BODY CONDITION SCORE 5: AN OLD WIVES' TALE OR THE FOUNDATION FOR PROFIT

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Summary

- Proper management of body condition score (BCS) is important for milk production, cow fertility, animal welfare and dairy farm profitability.
- Body condition score loss and gain are natural events in the lactation/pregnancy cycle of all mammals. Irrespective of what a cow is fed, her physiology dictates that she will mobilise body condition rapidly in the first 6 to 8 weeks postcalving.
- An ideal BCS at calving is 5 for mature cows and 5.5 for 1st and 2nd lactation cows.
- Fatter cows at calving lose more BCS, but are still in better condition at mating.
- Nutrition during the first 6 weeks of lactation does not appear to affect BCS loss.
- Restricting cows beyond 6 weeks of lactation will probably reduce BCS further and may reduce fertility. In such situations, energy supplements may improve fertility.
- If cows are well fed on pasture and pasture silage, energy supplements such as molasses, maize silage or cereal grain will not improve fertility.
- Cows receiving starch based supplements, such as maize silage or concentrates, in autumn will gain more BCS than cows receiving pasture alone or pasture and pasture silage.

Introduction

The modern dairy cow has been bred to produce large amounts of milk, but is limited in the amount she can physically eat. As a result, energy consumption is considerably less than milk energy output in early lactation (Figure 1). Therefore a substantial portion of milk produced in early lactation is from mobilisation of body reserves. Gibb et al. (1992) equated the contribution of mobilised body fat to a nutrient supply sufficient to produce approximately 35 kg milksolids (MS) during the first eight weeks of lactation. Similarly, Bauman and Currie (1980) estimated that approximately one third of milksolids in early lactation is produced from body tissue reserves.

Mobilising body reserves postpartum is a natural process for all mammals. For example the blue whale exists almost entirely on stored reserves for 7 months following calving (Bauman, 2000). It is only at six weeks or more postpartum that intake increases to the point where dairy cows regain a positive energy balance and cease mobilising body condition. This point is dependent on the strain of cow, the genetic merit for milk production and nutrition. However it is not the fact that cows lose BCS postcalving that is important. What concerns most people is the amount of body tissue that is lost in early lactation, the effect this has on animal production and reproduction, whether this poses an

animal welfare concern or not, and how excessive weight loss can be prevented. In this paper we will try to answer these questions.

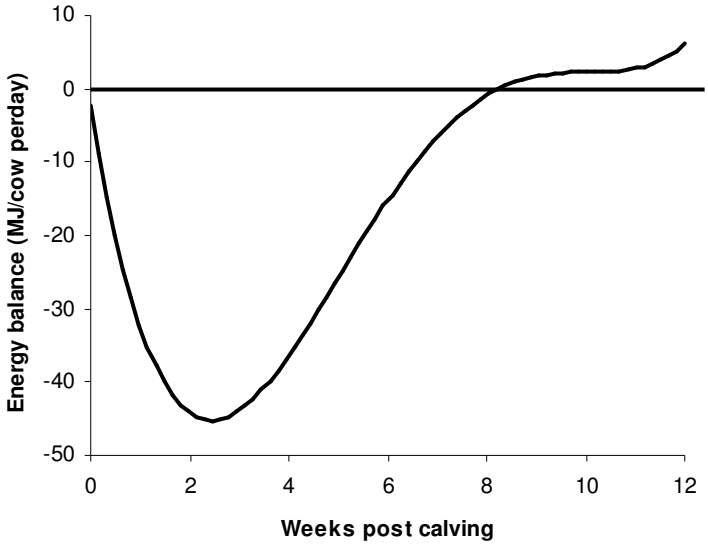

Figure 1: Energy balance of dairy cows in early lactation

How much body condition should I expect my cows to lose?

