

## 9 Managing dry cow feeding

Considerable work has been undertaken in recent years to ensure the smoothest possible transition from the end of one lactation into full production in the next, particularly with high yielding animals.

Good nutrition and management in the dry period have been shown to minimise calving problems and early lactation metabolic disorders, maximise subsequent lactation performance and udder health and optimise fertility and overall cow productivity.

The Cinderella of many dairy regimes in the past, dry cow feeding and management deserves particular attention in modern systems for the extent to which it can make the difference between success and failure in overall herd performance.

### What's in this section?

- Planning to make the most of the dry period
- Managing dry cow feeding for the best results
- Ensuring effective transition cow management.

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## Summary

- As a vital link from one lactation to the next and preparation for calving, the dry period must be managed positively to ensure cows start their new lactation in the best possible nutritional status
- Where cows have low cell counts and no history of mastitis a dry period shorter than the traditional eight weeks should not cause problems and may be preferable
- The level of feeding during the dry period has been found to affect early lactation performance, over-feeding being more harmful than slight under-feeding
- While recent work suggests that running cows in separate early and late dry groups may not be necessary nutritionally, maintaining such groups can be convenient for management, especially over the summer months
- The primary aim of dry cow feeding is to maintain body condition by ensuring an adequate energy intake
- Satisfying dry cow energy requirements within appetite limits present few, if any, difficulties – a ration energy density of 9-10 MJ ME/kg DM being perfectly sufficient
- Cow condition needs to be monitored at drying off and again pre-calving to ensure cows calve down in the best condition (BCS 2.5-3) for optimum performance
- Providing cows are managed correctly to avoid losing body condition, the use of expensive protein supplements in dry cow diets is not recommended
- Ensuring the correct mineral balance to avoid the most common early lactation metabolic disorders can be a particular challenge in dry cow feeding
- A smooth, low stress transition from the dry period to lactation is particularly important in maximising post-calving feed intakes to support high levels of performance with minimal health or fertility problems
- Metabolic disorders are most common in early lactation when cows are under particular metabolic stress and can generally be prevented by careful management of cows at drying off, during the dry period and in early lactation.

<b>See also...</b>	<b>Section 2:</b>	Planning your nutrition
	<b>Section 7:</b>	Managing your feeding
	<b>Section 11:</b>	Factsheet 1: Metabolic disorders Factsheet 3: The Dietary Cation Anion Balance (DCAB) system Factsheet 4: Body Condition Scoring Factsheet 9: Metabolic profiles

# Action plan

To prepare your cows as well as possible for the next lactation.

## 1. Be flexible in your dry cow policy

Be prepared to take a flexible approach involving dry periods shorter than the traditional eight weeks for some cows if it appears beneficial (**Page 9:4**).

## 2. Plan your dry cow management

Consider whether you actually need to run dry cows in separate groups and plan to avoid over-feeding them (**Page 9:6**).

## 3. Understand feeding requirements

Appreciate the specific energy, protein and mineral needs of dry cows to enable the best balanced and most economic rations to be used (**Page 9:7**).

## 4. Manage your feeding

Provide the most cost-effective balance of forage and concentrates to maintain cow body condition, monitoring progress through Body Condition Scoring (**Page 9:10**).

## 5. Ensure the correct mineral balance

Pay particular attention to ensuring the correct mineral balance in order to avoid the most common early lactation metabolic disorders (**Page 9:10**).

## 6. Manage the transition to lactation carefully

Do everything possible to minimise the stress placed upon cows as they move from the dry period into full milk production (**Page 9:12**).

**The Pd+ programme provides practical advice on improving herd fertility.**

**For detailed guidance on feeding for fertility see Section 7.**

# The dry period

As a vital link from one lactation to the next and preparation for calving, the dry period must be managed positively to ensure cows start their new lactation in the best possible nutritional status.

## Planning dry period length

Although a dry period of around eight weeks is traditional in UK herds, it is difficult to see precisely why.

