

Winter milk diets need careful formulation

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Teagasc dairy specialist.



As winter milk herds finish calving and grass disappears from cow's diets, thoughts turn to the winter feed plan. Given the 20% increase in concentrate costs in recent months, it is vital to focus on the economics of diet formulation.

The winter feed plan must take into account forage quality, herd milk yield and calving pattern (proportion of stale versus fresh cows).

Fresh cow diets should promote high milk solid production and good body condition to improve fertility. All while ensuring stale cows are fed appropriately for their yield, thus maximising feed efficiency at a whole herd level.

Concentrate feed is the largest variable cost for winter milk farms. There's nearly always scope to improve. While average cost is around 6.0-6.5c/l, there is considerable variation around the average (4.5 to >12c/l) at farm level.

On paper, 1kg concentrate has enough UFL for 2kg milk. But this response to marginal feed is never seen in practice. Why?

Extra concentrate reduces forage intake (substitution) and lowers



Larry Hannon and Ned Loughlin.

whole diet digestibility (called the associative effect). In short, the total UFL increase is less than the extra concentrate UFL fed (Figure 3).

The scale of this effect depends on cow type, days in milk etc. Feed responses appear better with low DMD silage, due to lower initial DMI, but

total feed cost per litre will be higher.

For a given herd situation, break-even concentrate feeding rate will not change too significantly, due to a $\pm 4c/l$ base milk price swing – milk response rate determines the economics to a greater extent.

» **Farmer Focus:** Larry Hannon, Fullerscourt, Ballitore, Athy, Co Kildare

How are you going to deal with rising concentrate costs this winter?

"Our winter diet has evolved into something that is relatively simple and delivers optimum performance.

"This hasn't always been the case. In the past, we have fallen into the trap of pushing the cows too hard, trying to maximise output per cow, with fertility and feed efficiency suffering as a result.

"In terms of concentrate usage, it's important to set out a diet plan that returns a high level of feed efficiency.

"The fresh cow diet is set around achieving optimum milk performance, but allowing the cow to retain body condition and go back in calf.

"Stale milking cows need to be fed efficiently for their level of production, avoiding overfeeding that will lead to excess body condition and unneces-

sary feed cost. Therefore, getting the base diet correct is vitally important, with cows topped up appropriately in the parlour thereafter."

Larry's winter diet

"The basis of the diet is high-quality home-grown grass silage and maize silage grown under contract."

Larry's silage analysis for three cuts can be seen in Table 4.

"I'm delighted with how the silage has tested this year. The first-cut is probably the best silage that has ever been made on the farm and makes up 40% of the total silage stocks.

"We'll start on the second- and third-cut and feed the first-cut when cows are coming near peak production.

"All the milking cows are run in the one group for simplicity. We feed a

simple TMR as our base diet, which consists of 10kg DM of silage, 4.5kg DM maize silage and 3kg of a 24% CP balancing ration.

"Cows are then topped up in the parlour with anywhere from 1-6kg of a high energy 18% CP nut depending on whether they are stale or freshly calved. Stale cows would typically be doing 15-16l, with the fresh group peaking at 32l.

"The diet is balanced for protein at around 16.5% CP and overall energy density of the diet is 0.94 UFL per kg DM fed. I have realised how much time is taken up, and also the running costs associated with it, so I like to keep it simple and feed the TMR once a day. By the time we are looking at having to complete multiple mixes in the spring, we are heading to grass."

—Ned Loughlin

What are the cow's requirements?

When it comes to diet formulation, Table 1 outlines what the typical autumn calving cow requires at differing daily milk output levels.

Intakes of 20-22.5kg DM are required to meet the cow's needs. Quality forage is essential – target at least 60% of DMI as forage (13-14kg per day) and balance with concentrate.

Energy is the first limiting nutrient for milk – diet UFL per kg is constrained by the need for fibre in the diet. Meet the target UFL per kg with high-quality forage and high-energy concentrates.