There is a large variation in the amount of condition that cows lose postcalving. Generally speaking, the better condition a cow is in at calving, the more condition she will lose postcalving. However she will still be in better condition at mating than if she had calved thinner. An analysis of 2,707 lactations from 1,106 cows at Dexcel showed that on average cows calving at BCS 4.8 lost 1 BCS unit postcalving, but this ranged from 0 to 2.2 BCS units. These data suggest that on a well managed farm the minimum BCS recorded on the majority of cows will be 3.5 to 4.0, and that BCS should not drop below 2.5 for individual cows.

The amount of BCS lost postcalving is dependent on a number of factors, including BCS at calving, genotype of cow, milk production and nutrition. Properly managing BCS can help us improve productivity and profitability, and the perception that urban people have of dairy farming.

BCS and milk production

The importance of BCS at calving for subsequent milk production has been well documented. Grainger and McGowan (1982) reported that each condition score unit difference at calving equated to approximately 8.5 kg of milk fat postcalving. This is consistent with recent results from Dexcel where cows produced 10-15 kg less MS for each 1 unit reduction in BCS at calving (Chagas et al., 2003; Roche et al., 2005a,c). Recent research at Dexcel has also shown that cows that calve at BCS 5.0 respond better to supplementary feed postcalving than cows that calve at BCS 4.5. This is

probably because thinner cows will incorporate more of the additional feed energy into BCS gain earlier than fatter cows, reducing the response of thin cows to supplementary feed.

In the U.S., Waltner et al. (1993) showed a 322 kg gain in fat corrected milk in the first 90 days of lactation when cows calved at a BCS of 5 compared with 3 (approximately 12 kg MS/BCS unit increase). However, the gain achieved by increasing BCS further was less important (≈ 2.5 kg MS/BCS unit). From this it can be concluded that a BCS of 5 at calving is probably optimum for milk production; a lower BCS resulting in reduced milk production and a higher BCS being an inefficient use of energy.

BCS and fertility

The most likely non-reproductive factors to influence fertility are BCS at calving and the timing, the extent, and the duration of the negative energy balance endured by cows in early lactation. Management of body condition score between drying off and mating can profoundly influence reproduction, affecting either the length of the postpartum anoestrus interval or the ability of the cow to successfully conceive.

Body condition score at calving

The BCS at calving is a very important determinant of timing of oestrus and therefore whether mating will be a success or a disaster, particularly with younger cows (less than 4 years old). It has been well established that a decrease of 1 BCS unit at calving will delay the onset of oestrus activity by 7 to 10 days (McDougall et al. 1995), increasing the number of non-cycling cows at the planned start of mating by 14 to 17% (Lucia Chagas, unpublished data). This will add significantly to the animal health bill and must be considered carefully with the removal of induction as a farm management tool, and reduced consumer acceptance in the future for the use of hormone treatment (e.g. CIDR) in food producing animals.

In addition to the increased animal health costs, pregnancy rates at 6 weeks were reduced from 73% to 63% and final pregnancy rate declined from 92 to 85% as BCS at calving declined from 5.0 to 4.0 (Lucia Chagas, unpublished).

Body condition score postcalving

Several researchers have shown strong relationships between what happens to BCS after calving and whether a cow gets pregnant. Cows that lose BCS quickly and that lose the most condition in early lactation are less likely to be submitted for AI and less likely to become pregnant. For example Butler and Smith (1989) reported that conception rates to 1st service for cows losing 1 to 2 BCS units after calving was 53%, while the conception rates to 1st service of those losing more than 2 BCS units was less than 20%. Similarly, Buckley et al. (2003) showed under grazing systems that herds where cows lost more than 1.0 BCS unit after calving had 7% lower 6-week in-calf rate. Cows

with low BCS at mating were less likely to become pregnant in a seasonal calving system, and particularly not in the first 6 weeks of the breeding season. In comparison, cows that were gaining liveweight before mating were more likely to get pregnant (Buckley et al., 2003).

The effect of BCS at mating on conception rate is another possible reason why BCS at calving has such a significant effect on final pregnancy rate (7% decline in pregnancy rate at calving BCS 4.0 vs. 5.0 – Lucia Chagas, unpublished data). Thin cows at calving tend to be thinner at mating (Roche and Berry, 2005) and herds where cows are thinner at mating (4.0 vs. 5.0) have greater non-pregnant rates (7% more empty cows).

