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 post-calving.
- 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 affect BCS loss.
- Restricting cows beyond 6 weeks of lactation will probably reduce BCS further. 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.
- Milking cows receiving starch-based supplements (e.g. concentrate feeds) in autumn will gain more BCS than cows receiving pasture alone. However, there is no difference in BCS gain in dry cows fed grass or cereal silage, grain or palm kernel extract.

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 the mobilisation of body reserves. Gibb et al. (1992) suggested that mobilised body fat contributed approximately 35 kg milksolids (MS) during the first eight weeks of lactation in high yielding cows. Similarly, Bauman and Currie (1980) estimated that approximately one third of milksolids in early lactation is produced from body tissue reserves (i.e. approximately 20 kg MS in cows peaking at 2 kg MS).

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 the 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

post-calving 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.

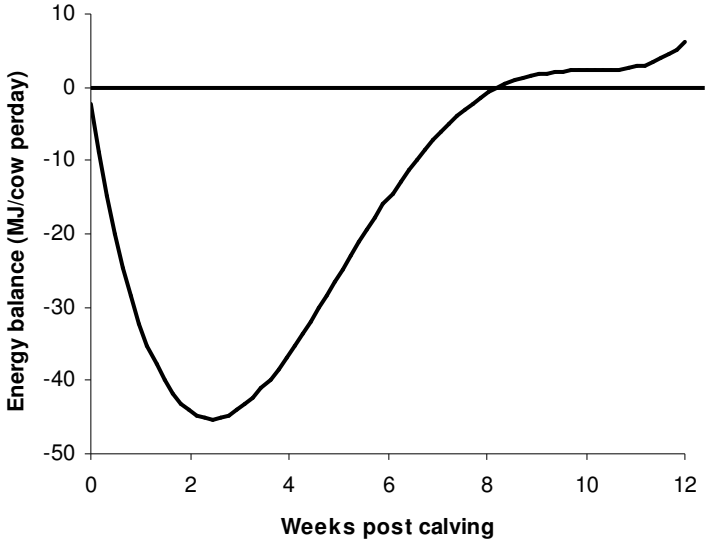

Figure 1. Energy balance of dairy cows in early lactation

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

There is a large variation in the amount of condition that cows lose post-calving. Generally speaking, the better condition a cow is in at calving, the more condition she will lose post-calving. 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 DairyNZ indicated that, on average, cows calving at BCS 5 lost 1 BCS unit post-calving, but this ranged from 0 to 2.25 BCS units. These data indicate 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 to 2.5 for individual cows. The new Animal Welfare Code of Practice, therefore, states that cows will not be less than BCS 3.0.

The amount of BCS lost post-calving is dependent on a number of factors, including BCS at calving, genetics of the 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 post-calving. This is consistent with recent results from DairyNZ (Roche et al., 2009), where cows produced 12.5 kg less MS when calving at BCS 4.0 and 30 kg less MS when calving at BCS 3.0 (compared with similar cows calving at BCS 5.0). However, there was little additional milk production from calving mature cows fatter than 5.0.

In the U.S., Waltner et al. (1993) reported a 322 kg gain in fat corrected milk in the first 90 d 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 beyond 5.0 was less important (≈ 2.5 kg MS/BCS unit).

Summary and implications

From these findings 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 time taken for cows to cycle post-calving 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) and increase the number of non-cycling cows at the planned start of mating by 7-8% per BCS unit at calving (Roche et al., 2007). This will add significantly to the animal health bill and must be considered carefully with the reduction in the use 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 to first service were reduced by 4% for every 1.0 BCS unit that cows were thinner at calving.

Body condition score post-calving

Several researchers have reported strong relationships between what happens to BCS after calving and whether a cow gets pregnant. Cows that lose the most condition in early lactation OR are

thinnest at mating are less likely to be submitted for AI and less likely to become pregnant. For example, New Zealand and Irish data (Buckley et al., 2003; Roche et al., 2007) indicate a 5 to 7% drop in pregnancy to first service and six week in calf rate for every additional BCS unit lost post-calving or in cows 1 BCS unit thinner at mating. In comparison, there was a small increase in six week in calf rate (2%) and final empty rate (1%) for very large gains in live weight (Lwt) during the mating period.

The effect of BCS at mating on pregnancy rate is another possible reason why BCS at calving has such a significant effect on final pregnancy rate on farm. Thin cows at calving tend to be thinner at mating and herds where cows are thinner at mating (4.0 vs. 5.0) have greater non-pregnant rates.

Summary and implications

Cows with a low BCS at mating or cows that lose a lot of BCS post-calving are less likely to become pregnant to AI or in a seasonal calving system (12 weeks of breeding)

- 4 to 5% less pregnant in 6 weeks and 3 to 4% less pregnant in 12 weeks, if
- cows lose 2.0 BCS units instead of 1.0 or
- if cows are a 3.5 at mating rather than a 4.5,

In comparison, cows that were gaining Lwt before mating were more likely to get pregnant (Buckley et al., 2003; Roche et al., 2007). However, this effect is small

- 2% more pregnant in 6 weeks and 1% more pregnant in 12 weeks, if cows gain 0.2 kg Lwt/d compared with losing 0.2 kg Lwt/day.

