

# Grazing management

Coming from a dairy farm in the UK and having lived and worked in New Zealand for two years, discussion group facilitator and consultant Mary Kinston BSc Agriculture PhD outlines the principles of grazing management for optimal dairy cow nutrition and performance

## UNDERSTANDING GRAZING PRINCIPLES

The objective of pasture-based milk production is high-profit milk solids. This basically means that if a farmer is paid €4 per kilogram of milk solid (kgMS; equivalent to roughly 28.6 cent per litre), then he needs to retain at least 30 per cent (€1.2/kgMS) – and ideally 40 per cent (€1.6/kgMS) – of gross farm income as a cash surplus. This cash surplus is then used to provide a decent living, service debt, pay tax and provide capital for reinvestment. This concept has become especially important in Ireland, where the opportunities to exploit the economies of scale have been limited due to milk quota and land parcel size. Therefore, presently, most dairy farms remain as owner-operator pasture-based units with a limited amount of employed labour. This concept also allows farmers to weather lower milk prices, as there is a greater margin of wiggle room in the short term for the cash surplus derived. In comparison, the ‘high-input, high-output’ system often generates a cash surplus of between 5 and 15 per cent of total gross farm income. This lower return per kgMS is offset by the high volume of litres produced both per cow and by scale in cow numbers. In this system, if only 10 per cent of the income is retained, a farmer would need to produce double the litres per cow (10,000 litres/cow vs 5,000 litres/cow) with double the amount of cows (200 cows vs 100 cows) to retain the same amount of cash surplus as a 40 per cent return on the pasture-based system. High milk prices tend to favour this system, and low milk prices or high-input prices expose the high-input, high-output system to higher levels of risk. Essentially, both systems come back to the old proverb of “what comes between a cow and a blade of grass must be paid for by the cow”.

When we consider the fundamental principles of the pasture-based system, the ‘main course principle’ explains its objective. This principle was developed by Thomson, Glassey and Bryant at Massey University and Ruakura in New Zealand in the 1980s. Ideally, we are aiming to feed cows and graze pastures to their requirement: no more, no less! Key targets for pasture-fed milking cows are:

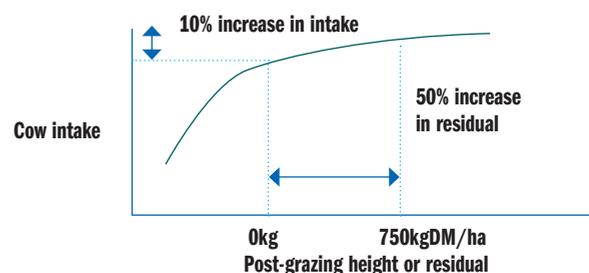
- Increase the intake of pasture after calving
- Increase the dry matter intake after calving to a peak 3.6 per cent of cow liveweight and hold it for three months
- Graze pastures to residuals of 3.5-4cm to maximise pasture production and maintain high-quality pasture in subsequent grazings.

These targets are achieved by offering the right amount of feed for the cows in the pre-grazing cover: no starter or dessert; just the main course! The pre-grazing cover is calculated from pasture demand per hectare and is monitored through the use of a feed wedge. Feeding cows pre-grazing covers which are too low penalise the cow by

reducing intakes. Essentially, low pasture heights reduce bite size, which cannot be compensated for by increases in biting rate and grazing time. However, fully feeding the cow on pasture with high pre-grazing covers comes at a cost, where offering too much pasture is as bad as offering too little. Experiments have demonstrated that to increase the cow’s intake by 10 per cent, from adequate intake (3.6 per cent of liveweight) to ‘fully feeding’ at 4 per cent of liveweight, requires an increase in grazing residual from 4cm to 7cm (750kgDM/ha available herbage). The consequence of this immediate increase on intake at subsequent grazings is reductions in intake and milk production unless other management techniques avoid these losses. Figure 1 demonstrates this relationship. Therefore, the pasture-based system of milk production relies on maximising the production of high-profit milk solids by offering cows an allowance of pasture that will meet 90 per cent of their total intake. No starter or dessert, just the main course. However, the grazing system must not favour the pasture to the detriment of the cow in terms of body condition, pasture intake or animal health. The use of cow signals (condition score loss or gain, daily production in terms of litres or butterfat and protein, etc) are as important as the grazing residual and feed wedge. While grazing is a complex interaction between the grass plant and the cow, regular monitoring of the target pre-grazing cover, post-grazing residual, cow condition and milk production will aid in balancing both the needs of the cow and the pasture.