Managing body condition score

Accepting that management of BCS influences milk production and reproduction, it is important to decide on ways to manage changes in BCS to achieve best results. An optimum BCS at calving of 5.0 (5.5 for 1st and 2nd calvers) for both milk production and fertility has already been alluded to, but questions constantly arise on how to prevent BCS loss in early lactation. There are many recommendations on how to reduce the amount of condition lost in early lactation, thereby improving fertility and the efficiency with which feed is converted to milk (energy into BCS before milk is less efficient than energy directly into milk). These recommendations generally centre around feeding cows supplements, although milking cows once-a-day during early lactation has also been suggested as a possible tool. In the following sections many of these options will be examined.

Genotype and breed of cow

Before examining management strategies aimed at reducing BCS loss in early lactation we must consider the type of cow that we are farming. Genetic selection for increased milk production has resulted in a cow that will readily mobilise BCS, even to her own detriment. For example Buckley et al., (2003) showed a reduction of 1.0 BCS unit at mating in grazing dairy cows for every 1000 kg increase in genetic merit for milk production (approximately 75 kg increase in genetic merit for MS production).

Therefore the type of cow may dictate the amount of BCS lost in early lactation and hence may have an influence on subsequent fertility. Careful decisions must be made in our breeding objectives for different systems of milk production.

Conjecture about whether Jerseys or Holstein-Friesians lose more liveweight in early lactation is ubiquitous, with protagonists for each breed claiming a superior cow. Examining four years of data in Dexcel, it appears that there is little difference between the breeds in the amount of liveweight lost postcalving (Figure 2). Holstein-Friesian cows lose weight more quickly, but lose it for a shorter period of time; as a result cows of each breed lose a similar amount of weight (approximately 25 kg over 31 days for Holstein-Friesians and 38 days for Jerseys).

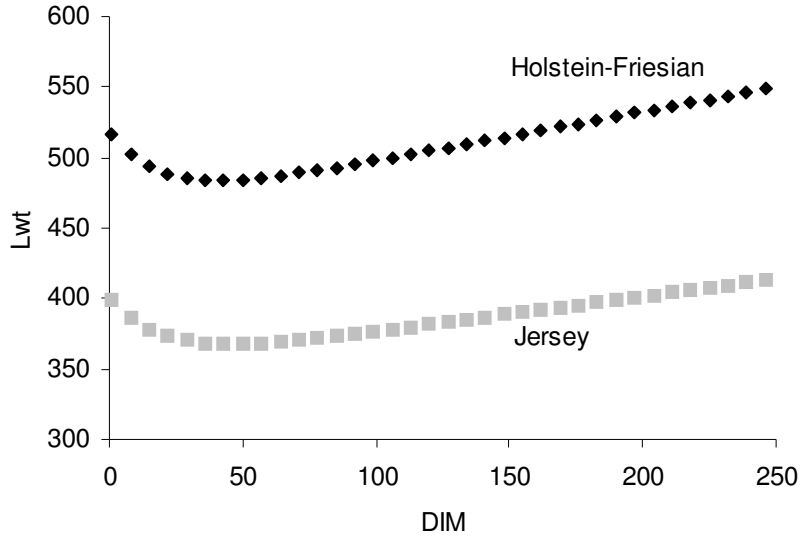

Figure 2: Liveweight change throughout lactation in Holstein-Friesian and Jersey dairy cows

Examining the BCS profile of different genotypes (Figure 3), it is evident that the influx of overseas genetics has resulted in a cow with increased BCS loss in early lactation, a fact that is exacerbated in pasture-only systems.

