Managing freshly calved dairy cows

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The transition period, defined as three weeks pre-calving (Figure 1) **and three weeks post-calving, is the highest risk period for the dairy cow during the production cycle.**

Figure 1. Cows pre-calving in cubicles.

This article will discuss some of the factors that can improve performance through the post-calving transition period and also touches on metritis. The second article in the series will review the factors that can affect the pre-calving period.

The reduction in dry matter intake (DMI) during the immediate pre-partum period and the lag in its rise post-calving, together with the dramatic increase in energy demands as lactation commences, are well-documented[1]. Over the same period, the requirement for calcium jumps from ~17g/d to ~50g/d [2].

This discrepancy between the increase in demands and DMI results in a period of negative energy balance for the modern Holstein cow during early lactation, and is a normal process. Modern cows are capable of mobilising body reserves (primarily in the form of fats) to meet this shortfall and continue to yield, which, as DMI increases through lactation, are replenished.

The mobilisation of body reserves can be observed in the milking cow through:

- condition loss during early lactation measured through body condition scoring (BCS)
- increased circulating levels of non-esterified fatty acids (NEFA)
- increased circulating beta-hydroxybutyrate (bHB) levels

The increased energy and calcium demands mean presenting the correct ration and maximising DMI are essential to minimise the level of negative energy balance that occurs. Should the degree of negative energy balance or hypocalcaemia slip above a threshold then they can act as gateway diseases for:

- compromised immune systems[3]
- displaced abomasums[4-7]
- extended calving to conception period[8,9]
- increased duration and severity of mastitis[10]
- increased prevalence of mastitis (clinical and subclinical)[6,11,12]
- metritis[13]
- reduced yields[14]
- retained foetal membranes[15,16]

The impact and risk of both subclinical ketosis and hypocalcaemia can be reduced by maximising the intake of a well-constructed ration.

After calving, the aim should be to move the cow from the calving area and ration to a higher energy and calcium density ration as quickly as possible. In larger herds, very often a fresh cow group is employed where the stocking density is kept as low as possible – fresh feed is always available and access to the parlour is convenient to try to ensure removal from feed is minimised. Feed space should be maximised and, ideally, approaching 1m/cow[17] to try and minimise the effect negative interactions/guarding.

Social interactions

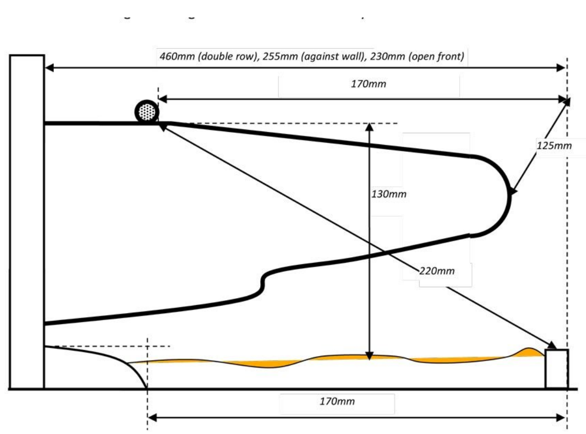

Figure 1 - Suggested cubicle dimensions for Holstein cows, adapted from [21]

Figure 2. Suggested cubicle dimensions for Holstein cows, adapted from *Dairy Housing: a Best Practice Guide*[21].

Due to the social nature of cows it has been suggested changes in groups can have negative effects on DMI as the group hierarchy is established. These social interactions can pose a significant risk to the freshly calved cow. However, the evidence as to whether these interactions have a negative effect on either DMI or energy balance is mixed[18,19] and the potential for minimising the number of group changes given typical UK herd size is limited.

Sufficient time for comfortable rest should form a significant part of a dairy cow's daily time budget and insufficient or uncomfortable rest can not only have significant impacts on DMI and, consequently, energy balance and milk production[20], but also on udder and foot health.

Depending on the herd, fresh cows may be provided with loose yards or cubicles. There are pros and cons to both, the details of which, however, are beyond the scope of this article.

Provided the system is well designed and managed there is little to decide between them. Suggested cubicle dimensions for mature Holstein cows are given in **Figure 2** and areas for straw yards in **Table 1**.

The presence of concurrent disease will have negative effects on DMI, and its early detection and effective treatment is critical. In larger herds, a fresh cow programme is often instituted as a proxy for classic stockmanship. These programmes will often use a combination of routine urine ketone testing, rectal temperatures, milk yield and vaginal examinations to try to detect those cows suffering (or at risk of suffering) concurrent disease.

