved the desired calving BCS, aim to feed 20% of the cows' non-pregnant live weight as ME (i.e. 85 MJ/day or 7.5 kgDM pasture/day for a Jersey cow, 90-95 MJ/day or 8.5 kgDM pasture/day for a Crossbred cow, and 100-110 MJ/day or 9-10 kgDM pasture/day for a Holstein-Friesian cow).

The diet can be a mixture of any feeds that are available, but feeds high in starch or sugar and/or low in fibre should be introduced gradually.

This should achieve the dual aim of a calving BCS of 5.0 for mature cows and a healthy cow after calving.

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Transitioning the team

Geoff Taylor, DairyNZ Development Team Leader for People and Business

Just like the transition cow, the people on your farm require some specific attention to move them effectively into the new season and help them to perform at their best. These people may be new to the business or they may have been with you for a few years – it doesn't matter both groups are equally in need of attention.

The aim of this transition period is to maximise employee engagement. An engaged employee is one who is "fully involved in, and enthusiastic about, his or her work, and thus will act in a way that furthers the interests of their employer[1]".

The reason this is important is that there are demonstrated correlations between employee engagement and desirable business outcomes such as retention of good staff, individual performance and financial performance[2].

Dealing with new staff

The process of introducing a new staff member to the team and getting them up to speed in their role is called orientation (sometimes known as induction).

Why is orientation important

At the time of employment each party is assessing the other for some quite tangible things, for example: skills, money, accommodation and scale of the job. These trades negotiated between employer and employee are illustrated in Figure 1.

However, when the new recruit comes to start work in a new organisation a raft of new needs and concerns come into play (See Figure 2).

Changing job or starting a new one is a very stressful occasion and employees typically feel a lot of anxiety. Effective orientation programmes aim to resolve as much of the uncertainty as possible for the new person. This allows them to overcome their anxiety as quickly as possible and focus on performing in the role.

Employers may not believe they have a role in meeting these broader needs; however, the success of the employment relationship is dependent on the new recruit being able to resolve these issues to some extent.

The employee's unexpressed beliefs and expectations as well as their perceived promises and responsibilities with respect to what constitutes a fair exchange within the employment relationship are referred to as the psychological contract they have with the business[2]. If the needs of that psychological contract are not fulfilled, engagement and performance levels will fall, and it is likely the person will leave.

Even the best of employers won't resolve all these issues with their staff. However, if the employer appreciates the needs and concerns of a new person and can be empathetic as the employment relationship develops and is established, the likelihood of success is greatly enhanced.

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What is orientation?

Orientation can be broken into three parts[3]:

- Socialisation
- Introduction to work
- Training.

Socialisation

Socialisation is "the process of adaptation that takes place as individuals attempt to learn the values and norms of work roles[3]". It must be stressed that "values and norms" encompass far more than the actual job that the person is employed to do, it covers off everything from attitudes, to inter-personal relationships, to the way in which staff, especially in larger teams, define the pattern and pace of work.

Through the recruitment process the new employee forms impressions and expectations of the workplace. Adaptation of these beliefs occurs as the new employee enters the work place and has to cope with any disparity between these perceptions and the reality of what actually happens on farm. Further adaptation occurs as the employee learns the job and starts to fit in with their co-workers.

Introduction to work

This part of the orientation process completes HR requirements and familiarises the new employee with the farm business, its goals, existing systems and processes and provides an introduction to the work. This is often the limit of what is included in an orientation plan.

Training

A new employee comes into the workplace with a set of skills and a way of working. Either of these may be deficient for the needs of the farm business. Training will assist the employee to carry out work to the standard expected in the workplace.

Due to the seasonal nature of dairy farming many tasks that a person will carry out may not be called for until well into their employment tenure.

Dry cow therapy is a good example. A new employee starting on 1 June will not be involved in this activity for another 10 months, yet there will be protocols to be observed that are unique to the farm business and training will be required to complete the task. This training must occur just prior to the need for the activity in order to be effective, so in reality the training period of orientation can last upwards of 12 months.