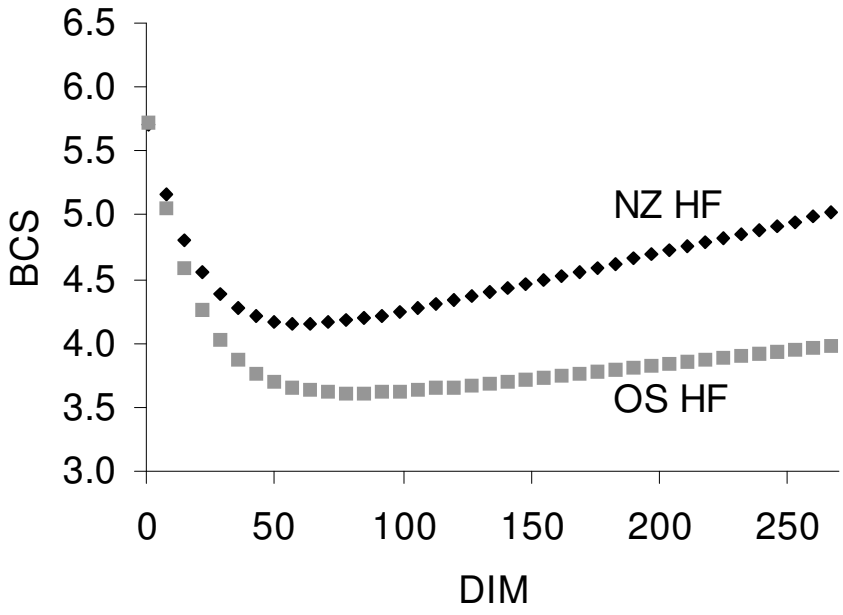

Figure 3: BCS change throughout lactation in NZ and US Holstein-Friesian dairy cows

The ideal cow for seasonal systems is probably one that peaks later and loses less body condition more slowly. Such a cow is more likely to get pregnant to first service (Buckley et al., 2003), produce an AI calf and remain in the herd longer. Recent research (Figure 2) undertaken by Dexcel showed that US Holstein-Friesians lose 0.5 BCS units more than, and at a greater rate in early lactation (Roche et al., 2005b) than traditional breeds. This is consistent with Buckley et al. (2003) who reported that cows with 85% overseas genetics lose approximately 0.5 BCS unit more in early lactation than traditional Friesian type animals.

The importance of BCS and its link to fertility in New Zealand has been acknowledged by the NZ Animal Evaluation Unit and work is underway to include BCS in the national index.

Supplementary feeds

Nutrition strategies aimed at offering cows alternatives to pasture (e.g. maize silage, grain, molasses) are often touted as the way to manage BCS loss postcalving. However, most research shows no linkage between these feeds and improved BCS or fertility in dairy cows that are otherwise well fed on pasture in early lactation. This has been confirmed in research undertaken in New Zealand (Figure 4; Roche et al., 2005b).

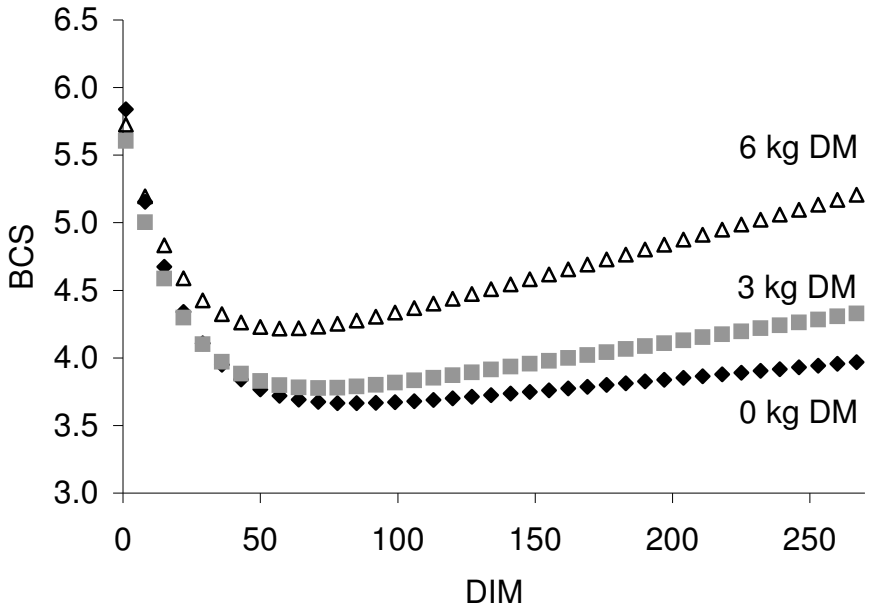

Figure 4: BCS change throughout lactation in Holstein-Friesian cows offered 0, 3 or 6 kg DM of concentrates/day