High UFL energy per kg promotes good milk solids and body condition. Ensure you provide enough total PDI (protein) for target production. To maximize efficiency of energy and protein utilisation for milk production, it is important to match the PDI and UFL ratio of the diet.

Table 4: Silage analysis 2021.

	First cut	Second cut	Third cut
DM %	24.9	34.1	28.1
DMD %	79.8	71.3	72.8
CP%	12.7	13.4	16.4
UFL	0.91	0.80	0.82
NDF %	48.7	50.8	44.6

When the diet is balanced for protein fractions (PDIN and PDIE are similar), total crude protein level can be reduced to 15.5% (from the standard 17.5%), saving on feed costs. For example, a diet with 0.94 UFL per kg should have 94-97g PDI.

A total diet NDF (fibre) target of 30-36% will maintain rumen health and avoid acidosis – 24-28% should come from forage. Silage DMD and intake achieved dictate overall diet NDF.

However, excess NDF (>40%) from poor forage sources or straw reduces DMI and milk yield. Use quality digestible fibre sources if forage intake/quality is limited.

Are you buying the correct quality ration?

Winter rations are often solely purchased on crude protein content, but they should be bought on the basis of quality ingredients.

High crude protein rations are not necessarily better quality, high energy content is needed too. Excess protein is wasted if energy is lacking, but too-low protein can reduce feed intake also.

Choose high energy (0.94+ UFL/kg as fed) rations, then pick the level of protein to suit the forage.

As can be seen in Table 2, two ra-

Hannon Herd performance

Larry notes how herd performance is continuing to improve year-on-year.

"We have placed a large emphasis on improving both the fertility and milk performance of the herd through the use of EBI over the last number of years," he adds.

Herd EBI stands at €162, which places the herd in the top 15% of herds nationally. Milk solids output stands at just over 550kg per cow.

It's difficult to put an exact split on the figures, but the estimate is that the autumn cows are delivering 600kg milk solids and their spring counterparts deliver 530kg on meal inputs of 1.8t and 1.3t respectively.

"We calve approximately 50 cows in the autumn in a six week block starting in mid-October. The remainder of the 170 cows calve from mid-January across 12 weeks, with 86% calving inside six weeks.

—Ned Loughlin

tions with equal crude protein can have very different performance potential due to their energy (UFL) content. Premium18 contains many moderate-to-low UFL ingredients (soya hulls, maize gluten, sunflower, wheatfeed).



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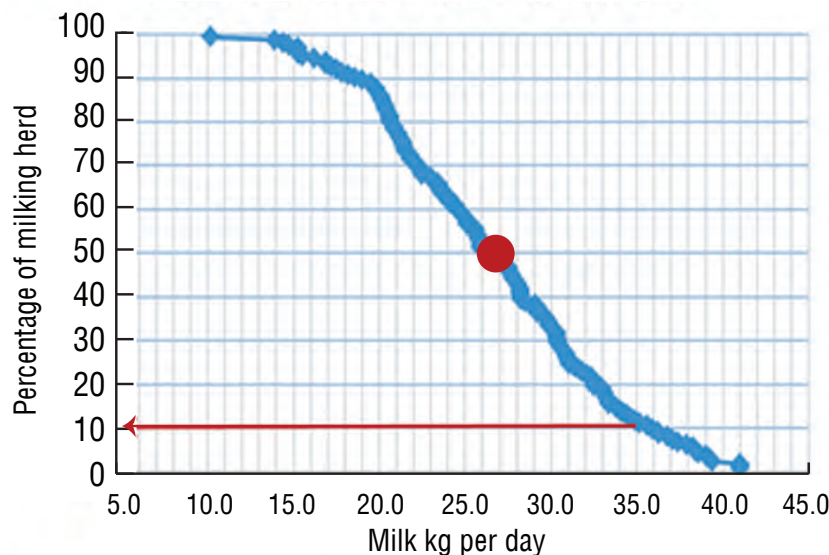
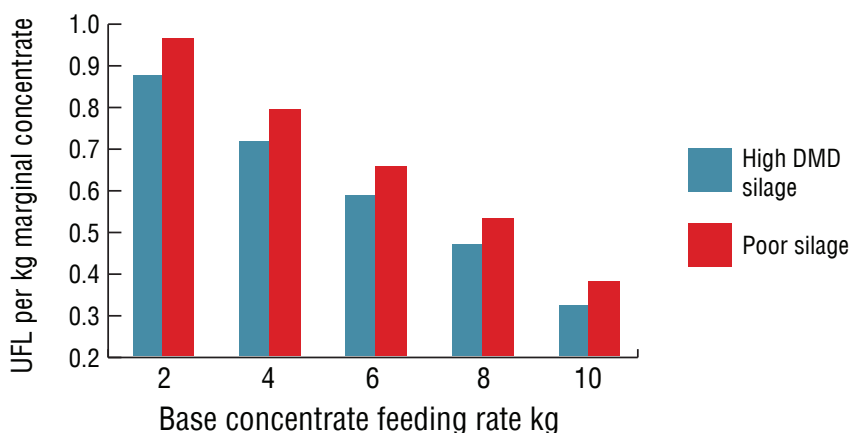
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Figure 1: Milk yield distribution Jan/Feb 2017.**Figure 3:** Total UFL increase per kg meal fed