Where there are active udder infections – evident in repeated cases of mastitis or cell counts above 250,000 for a period of time – a full 56 day dry period is always advisable to give sufficient time for them to clear up and damaged tissues to be repaired.

Where cows have low cell counts and no history of mastitis, a shorter dry period should not cause problems and may even be preferable.

Despite considerable research in America, in particular, there remains no general agreement over the best length for the dry period.

Reducing the length of the dry period to four weeks has been shown to reduce early lactation milk yields by 10%.

However, if the milk produced from the normal drying-off date up to actual drying-off in the previous lactation is added to that from the current lactation overall yield differences have been found to be small. (Table 9.1).

**Table 9.1: Milk production with different dry periods (litres)**

Days dry	0	28	56
Milk production at end of previous lactation (Day -56 to Calving)	750	422	0
Milk production at start of current lactation (Days 1-70)	2373	2653	2971
Total yield over trial period (Day -56 to Day 70)	3123	3075	2971

Source: Rastani et al (2005) *Journal of Dairy Science* 88, 1004

While this work suggests there is no direct milk income loss through shorter dry periods, noticeably higher yields at day 70 of the lactation following the 56 day dry period could have led to higher overall production had the trial been extended to cover the entire lactation.

On the other hand, the trial also showed higher pre-calving and early lactation dry matter intakes in cows receiving shorter dry periods.

Together with the lower milk outputs, this led to reduced periods in negative energy balance and valuable fertility benefits (Table 9.2).

**Table 9.2: Body condition and fertility with different dry periods**

Days dry	0	28	56
Body Condition Score loss (Calving to Day 70)	0.56	0.81	1.37
Days to first ovulation	13	24	32
Days to first service	69	68	75
First service conception rate	55	26	20

Source: Rastani et al (2005) *Journal of Dairy Science* 88, 1004 and Gunman (2005) *Journal of Dairy Science* 88, 2401

**The Pd+ programme provides practical advice on improving herd fertility.**

**For detailed guidance on feeding for fertility see Section 7.**

### Rules of thumb

Only cows with late lactation cell counts of below 200,000 should be considered for short dry periods and even then, all quarters should pass the California Milk Test at 8 weeks before the due date.

Assessments of farm data reveal that dry periods of less than 30 days or longer than 70 days are costly in terms of lifetime yield, establishing optimum lengths for the dry period depending on lactation number (Table 9.3).

**With reduced dry periods it is important to ensure dry cow antibiotics have appropriately short withdrawal periods.**

**Table 9.3: Optimum dry period lengths**

Lactation number	To maximise next lactation yield	To maximise lifetime production
1	40-45 days	40-50 days
2	40-45 days	30-40 days
3 and more	55-65 days	30-40 days

Source: Kuhn (2006) *Journal of Dairy Science* 89, 1713

The dry period for younger animals that are still growing – under three years old at drying-off – should be a full eight weeks.

# Feed planning

American work has shown the level of feeding in the dry period can have important effects on subsequent early lactation performance, with restricted feed energy levels in the 20 days before calving increasing both feed and energy intake in the 20 days after calving.

By improving intakes immediately post-calving, restricted dry cow feeding led to a better early lactation energy balance, as measured by metabolic profiling (Section 7).

**Factsheet 9 provides further information on metabolic profiles.**

The level of feeding during both the early and late dry periods has further been found to affect early lactation performance, over-feeding being more harmful than slight under-feeding (Table 9.4).