Therefore, achieving a BCS of 5.0 at calving is essential to ensure cows are in optimal condition at mating.

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 can BCS loss in early lactation be prevented. 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 examine 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 DairyNZ, it appears that there is little difference between the breeds in the amount of liveweight lost post-calving (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).

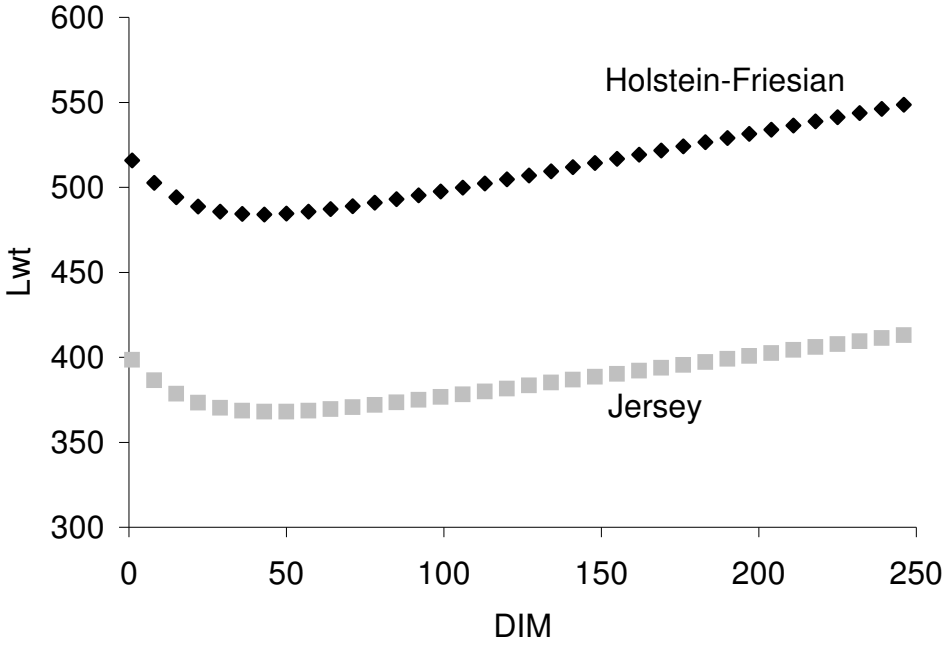

Figure 2. Liveweight change throughout lactation in Holstein-Friesian and Jersey dairy cows

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.

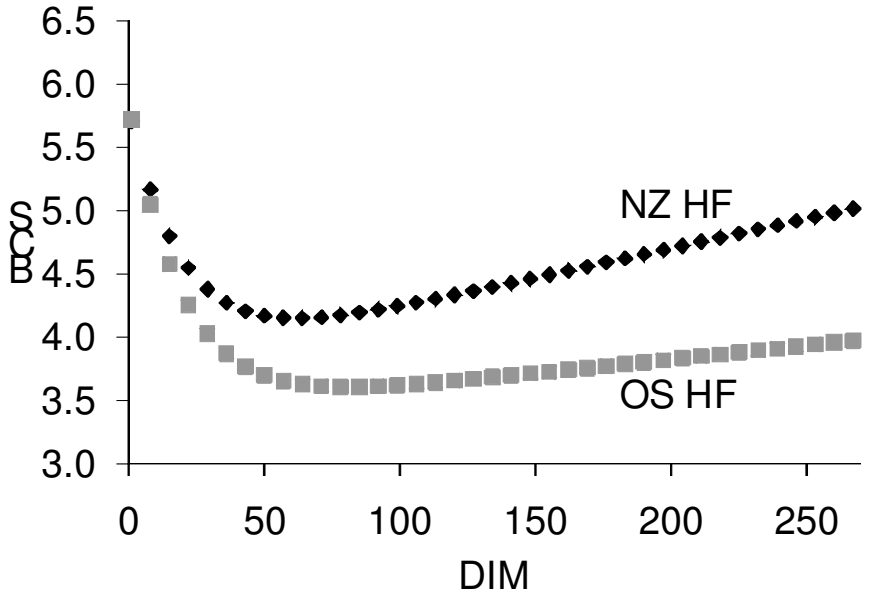

Figure 3. BCS change throughout lactation in NZ and US Holstein-Friesian dairy cows

The ideal cow for seasonal systems is probably one that peaks later and loses less body condition more quickly. Such a cow is more likely to get pregnant to first service (Buckley et al., 2003; Roche et al., 2007), produce an AI calf and remain in the herd longer. Recent research (Figure 3) undertaken by DairyNZ indicated that US Holstein-Friesians lose 0.5 BCS units more and at a greater rate in early lactation (Roche et al., 2006) than traditional breeds. This is consistent with Buckley et al. (2003) who reported that cows with 85% North-American/Dutch genetics lose approximately 0.5 BCS units more in early lactation than traditional Friesian type animals.