Figure 1: Trades negotiated between employee and employer at recruitment

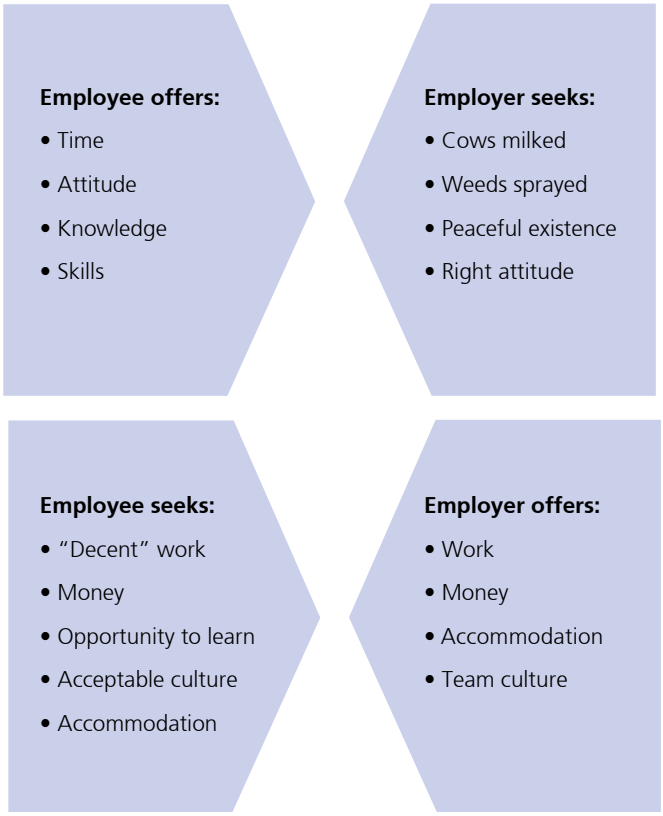
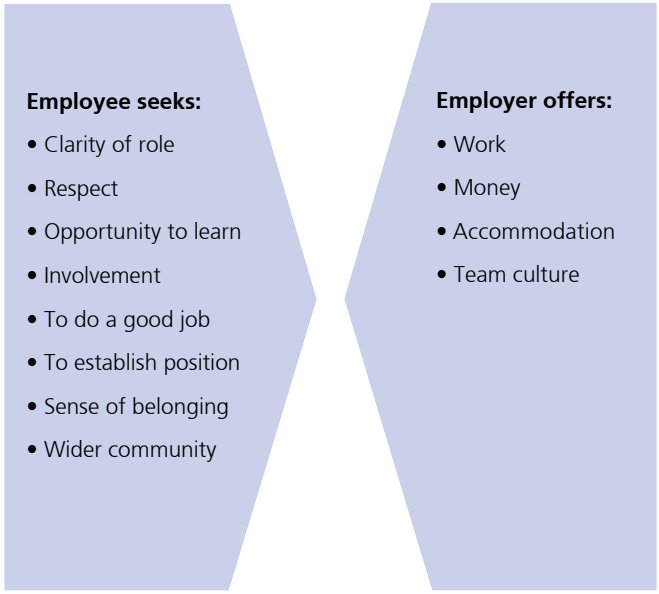


Figure 2: Needs of the new employee and their employer at job commencement



Effective orientation of new staff

Be professional from the start

The orientation period effectively starts at the job interview. The way in which this process is managed starts to shape the employees perception of the job and the farm. At this point the employee is trying to establish their fit with the values, expectations and attitudes of the employer. A professional approach portrays the business in a positive light and sets high expectations for the employee.

Manage the gap between recruitment and starting date

In the dairy industry the time between hiring and commencement of a job can be quite prolonged. Over this period there is the opportunity to help with the socialisation process from a number of angles. Examples of activities include:

- Inviting the new employee to join in farm walks and assist in key decisions that may affect them
- Helping to introduce them to the local community, schooling, healthcare, clubs etc. While these details don't directly affect work, doing this will help make them feel valued and welcome.