**Table 9.4: The effect of dry period feeding on early lactation performance (wks 1-8)**

Feeding level in early dry period (% of requirements)	80		100		150	
	80	150	80	150	80	150
Dry matter intake (kg)	21.1	21.6	21.7	21.9	20.6	20.5
Milk yield (litres)	37.1	36.8	39.7	39.2	37.1	36.7
Weight loss (kg)	21	6	22	13	20	23
Energy balance (%)	106	109	102	108	99	104

Source: Dann et al (2006) *Journal of Dairy Science* 89, 3563

**While recent work suggests that running cows in separate early and late dry groups may not be necessary nutritionally, maintaining such groups can be convenient for management, especially over the summer months.**

### Keeping dry cows in two groups will allow:

- Greater daily attention to be given to cows approaching calving
- Recently dried off cows to utilise relatively distant or inaccessible grazing
- Costs associated with Dietary Cation Anion Balance (DCAB) feeding to be minimised.

**Factsheet 3 provides detailed information on the DCAB system.**

**On the other hand, keeping dry cows in a single group will:**

- Enable a single basal forage diet to be fed throughout the dry period
- Reduce the time and stress involved in sorting cows between groups.

If dry periods are to be reduced there is little advantage in running two dry cow groups.

## Assessing dry matter intakes

**Although the growing calf and its associated fluids physically restrict rumen capacity and, through it, appetite in the dry period, relatively low energy requirements at this stage mean this presents few, if any, feeding problems.**

Trials suggest intake can vary from 1.7% to 2.3% of bodyweight during the dry period and does not decrease until the point of calving.

### Rule of thumb

Typical Holstein/Friesian dry cows can eat 2% of their body weight in dry matter each day.

This means a 600kg cow has a dry matter intake of around  
 $600 \times 2 \div 100 = 12.0\text{kg/day}$

## Assessing energy requirements

**The primary aim of dry cow feeding is to maintain body condition by ensuring an adequate energy intake.**

On top of normal maintenance requirements, extra energy is required in late pregnancy to support the growing calf.

### Rules of thumb

Typical Holstein/Friesian dry cows require 15% of their bodyweight plus 10 MJ of ME each day to maintain their body condition.

This means a 600kg dry cow requires  
 $(600 \times 15 \div 100) + 10 = 100 \text{ MJ of ME/day}$ .

In a split feeding regime, cows in the early dry period should receive ME levels equivalent to 15% of their bodyweight with those in the late dry period receiving M levels equal to 20% of bodyweight.

This means a 600kg dry cow should received  
 $600 \times 15 \div 100 = 90 \text{ MJ ME/day}$  in the early dry period and  
 $600 \times 20 \div 100 = 120 \text{ MJ ME/day}$  in the late dry period.

More than slight under-feeding of dry cows will lead to excessive fat mobilisation but since this will primarily involve internal reserves it can go unnoticed unless cows are routinely assessed for condition.

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Routine condition scoring is also important to avoid persistent over-feeding which raises insulin levels to enable excess energy to be stored as fat.

This causes cows to become increasingly less responsive to insulin (in much the same way as type II diabetes in overweight humans) reducing energy intake and increasing weight loss in early lactation.

There is increasing evidence that cows on high concentrate diets may benefit from being in BCS 2.5 at calving rather than the traditional score of 3.0 on lower concentrate systems.

A BCS of 2.5-3.0 is, therefore, recommended as a general rule (**Section 2**).

**Factsheet 4 provides practical advice on Body Condition Scoring.**

## Assessing protein requirements

Less protein is required to support the growth of the calf and development of the udder than for milk production.

### Rule of thumb

A dietary protein content of 13-14% (130-140g/kg) in the dry matter will usually be adequate for dry cows at any stage of the dry period.

Diets with less than 12% protein can reduce colostrum quality, feed intake and early lactation milk yields.

Trials in the 1990s suggested supplementing dry cows with sources of Digestible Undegraded Protein (DUP) could improve milk yields and proteins in the subsequent lactation.

More recently, however, it has been established that there is no consistent positive effect from such supplementation except where dry cows are losing significant levels of body condition.

**Providing cows are managed correctly to avoid losing body condition, the use of expensive protein supplements in dry cow diets is not recommended.**

## Assessing mineral and vitamin requirements

In much the same way as protein, the mineral requirements for dry cows are low compared to milking animals.