## THE APPLICATION OF GRAZING MANAGEMENT TO MAXIMISE COWS’ INTAKE OF PASTURE AND MANAGE PASTURE QUALITY

As shown in Figure 2, grass growth, though variable between years, tends to follow a distinct pattern. Grass growth rates are hugely influenced by solar radiation, temperature and moisture. As a result, cold winters see little or no growth. Early spring often sees increasing growth rates to a peak of ~90kgDM/ha/day, but this is also associated with the reproductive phase (heading) of



Pasture Allowance: ‘The Main Course Principle’. NA Thomson.

Figure 1. Grazing residual and intake.

pasture in late spring. The return to vegetative growth generally coincides with a small decline in grass growth during summer but growth rates are often good unless drought prevails. Again, grass growth starts to decline into the autumn, with often only 5-10kgDM/ha/day produced in November. While there might be short-term surpluses and deficits, the ideal of grazing management is to take a general grass growth curve and align pasture demand against it. As growth is assessed in terms of kilograms of dry matter produced per day, one of the most useful tools in grassland management is to assess pasture demand on the same basis. Demand per hectare is calculated from the total demand of the grazing stock, divided by the number of grazing hectares available. However, a fast and simple way to calculate demand per hectare is:

Stocking rate x intake  
grass per cow =  
Demand/hectare/day  
eg. 3.3 cows/ha x  
16kgDM/cow/day =  
53kgDM/ha/day

From week to week in the grazing calendar, the objective is to constantly balance grass supply (growth) with grass demand. As grass growth is slow in early spring and again in autumn, these distinct periods of grass deficits have to be managed by storing grass (pushing grass forward) from one week or season to another. This is done by the use of three key tools:

1. Rotation length determines how

quickly the grass is grazed. This is calculated from the total area available divided by the area grazed per day and is either expressed as a fraction or as the number of days. Going slow (30-45 days) offers grass more time to grow and is useful in periods of

grass deficits (early spring and autumn). Going fast (18-21 days) grazes the area quickly and maintains pasture quality. This is important in periods of grass surpluses (late spring and summer).

2. The amount of pasture remaining on farm at the end of the grazing season. This is called

the closing pasture cover and determines the amount of pasture available in spring.

3. Spring rotation plan. This plan determines the speed at which the available pasture is grazed during the spring until the period when grass growth equals grass demand per hectare.

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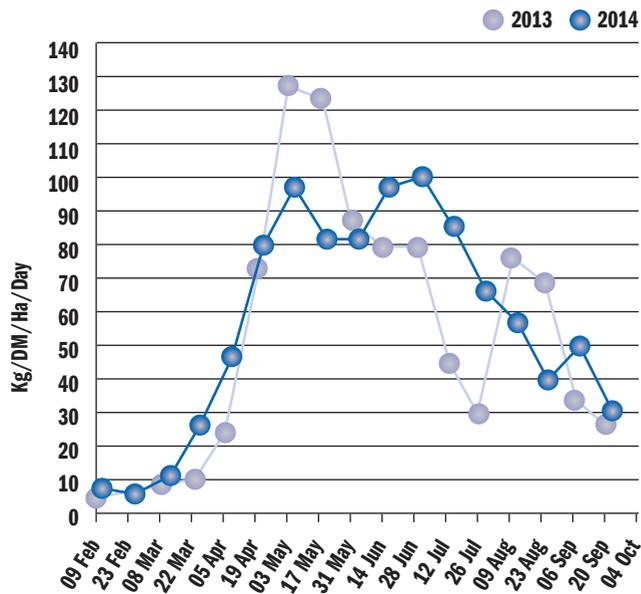


Figure 2: Moorepark grass growth 2014.

So the first step in grazing management is to know what you have. This requires a farmer to know the area of each paddock and to make an assessment of how much grass is on the paddock in terms of kgDM/ha. The total feed available in the paddock is calculated by:

Paddock area x available pasture per hectare = Total feed available

eg. 1.4ha x 1,300kgDM/ha = 1,820kgDM/ha

Essentially, what this calculates is the tonnes (1.8t) of feed available to the grazing animal, and on a daily basis this can be used to match the herd's requirements. For example, if 100 cows were being fed zero meal, this paddock would allocate the cows 18.2kgDM/head (1,820/100 cows) over a 24-hour period. However, if a farmer wanted to feed 2kg meal per cow, and desired to feed the cows 16kgDM/head of grass, there would be too much pasture in this paddock, which would result in an increase in the grazing residual from 0kg to 150kgDM/ha (220kg/1.4ha) if fed over a 24-hour period.