Take a first day, first fortnight, first month approach

The simple message is that orientation is not a one day process - it takes time! Whatever process is followed, it is critical to recognise the ongoing requirements of orientation. People bring different attitudes, habits and skills with them to any new job and it is critical that these are aligned as much as possible with the employers expectations, otherwise the employment relationship will be short lived.

Table 1 provides some ideas as to what might be included in an orientation plan. The key point is to plan early and make time to spend with the new team member.

Assign a "buddy"

Appointing someone that can act as a guide or a sounding board is a useful way to help the new person form relationships in the workplace.

The DairyNZ HR Toolkit[5] provides a number of resources to assist with orientation, training and performance management. The HR Toolkit can be downloaded on the DairyNZ website (dairynz.co.nz) or a hardcopy can be ordered by calling the DairyNZ Farmer Information Service on 0800 4 DairyNZ.

Table 1. Orientation activity plan

First day
• HR administration requirements • Introductions to the team • Familiarisation with the farm • Health and safety briefing • Introduction to policy and process manuals • Introduction to immediate tasks.
First fortnight
• Review day by day to address any issues that arise • Review and discuss policy and process manuals with staff • Develop training plan to address: i. Skill deficits shown up during the recruitment phase ii. Special requirements on farm iii. Preparation for upcoming seasonal events • Set objectives for performance review in consultation with staff member • Introductions to the neighbours.
First month
• Review of first month • Acknowledge learning and progress made in first month • Address any performance gaps • Review training plan, especially with respect to farm specific requirements for upcoming seasonal events • Review performance objectives • Introductions to local forums, e.g. DairyNZ Discussion Group.

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The role of the manager

One of the biggest impacts on the success of a new person is the attitude of the manager toward staff – it becomes a self fulfilling prophecy[5]:

- Believe in them and support them to do a good job and usually they will
- Expect the opposite and they will deliver!

New staff generally want to do a good job and it's the manager's role to help them do it. This means investing time. A new staff member can have a significant impact on the business both positive and negative. It pays to get it right.

Transitioning existing staff

Staff can be ignored with the change in seasons, new people starting and a focus on preparing for the fast approaching next calving. This is a potential risk to the business in terms of reduced engagement, increased risk of turnover and the opportunity cost of not growing higher level skills in the business. Effective transitioning can mitigate this risk.

Why is transitioning existing staff important?

Transitioning existing staff, just like new staff, is about maximising engagement, developing the level at which they can contribute to the business and gaining the benefit of the persons discretionary effort. The end result of this should be a more productive farm busuiness.

Existing staff are capable of delivering real gains in productivity because they have got beyond the period where they are getting to know the ropes. With time in the business staff can move further up the learning curve to a "mastery position" (see Figure 3). As skills increase staff are able to add significantly more value to the business through contributing to system learning and efficiency gains. With around 40% of people in the industry having been in their current role for less than one season[6], suggesting they are only just "learning the ropes", retaining people is a sensible business goal.

What is transitioning for existing staff?

Transitioning for existing staff is the process of reviewing their role and refocusing them for the upcoming season. It should simply be the continuation of good people management practice on farm.