**Adequate maintenance levels of minerals and trace elements are necessary in the dry period, the correct balance being more important than absolute levels.**

**Incorrect mineral balances in the dry period can cause:**

- Difficult calvings – as a result of poor muscle tone
- Retained cleansings – due to poor uterine contractions
- Milk fever – which can lead to reduced feed intake and displaced abomasums.

**Factsheet 1 provides practical guidance on metabolic disorders.**



**The main minerals to consider in minimising problems are:**

- Calcium
- Phosphorus
- Magnesium
- Potassium
- Sodium.

All these minerals are primarily related to calcium supply which is critical in view of the sudden, dramatic increase in requirements at calving and the relative immobility of body reserves.

Selenium and Vitamin E are also important considerations by virtue of their role in maintaining fully operational cell defences after calving when cows show a natural suppression of their immune systems.

Although it has been associated with retained cleansings, selenium deficiency is now uncommon as high levels have generally been fed for the past 15-20 years and selenium is recycled via dung.

Traditionally, selenium problems have been linked to high levels of straw or root feeding but in modern systems high inclusions of forage maize may be more significant.

Interest has increased in Vitamin E in recent years as higher oil diets have been fed.

Iodine is also important in dry cows for its role in the hormone thyroxine, which controls metabolic rate and is involved in the immune system and brain function.

Iodine deficiency increases calf mortality and retained cleansings but is only really significant in well-defined local problem areas and with very low input systems.

**The Pd+ programme provides practical advice on improving herd fertility.**

**For detailed guidance on feeding for fertility see Section 7.**

# Feed management

**Satisfying dry cow energy requirements within appetite limits present few, if any, difficulties – a ration energy density of 9-10 MJ ME/kg DM being perfectly sufficient.**

## Rule of thumb

There are no hard and fast rules for concentrate feeding in the late dry period but 2kg/day of the same concentrate to be fed immediately after calving is a good guide.

## Managing forage and concentrate feeding

A basal diet of straw (6-7 MJ ME/kg DM), hay (7-8.5 MJ ME/kg DM) or mature grass silage (9-10 MJ ME/kg DM) will provide adequate energy in dry cow feeding.

### It is important to avoid feeding:

- Mouldy forages – which can cause abortion
- Late-season grass from areas where soil potash is likely to be high – which can increase the risk of milk fever
- High clover silage – which can also increase milk fever risk.

Although forages alone can meet dry cow energy requirements, stock fed all-forage diets have very low levels of starch-digesting bacteria in their rumens which can limit their initial capacity to utilise concentrates in early lactation.

To ensure cows can make the best possible use of their early lactation rations – and so minimise early lactation energy deficits – some concentrate feeding in the later stages of the dry period is always advisable to condition rumen microbial populations.

Cow condition needs to be monitored at drying off and again pre-calving to ensure cows calve down in the best condition (BCS 2.5-3) for optimum performance (**Section 2**).

**Factsheet 4 provides practical advice on Body Condition Scoring.**

## Managing mineral feeding

**Ensuring the correct mineral balance to avoid the most common early lactation metabolic disorders can be a particular challenge in dry cow feeding.**

The most important need is to prime the metabolism to cope with the three to fourfold increase in daily calcium requirements at calving.

While body reserves of calcium (in bone) are high, the diet can significantly influence the speed and extent to which these can be mobilised.

### Three techniques can be used in the dry period to improve calcium mobilisation:

- 1. Feeding a low calcium diet pre-calving** – to improve the efficiency with which dietary calcium is absorbed and stimulate increased mobilisation from bone
- 2. Feeding extra Vitamin D very close to calving** – to increase short-term bone mobilisation and gut absorption

While Vitamin D injections 24 hours prior to calving can give the necessary boost to calcium supply, it can be difficult to accurately assess when some cows will calve

This is important because the same injections given 3-4 days prior to calving can actually increase the risk of milk fever

- 3. Acidifying the blood with balanced mineral feeding** – to activate the natural mobilisation system.