After assessing each paddock, the calculated mass on each paddock is used to determine the average pasture cover over every hectare of the farm. Ideally, this should match the requirements of the cows over the rotation period. For example, if the cows had a daily demand of 66kgDM/ha in June when grass growth generally meets or exceeds demand, a faster rotation length of 21 days would often be applied. This would mean that the whole grazing area would be grazed in 21 days. Therefore, to make sure there is enough grass available, multiplying the demand per hectare (66kgDM/ha/day) by the rotation length (21 days) would determine the pre-grazing yield (1,386kgDM/ha) which is required to feed the cows per day while achieving a good grazing residual of 3.5-4cm. If you then divide this figure by 2 it also indicates what would be the ideal average cover (1,386/2 = 693kgDM/ha) on the farm at that time.

While periods of deficits are challenging, introducing feed is often a simple solution. However, surplus management is essentially what sorts the men from the boys as it can

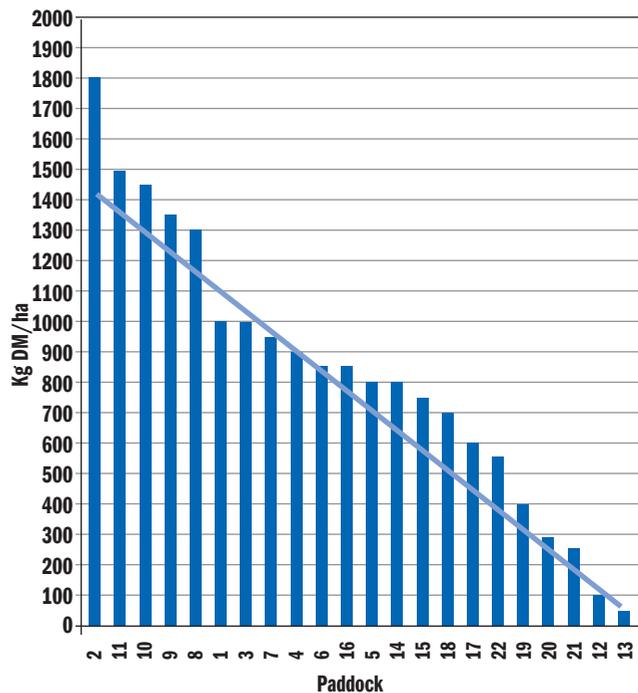


Figure 3.

be fairly tricky. There are tools which aid management decisions and help farmers maintain this balance, but all of them are reliant on weekly monitoring of the grass cover and putting the pasture covers into a bar graph from highest to lowest: the 'feed wedge'. By being aware of the desired pre-grazing yield that is required by the cows for each week, a surplus or deficit situation can be anticipated and managed. Again, the pre-grazing cover can be calculated as shown below and is often referred to as the 'trigger level'. Paddocks exceeding this cover present a surplus above the herd's feed demand.

Target pre-grazing cover = (stocking rate x intake of pasture x rotation length) + residual cover

eg. 4 cows/ha x 17kgDM grass/cow (-1kg ration/cow) x 20 days + 50kgDM/ha = 1,410kgDM/ha

This target, alongside the residual cover target, should be used with the feed wedge to help you to identify both immediate and upcoming surpluses and deficits throughout the main grazing season (April-August), as shown in Figure 3 for the pre-grazing target calculated above.

In this example, there is an immediate surplus with a number of paddocks with covers in excess of the pre-grazing target and also a surplus potentially becoming evident in about two weeks' time. To manage such a surplus there are three management options to consider:

1. Accumulate a surplus on a small area to be conserved as pit silage/bales (long-term silage)
2. Surplus on a small area to be conserved immediately, often as bales (short-term silage)
3. Remove a small area of pasture and reseed or sow a crop that can be eaten after the period of surplus.

A farmer would choose one of these options to manage the surplus and then review his situation one week later. All three options aim to prevent the immediate surplus manifesting into a surplus all over the farm and a resultant loss of pasture quality.