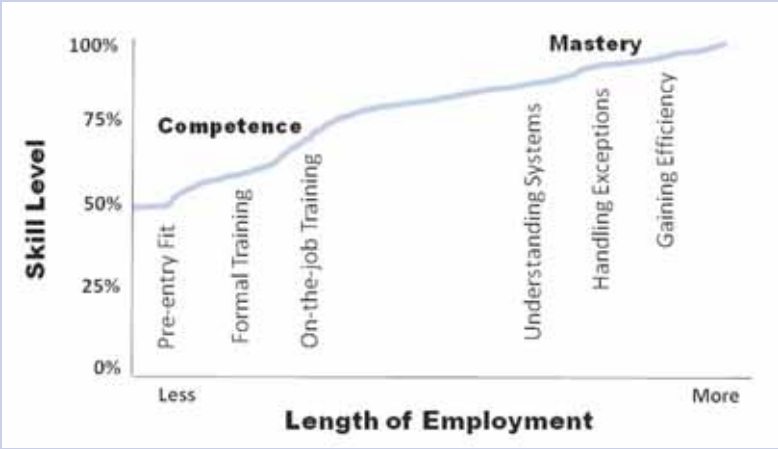

Figure 3: The two stage employee learning curve

Effective transition of existing staff

A few ideas that will help in effective transition of existing staff are outlined below.

Help staff to set some goals

This idea can be intimidating but it can also be really simple. A goal may be as simple as learning a new skill at work, getting fit or saving for a new TV. On the other hand it may be as complicated as plotting out a career path and implementing a training plan to achieve career goals. It's great if the goal has some stretch in it and challenges the person a bit, but either way the goal will help drive some engagement with work, especially if the business can help them achieve it.

Conduct a performance review

Reviewing performance over the last six months or year is an important learning exercise. Reviews should not be punitive, they should be focussed on the future and the development the staff member requires to contribute in a greater way to business goals. If it is seen as a punitive measure it will not help to transition staff, it is more likely they will opt out of the business. The review should help to identify opportunities for growth and put together a plan that will deliver on it.

Review job description

Often a job description becomes obsolete over time as people develop in their work. (Update the job description) See what is still relevant and if the person is performing well, think about how you could stretch them by giving them responsibility that may usually be reserved for a more senior role.

Set a training plan

To support the three points above a training plan should be developed for each employee. Training should link to the business plan and help to drive business success as well as supporting the individual's goals.

Involve them in planning

Employees need to feel they are involved and contribute to the success of the farm business. Annual and seasonal planning is the ideal opportunity to do this.

Summary

People on farm require some specific attention between seasons to help them to perform at their best. Whether this is helping new staff to overcome initial nerves and find their place in the team or helping existing staff to set new goals for the upcoming season all of the team require attention. As a result of an effective transition staff should be engaged with the business goals and building their contribution to the productivity of the business. This is likely to be the best investment the business will make all year!

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Early spring management – use of a Spring Rotation Planner

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A series of farmlet experiments were undertaken at No. 2 Dairy (Ruakura) in the early 1980s, to establish good practice in pasture management over the autumn, winter and early spring [1, 2, 3, 4]. Results greatly improved our understanding of optimal pasture management and led to the development of the Spring Rotation Planner.

Summary

The level of pasture cover at calving is very important. Too much feed will mean that pasture is wasted and growth may be reduced. Whereas, if there is insufficient pasture, the cows will be underfed. If, in an attempt to fully feed cows, the inter-grazing interval is reduced (where pastures are grazed before the two and a half leaf stage), growth will be reduced and pasture mass will stay low until summer. Therefore, it is essential not to speed up the rotation too quickly after calving.

The Spring Rotation Planner is an excellent tool to manage rotation length. Aim to be on the fastest rotation when pasture growth gets ahead of herd requirements. The higher the stocking rate and especially if little or no supplement is available, the more important this rule becomes.

Importance of pasture cover at calving

This experiment evaluated the effect of amount of feed on the farm at calving, with a combination of either a slow or fast rotation (Table 1, Figure 1), both pre and post-calving on eight farmlets. Figure 1 shows pasture available (kg DM/ha above grazing height) for three of the farmlets and Table 1 the rotation length. The control farm (slow pre and slow post-calving; Slow-Slow; farmlet 2) had a farm cover on 1 July of 2400 kg DM/ha (1400 kg DM/ha available) and a May-June rotation length of 128 days. This is compared with two farmlets (farmlets 7 & 8) that had a fast rotation pre-calving with an average pasture cover of 1800 kg DM/ha (700 kg DM/ha available); the Fast-Slow and Fast-Fast farmlets, during May-June had an average rotation length of 50 days. After calving, the rotation lengths in August-September for the extreme farmlets were 32 or eight days.