Probably the most commonly used approach these days, this involves balancing the minerals naturally present in the feeds to ensure the most favourable, slightly acidic conditions in the bloodstream using the Dietary Cation-Anion Balance (DCAB) system.

A detailed analysis of forage mineral levels is fundamental to success with DCAB which can be applied in one of two ways.

**Partial DCAB** is a simple, low cost option, involving the selection of feeds to minimise potash and sodium intakes followed by the addition of magnesium chloride at the right level to achieve a DCAB of between -150 and -200.

**Full DCAB** is a more sophisticated and costly option, involving similar feed selection and the use of a commercial mineral supplement containing a balance of anionic salts and additional calcium.

This works well under careful management but the high calcium input can make the milk fever risk worse if the supplement is not fed accurately every day.

Dietary selenium levels of between 0.2 to 0.3mg/kg DM are considered adequate in dry cow rations.

To maintain the most active cell defences and give a good transfer of Vitamin E to colostrum, dietary levels of 800-1000iu/day are suggested on silage-based diets, with less than half these levels required on fresh grass.

Dry cow intakes of 0.5 to 2.0mg iodine/kg DM will safeguard against deficiency – the higher levels being advisable where high levels of kale, forage rape or rapeseed meal are fed.

**Factsheet 3 provides detailed information on the DCAB system.**

## Managing the feeding system

Where a TMR or partial mixed ration is being fed to the milking herd the same mix can usually form the basis of the dry cow diet, with quantities matched to energy requirements.

### Specific considerations for different feeding systems include:

- **Milking mix fed restricted, with long forage offered separately** – feed space must be sufficient for all stock to eat at once. Heifers may not get their full share
- **Milking mix bulked-up with chopped straw fed ad lib** – the safest option as every mouthful is the same
- **Special dry cow TMR** – extra work is required if an extra mix is necessary to exclude unsuitable ingredients like high potash grass silage or caustic treated wheat. Higher straw inclusion is possible (typically 50% of the mix fresh weight)
- **Silage fed ad-lib with separate concentrates** – this is necessary in the absence of a mixer wagon. Sufficient feed space is essential for all stock to eat concentrates together. A proprietary dry cow feed is advisable to ensure the correct mineral balance

# Transition cow management

**A smooth, low stress transition from the dry period to lactation is particularly important in maximising post-calving feed intakes to support high levels of performance with minimal health or fertility problems (Section 2).**

Because cows are social animals they should only be isolated in loose boxes when essential and, unless isolation is as a disease precaution, they should be allowed to see other cows from these boxes.

The feed offered in loose boxes needs to be the same as the ration provided elsewhere and appropriate for the stage of pregnancy or lactation.

The milking diet should be introduced immediately on calving, cows being added to the main milking group as soon as practicable, ideally within 24 hours.

In large herds it is useful to group fresh calved cows together in a convenient area so a close eye can be kept on them. This area should have the best feed access and greatest cow comfort.

Heifers should be parlour trained prior to calving if feasible.

## To be avoided in transition cow management are:

- Heat stress
- Overcrowding
- Poor ventilation
- Slippery surfaces
- Uncomfortable cubicles or bedding areas
- Poor grouping management
- Stressful cow movement and rough handling.

Such environmental or behavioural stresses can easily suppress the immune function, leading to increased susceptibility to infections.

## Preventing metabolic disorders

**Metabolic disorders are most common in early lactation when cows are under particular metabolic stress and can generally be prevented by careful management of cows at drying off, during the dry period and in early lactation.**

## The most common disorders that need guarding against are:

- Hypocalcaemia (milk fever)
- Retained foetal membranes (retained cleansings)
- Ketosis (acetoanaemia)/fatty liver
- Displaced abomasums (DA).

**Factsheet 1 provides practical guidance on metabolic disorders.**