A well-constructed and implemented programme executed through well-trained staff can work very successfully. It is, however, not uncommon to find them diluted down to simply rectal temperatures in UK herds. Unfortunately, rectal temperature is often greater than the accepted normal range during the first 10 days after parturition[23,24] and this occurs in response to the detection of proinflammatory cytokines (IL-1, IL-6, and TNFa) by receptors stimulating a coordinated neural response in the hypothalamus and brainstem to reset the thermostatic set point for body temperature[23].

A more risk-based approach can be taken to selecting cows for further examination by identifying those at higher risk of periparturient disease. These might include those that suffered an assisted calving, stillbirth, retained fetal membranes or clinical hypocalcaemia/ketosis, or gave birth to twins (**Table 2** and **Table 3**).

Table 1. Suggested stocking densities for straw-bedded yards[22]

Straw-bedded lying area	1.25m²/ 1,000L/cow
Loafing area*	3m²/cow

*Loafing areas are defined as non-lying, non-passageway, non-feeding areas

Table 1. Suggested stocking densities for straw-bedded yards[22].

Table 2. Risk factors for metritis[25]

Risk factor	Odds ratio
Stillbirth	1.5
Assisted calving	2.1
Retained fetal membranes	6.0
Clinical ketosis	1.7

Table 2. Risk factors for metritis[25].

Table 3. Risk factors for left displaced abomasum[25]	
Risk factor	**Odds ratio**
Clinical hypocalcaemia	2.3
Clinical ketosis	13.8
Assisted calving	2.3

Table 3. Risk factors for left displaced abomasum[25].

From a uterine health perspective, the first two weeks should focus on the detection of metritis, after which the shift is towards endometritis (**Figure 3**). The prevalence of metritis can range widely between farms, from 1% to 40%[26].

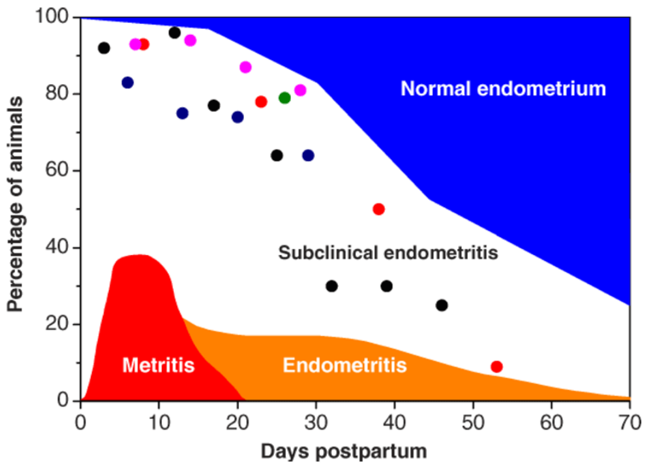

Figure 3. Prevalence of uterine disorders in dairy cattle relative to calving[27].

Metritis is a severe inflammatory reaction involving all of the layers of the uterus (endometrium, submucosa, musculari and serosa) and is characterised by delayed involution of the uterus, a foetid watery purulent vulval discharge and often pyrexia26 (?39.5°C, although temperature during the first 10 days postpartum is not a good indicator of the number of bacteria in the uterus as only ~50% of cows with a high temperature had metritis[28]).

The presentation can range from relatively mild to toxic and a grading system has been described (**Table 4**).

Due to the involvement of all layers of the uterus, treatment should be by parenteral antimicrobials[30] and success is a combination of the drug's ability to penetrate the uterus, the conditions within the uterus and the minimum inhibitory concentration (MIC) of the bacteria involved (most commonly expressed as MIC_{50} and MIC_{90}).

Table 4. Grading system for metritis[29]	
Grade 1 metritis	Cows with an abnormally enlarged uterus and a purulent uterine discharge without any systemic signs of ill health
Grade 2 metritis	Animals with additional signs of systemic illness such as decreased milk yield, dullness or pyrexia
Grade 3 metritis	Animals with signs of toxaemia, such as inappetence, cold extremities, depression or collapse

Table 4. Grading system for metritis[29].

Both gram-positive and gram-negative pathogens will be implicated; therefore, a broad spectrum antimicrobial will be required. It is also worth noting sulphonamides are unlikely to be effective due to the production of para-aminobenzoic acid metabolites in the uterine lumen[31] and aminoglycosides are not likely to be active in the predominately anaerobic conditions of the uterus.

Selection of an antimicrobial should take into consideration the principles of responsible antimicrobial use[32], the World Health Organization list of critically important antimicrobials[33] and licensed products.

Summary

Maximising DMI through good ration preparation and presentation, together with good environmental management, should promote a good lactation and reduce the incidence of related gateway diseases. A risk of successful lactation can be further increased by the prompt detection and appropriate treatment of periparturient diseases.

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