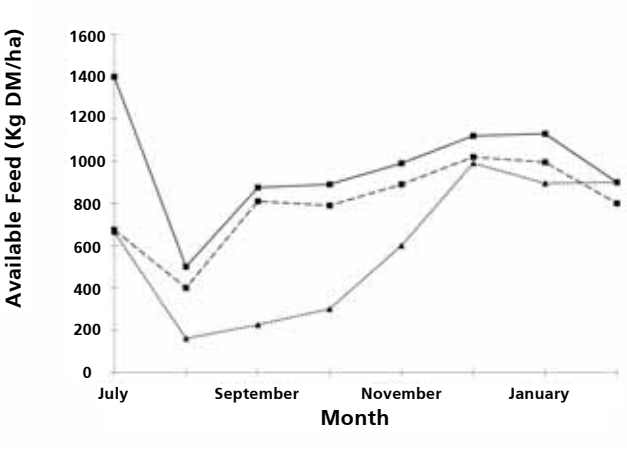
Table 1: Average pasture cover and rotation length for three farmlets (2, 7 & 8) of a farmlet trial in 1983/84 season

	Pasture cover		
Farmlet	2 (Slow-Slow)	7 (Fast-Slow)	8 (Fast-Fast)
Average Pasture Cover 1st July (kg DM/ha)	2400	1800	1800
Available pasture (kg DM/ha)	1100	700	700
	Rotation length (days)		
May-June (pre calving)	128	50	50
July-August	80	50	39
Sept-Oct	32	32	8

Figure 1 shows the effect of rotation length on available feed before calving and after calving. For the two farmlets that were on a fast rotation pre-calving, pasture cover dropped quickly. For the Fast-Slow farmlet, pasture cover increased during spring so that by early September it was similar to that of the Slow-Slow farmlet. This compares with the Fast-Fast farmlet where the feed cover on the farm was slow in increasing and got to similar levels as the other two farmlets in December. Pastures were grazed when there were only one to two leaves. The low cover at calving herd that was on a fast round (Fast-Fast) took a long time to recover as the farmlet did not grow as much grass, as growth rates were reduced due to the fast rotation (short inter-grazing interval).

This trial emphasised the need for planning in the autumn to ensure that an appropriate pasture cover is on the farm at calving. This will necessitate slowing the rotation early enough to build up pasture cover. The actual level will depend on the stocking rate and locality but is generally accepted to be near 2400 kg DM/ha.

Figure 1: Effect of speed of rotation on available feed (kg DM/ha)



—— Slow-Slow (slow both pre and post-calving)
- - - Fast-Slow (fast pre calving and then slow post-calving)
….. Fast-Fast (fast both pre and post-calving).

Effect of differing grazing intervals after calving

The second trial set out to examine further what happens after calving if groups of cows had differing rotation lengths from mid-July to mid-September (Table 2). There were four treatments each replicated.

The area grazed by the Treatment 1 cows was increased slowly (by having a slow rotation length) during the first eight weeks after calving so that in this period they did one rotation of the farm. At the other end of the range of treatments, Treatment 4, cows were given a large area (fast rotation) immediately after calving in an attempt to maximise intake and did more than four rotations of the farm.

Table 2 shows that by late-September the farm cover had been reduced to a very low level on the faster rotation farmlets, compared with slower rotation herds and, as with the first experiment, pasture cover stayed low until early summer. The intermediate treatments (Treatment 2 & 3) produced more milksolids (MS) in early lactation than treatments 1 & 4. Differences in MS production per cow between the treatment groups, that were evident in October, had increased by February with Treatment 2 producing over 20 kgMS more than Treatment 4.