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 post-calving. However, most research shows no linkage between these feeds and improved BCS in early lactation 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., 2006).

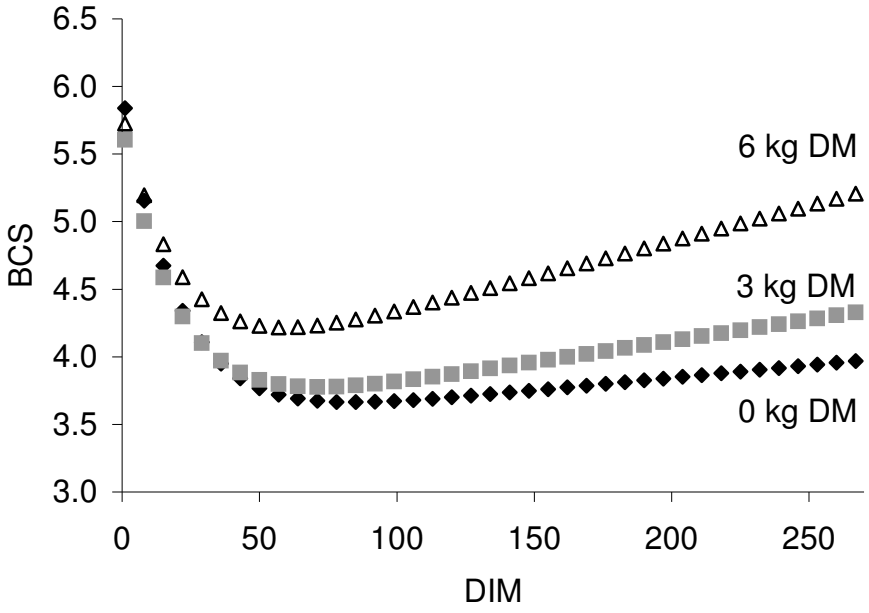

Figure 4. BCS change throughout lactation in Holstein-Friesian cows offered 0, 3 or 6 kg DM of concentrates/day

Supplementing cows with 3kg or 6kg DM of concentrates did nothing to the amount of BCS lost during the first six weeks of lactation. However, supplementing cows with energy supplements from around six weeks after calving did increase the rate of BCS gain (Roche et al., 2006) 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 post-calving. Supplementation with energy supplements in early lactation will only improve milk production, and only if cows were to be otherwise underfed (i.e. post-grazing residuals < 1,500 kg DM).

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 after 6 weeks in milk (Figure 5). It could be used in late lactation to help thinner cows gain condition while still milking.

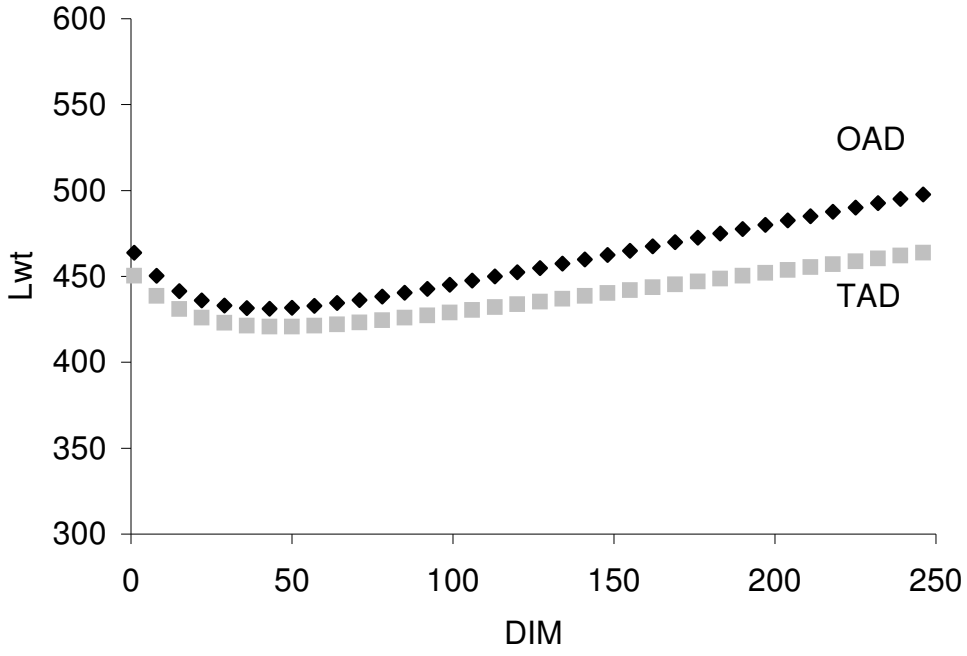

Figure 5. Lwt change throughout lactation in cows milked either once or twice a day

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 more cows cycling earlier, 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).

Acknowledgements

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Further Reading

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