Supplementing cows with 3kg or 6kg DM of concentrates did not change the amount of BCS lost during the first six weeks of lactation. However, supplementing cows with energy supplements from six to eight weeks after calving in milk did increase the rate of BCS gain (Roche et al., 2005b) and may therefore improve fertility in cows that would otherwise be underfed. This and the fact that fatter cows at calving have high BCS at mating would indicate that energy supplements should probably be used to gain condition in late lactation to ensure optimal BCS at calving, rather than being used to prevent BCS loss postcalving. Supplementation with energy supplements in early lactation will only improve milk production, and only if cows were to be otherwise underfed.

Once-a-day milking

Milking cows once a day in early lactation does little to alleviate liveweight loss in early lactation, but it improves the rate of liveweight gain following 6 to 8 weeks of lactation (Figure 5). It could be used in late lactation to help thinner cows gain condition while still milking.

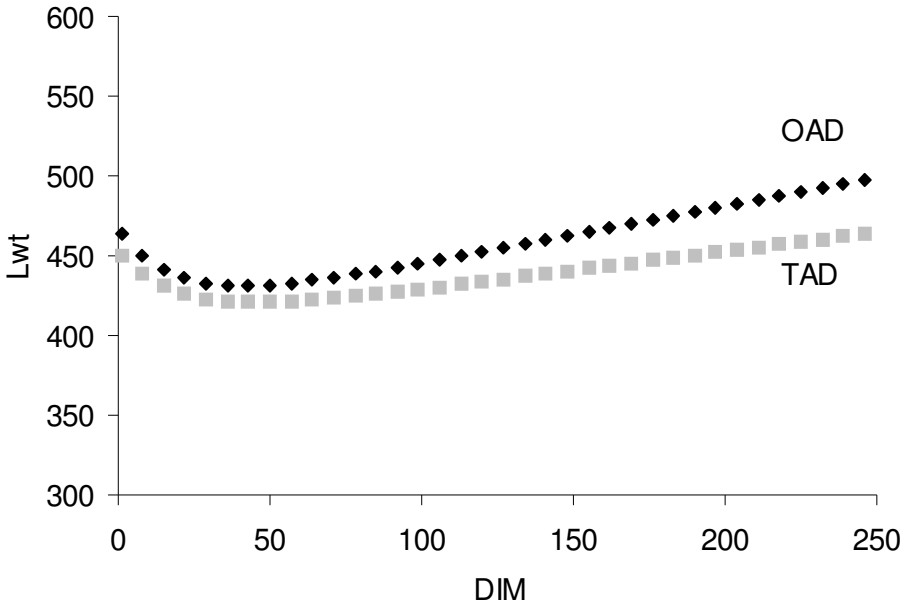

Figure 5: BCS change throughout lactation in cows milked either once or twice a day

Conclusions

Nature has accorded a high priority to lactation, allowing it to proceed at the expense of other important processes. As a result of this, all cows are 'pre-programmed' to lose condition in early lactation.

Fatter cows at calving lose more BCS than thinner cows, and hence produce more milksolids. They also have a greater BCS at mating, ensuring fewer anoestrus cows, lower CIDR requirement and higher pregnancy rates.

Selection for milk production traits has resulted in a cow willing to mobilise more body condition in early lactation. This occurs irrespective of early lactation nutrition. However supplementation with starch-based supplements in mid or late lactation will accelerate BCS gain, ensuring that cows calve in optimal BCS (5.0 for mature cows and 5.5 for 1st and 2nd lactation cows).

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