This work identified that it is essential not to speed up the rotation too quickly after calving[2] as it will reduce feed on the farm in late spring and the cows will produce less MS. The lower the pasture growth in the spring, the greater the penalty of adopting a faster, rather than a slower, spring rotation. At No. 2 Dairy a policy was developed to speed up the rotation length gradually after calving and this was developed into the Spring Rotation Planner, which results in approximately 1.2 – 1.5 rotations of the farm in 8 weeks, depending on whether the Spring Rotation planner starts on a 100 or 80 day rotation, respectively.

Table 2: Effect of differing rotation lengths on farm cover (kg DM/ha) and subsequent milksolids production (average for treatment)

	Treatment			
Period	1	2	3	4
	* Rotation length (Days)			
21/7 - 3/8	100	58	41	33
4/8 - 17/8	60	37	26	20
18/8 - 31/8	52	35	21	14
1/9 - 14/9	42	28	14	7
No. of rotations (21/7 - 14/9, 56 days)	1.0	1.5	2.5	4.1
Farm cover at 18 July (kg DM/ha)	1970	1920	1890	1920
Farm cover at 22 September (kg DM/ha)	1610	1470	1210	1140
Kg MS/cow to 1 October	78	88	83	81
Kg MS/cow to 9 February	248	267	257	246

** A rotation of 100 days means that 1/100th of the farm was grazed each day.*

(cont'd p14)

(cont'd from p13)

Effect of post-grazing residuals

In the late 1990s the benefits of leaving higher post-grazing residuals on subsequent pasture growth rates was tested[5]. In early and late July, pastures were grazed for two, four, eight or 24 hours and after these times were protected from further grazing using cages. This resulted in growth for different post-grazing residuals.

The effect of the differing post-grazing levels on pasture regrowth was measured. The pastures were not visibly damaged by pugging following the grazings. The average post-grazing immediately after and the pre-gazing levels at 52 days later are shown in Table 2. The post-grazing levels ranged from as low as 864 for the area that was not removed from the grazeable area (24 hours) up to 1773 kg DM/ha, on areas cows grazed for only two hours.

Even though the 24 hour areas were grazed much harder than the two hour ones, the accumulated growth after 52 days was 38% higher (Table 3 & Figure 2). The area that had the lightest grazing, subsequently had the lowest pasture growth although it maintained the highest pasture cover at the next grazing.

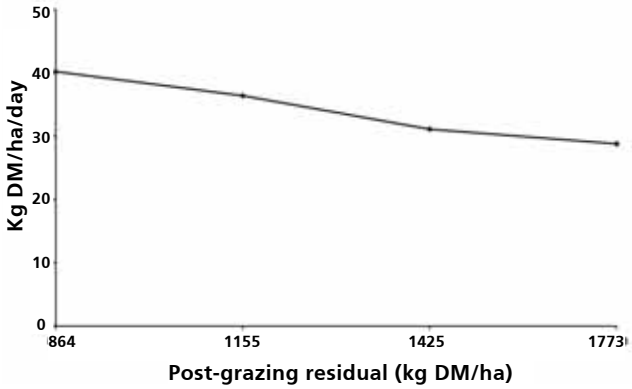
At the end of winter many of the leaves in pastures are reaching the end of their life. If left ungrazed old leaves will die before the next grazing. It is likely the rate of appearance of new leaves between the grazing treatments were similar. However, some of the new leaves simply replaced the loss of old material thus reducing the net DM accumulation.

Results of this trial indicate that a grazing intensity that results in a post-grazing residual of 4-5 cm maintains sufficient plant energy reserves, maximises pasture regrowth and quality, and encourages tiller initiation due to increased light penetration, and minimise pasture wastage. Further work in 2006[6] identified that a severe grazing (<3 cm) reduces pasture regrowth and can reduce plant persistence due to removal of plant energy reserves, while lax grazing (>6 cm) reduces the herbage quality of the feed on offer. While regrowth may not be affected in the short term, subsequent lax grazing will result in a less productive and a less persistent pasture[6].