Although the crude protein is 18%, the UFL value is only 0.89/kg as feed. This is a poor-quality ration for milking cows. Dairy HE 18 uses good-quality ingredients in the main (barley, beet pulp, soybean meal, maize, distillers). The UFL value in this case is 0.97, making it a premium ration for milking cows.

Dairy HE 18 would be expected to support an extra 220-260l of milk per tonne fed, depending on silage quality and feeding levels. The value of this milk is often greater than the difference in purchase cost between the rations.

This shows that feed quality cannot

be decided based on crude protein content. Ensure when buying winter concentrates that they have a UFL value of 0.94 or greater per kg fed.

What level of concentrate does the diet require?

The benefits of higher DMD silage are well proven – increased forage intake, more milk solids and milk from forage, better rumen health and lower concentrate feeding levels.

Average silage quality on farms remains similar, year-on-year, at 68 DMD, thus explaining the wide variation in the level of concentrate fed at farm level.

Table 3 outlines the concentrate feeding levels required for different levels of milk output, depending on the silage quality available.

For example, the typical 600kg cow will require 7.5kg of concentrate to produce 30kg of milk, whereas that requirement would be 10.0kg should the silage be 65 DMD. Typically, every five unit drop in DMD will need 1.0-1.5kg extra concentrates to compensate for the lower energy level.

Where silage quality is poor, forage intake levels will reduce. Therefore, it's important to monitor NDF levels in the diet and where shortfalls are identified, extra fibre sources should be fed. There are significant challenges in meeting energy requirements in these situations.

Analyse herd level performance before setting the feed plan

Farmers should check the milk yield distribution for their own herd using winter milk recording data before setting their feeding strategy.

Following analysis of milk recording data for a high-yielding herd (8,000kg), with 40% of the herd calving in the autumn, Figure 1 shows the typical milk yield distribution per cow for the months January and February for a herd of this type.

The average yield for the herd was 27kg. This high-yielding herd has 9% of cows over 35kg.

Figure 2 details the breakdown of the total daily herd milk supply. The total milk output from the highest yielders accounts for 14% of total output, while the marginal milk produced (milk produced >35kg by these cows) equates to 1.2% of daily output. Therefore, 86% of daily milk output comes from the standard base cow within the herd.

The strategy should be to ensure the basis of the diet is formulated to a herd level and not that of the 'best' cows based on the herds own performance. Individual high yielders can be managed as a sub group thereafter.

Johnstown Castle winter milk herd

For the Johnstown Castle winter milk herd, the aim is to have a good-quality base diet that will work well for high-yielding and lower-yielding groups alike. This simplifies feeding in the yard. The parlour is used to top up the

Table 1: Nutritional requirements at differing production levels.

Requirements for 600kg cow at 4.1% fat and 3.4% protein			
Milk / day	25 kg	30 kg	35 kg
UFL / day	17.2	19.4	21.6
PDI g / day	1675	1930	2238
UFL / kg DM	0.90	0.94	0.97
PDI / kg DM	90	94	98
DMI (kg)	19.1	20.7	22.5

Table 3: Concentrate feeding levels at different levels of silage quality.

Silage quality			
Milk yield	65 DMD	70 DMD	75 DMD
20l	5.5kg	4.0kg	3.0kg
25l	8.0kg	6.5kg	5.5kg
30l	10.0kg	8.5kg	7.5kg
35l	12.5kg	11.0kg	10.0kg

high-yielding group with additional concentrate.

The feed ingredients used for the basic milking diet are:

- 9kg DM of good-quality grass silage (74% DMD).

- 5kg DM of high-quality maize silage (33% starch).

- 3kg of a high protein (23% crude protein) coarse blend fed as part of the forage mix (this contains barley, soybean, beet pulp and distillers grains). This diet provides enough nutrients for approximately 20kg high solids milk as a base level. Lower-yielding cows receive a further 2kg parlour ration. Fresh cows receive up to 6kg additional parlour concentrate, bringing their daily dry matter intake to 21.5kg on average.

This covers the fresh group with enough energy (UFL) and protein (PDI) for a group average milk yield of 31.5kg, which is our target for December/January. Parlour concentrate is formulated for high energy at 18% crude protein equivalent and contains full minerals and vitamins.

Figure 2: Breakdown of total daily milk

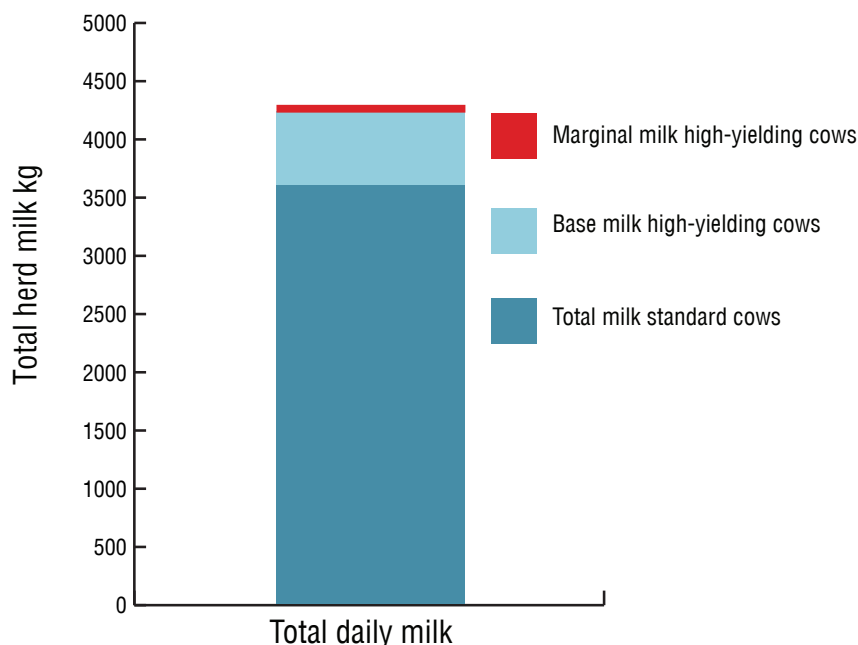


Table 2: Example of two 18% CP rations.

	'HE' 18%	Premium 18%
Ingredients	Barley, beet pulp, soya meal, maize, distillers, rape-seed, molasses, fat, mins + vits	Barley, soya meal, soya hulls, maize gluten, wheat-feed, sunflower, molasses, maize, mins + vits
Feed Value (per kg fed)	0.97 UFL / 114 PDIE	0.89 UFL / 112 PDIE

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