Table 3: Average pre and post-grazing and accumulated pasture cover (kg DM/ha) for areas grazed for 2, 4, 8 and 24 hours in July

Hours	2	4	8	24
Post-grazing (July)	1773	1425	1155	864
Pre-grazing (September)	3264	3030	3000	2916
Accumulated growth (52 days)	1491	1605	1845	2052
Net pasture growth (kg DM/ha/day)	29	31	35	39

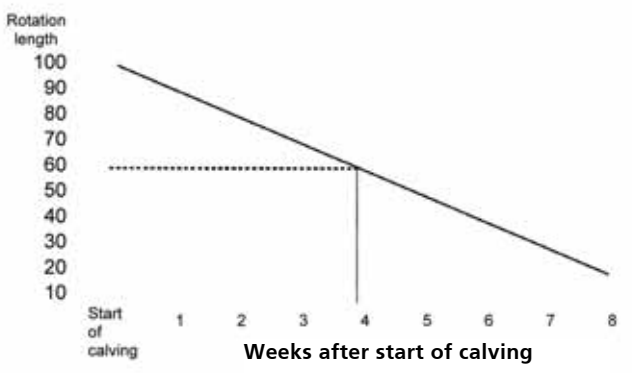
Figure 2: Average pasture growth 0-52 days post-grazing for areas where cows were removed at set times



How the Spring Rotation Planner works

Full descriptions of the Spring Rotation Planner are given in Farm Facts (1-12, 1-13a, 1-13b), available from the DairyNZ website. Simply, it is designed to ensure that feed supply does not run out and at the point where pasture growth gets to be greater than herd demand the herd is on the fastest rotation (shortest inter-grazing interval). Figure 3 is a graphical depiction of how it works. In this example pasture growth is assumed to be greater than herd demand approximately 8 weeks after the start of calving and the herd should be on a 20 day grazing interval. In the example here, it shows that starting from a 100 day rotation at calving, at 4 weeks post-calving the desired rotation length is 60 days (1/60th of the farm per day). To ensure this occurs, the break size for the dry cows is calculated so that they are receiving the desired level (e.g. 10 kg DM/cow/day) of pasture (see calculations). The remainder of the pasture available for that day is given to the milkers.

Figure 3: Change in rotation length after calving



Calculations to work out the area to allocate to the herd when on a 60 day rotation, 3 weeks after the start of calving.

60 ha farm;
180 cows - 120 cows calved;
4 weeks post-calving;
A 60 day rotation is required;
Therefore, 1 ha/day is required for the whole herd.

There are 60 dry cows that require 10 kg DM/cow/day;
Pasture cover ahead of dries 3600 kg DM/ha;
Grazing down to 1200 kg DM/ha;
Therefore consuming 2400 kg DM/ha.

60 cows x 10 = 600 kg DM/day required for the dry herd;
600/2400 = 0.25 ha/day for the dry cows. (2500 m^2);
Therefore, the area to give to the milkers is: 1 ha - 0.25 = 0.75 ha (7500 m^2).

If the pre-grazing cover for the milkers is the same as for the dry cows (3600 kg DM/ha) but they only graze it down to say 1500 kg DM/ha, then the milkers intake will be about 13 kg DM/cow/day (3600 - 1500 = 2100 x 0.75 ha/120 cows). Thus, if the cow requirements are 15-16 kg DM/cow/day supplements will be required.

An important proviso to the use of the Spring Rotation Planner is that it is designed to use pasture to maximise regrowth, so it is possible that the cows may be underfed if just being fed pasture. Therefore, supplements of some sort may be needed to meet the intake shortfall.

Where supplements are a major part of the farm system, the date when pasture growth is greater than herd demand will generally be earlier, the days from calving to this date will generally be less than shown in Figure 3. Thus the graph and pasture intake needs to be adjusted to allow for this.

Conclusion from these trials.

The level of pasture cover at calving is very important. Too much feed will mean that pasture is wasted and growth may be reduced. Whereas if there is insufficient, the cows will be underfed and if in an attempt to maximise intake the inter-grazing interval is reduced, growth will be reduced and herbage mass will stay low until the summer. Therefore, it is essential not to speed up the rotation too quickly after calving and this can be achieved by use the Spring Rotation Planner or a similar system. Aim to be on the fastest rotation when pasture growth gets ahead of herd requirements. The higher the stocking rate and if little or no supplement is available the more important this rule is.

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Focus on international research

The following is a brief summary of some key science papers recently published

Janovick and others (2011). Prepartum dietary energy intake affects metabolism and health during the periparturient period in primiparous and multiparous Holstein cows. *Journal of Dairy Science* 94:1385-1400.

Heifers and mature cows were offered more energy than needed during the month prior to calving or were restricted to 80% of their estimated requirements. The cows that ate more than requirements had greater concentrations of fat and ketone bodies in blood after calving, greater amounts of fat in liver and greater metabolic disorders.

DairyNZ comment: These data are consistent with DairyNZ experiments, wherein cows that were restricted in the month pre-calving were less likely to get milk fever and lost less condition in the first week after calving. However, for this management regime to be successful, it is important that cows are at condition score 5.25 and heifers are 5.5 one month pre-calving.

McEvoy and others (2011). Development and application of an economic ranking index for perennial ryegrass cultivars. *Journal of Dairy Science* 94:1627-1639.

Economic values in euros were calculated for traits of economic importance in Irish grass-based systems. The economically important traits selected were spring, midseason, and autumn grass dry matter (DM) yield (€/kg of DM per ha), grass quality (€ per unit DM digestibility), first- and second-cut silage DM yield (€/kg per ha), and sward persistency (€/% change in persistency per ha per year). The economic value for each trait was calculated by changing the trait of interest while keeping all other traits constant, using the Moorepark Dairy Systems Model. An increment in spring pasture was assessed to be five times more valuable than one for autumn pasture. The economic values were applied to experimental production data collected over three years for 20 perennial ryegrass cultivars to establish the total economic merit for each cultivar and then to rank each cultivar based on its economic performance. The total merit index will identify the cultivars that can make the greatest economic contribution to a grass-based production system.

DairyNZ comment: DairyNZ funded research is examining the use of such an index for New Zealand cultivars recommended for dairy pastures. Although the principles of a total merit index apply to New Zealand, and DM yield, quality and persistence will be likewise important, winter grass growth will have to be included and less emphasis put on silage yield.

van Zijderveld and others (2011). Effects of a combination of feed additives on methane production, diet digestibility, and animal performance in lactating dairy cows. *Journal of Dairy Science* 94:1445-1454.

Dutch researchers supplemented cows with various levels of different fats. Methane emissions (i.e. g/day) were reduced by 10%. However, because milk and milk fat also declined, methane emissions/kg milk was not affected by treatment.

DairyNZ comment: Many researchers around the world are looking for ways to reduce methane production from ruminants. Although some have been successful in reducing methane production/cow, most technologies do not alter methane output/kg milksolids.

Delany and others (2010). Blood plasma concentrations of metabolic hormones and glucose during extended lactation in grazing cows or cows fed a total mixed ration. *Journal of Dairy Science* 93:5913-5920.

In this Australian study, Holstein-Friesians were managed for a 670-day extended lactation. Cows were either fed a total mixed ration (TMR) or fresh pasture with a grain supplement between 332 to 612 days in milk. Cows fed TMR did not produce more milk, but gained more live weight and body condition score (BCS) and dried-off earlier, than cows grazing pasture supplemented with concentrates. Blood metabolite and hormone concentrations indicated that Australian Holstein-Friesians fed TMR partitioned nutrients into BCS gain at the expense of milk production during an extended lactation.

DairyNZ comment: These findings are consistent with DairyNZ research results, wherein cow performance during an extended lactation in a pasture-based system is affected by cow genetics and concentrate supplementation. Holstein-Friesians with a high degree of North American genetic ancestry were better suited to extended lactations than those of New Zealand genetic ancestry, as they partitioned energy towards milk production rather BCS gain, particularly at a high rates of concentrate supplementation.