Reproductive performance plays a major role on profitability of dairy herds because of its impacts on average days in milk (DIM), daily milk yield, involuntary culling, and production of replacement heifers. Good reproductive performance, however, also plays a crucial role on health and performance in subsequent lactations.

In a recent study we evaluated body condition score (BCS) at dry-off of approximately 5,000 cows (> 2nd lactation) and over 7,000. BCS is an indirect measure of the amount of fat storage and decreasing BCS represents body weight loss, primarily fat. In Holstein cows, one unit of BCS represents approximately 150 pounds of body weight. In the study mentioned above, cows received a BCS at dry-off and at calving. Their dry periods averaged 54.7 days (range 30 to 90). Cows were then followed during the subsequent lactation when productive, reproductive, and health parameters were evaluated. The majority of cows (over 80 percent) had BCS at dry-off between 3.25 and 3.75 (Figure 1).

The factor that was most important to determine BCS at dry-off was interval from calving to conception, also known as days open. The correlation between days open and BCS at dry-off was positive and linear, indicating that for every 100-day increase in days open beyond 60 days there was a 0.1 increase in BCS at dry-off. Further, there was a positive and linear correlation between DOPN and percentage of cows starting the dry period with BCS over 3.75. As such, for every 10-day increase in days open beyond 60 days there was a one percent increase in the percentage of cows with BCS over 3.75 at dry-off (Figure 2).

For cows entering the dry period with BCS under 3.5, whereas cows entering the dry period with BCS over 3.75 lost 0.28 BCS unit. This indicates that cows that entered the dry period with BCS over 3.75 lost approximately 45 pounds of body weight from the start of the dry period to calving, approximately 0.8 pounds per day during the dry period.

During the dry period cows have significantly smaller nutrient requirements compared to lactating cows because, despite the fact that during the last trimester of gestation there is a significant increase in energy and nutrients requirement for fetus growth, no milk is produced. Therefore, it is expected that during the dry period cows should not lose body weight or body condition score. The transition period, 21 days before and after calving, is a critical period of cows’ lives because they transition from a period of reduced nutrient requirements and stress to a period of elevated nutrient requirements and stress associated with calving, changes in diet and grouping, and milk production.

In the last week before calving and in the first 42 days postpartum most cows undergo a period of negative energy balance, characterized by insufficient dry matter intake compared with nutrient requirements for maintenance and fetal growth prepartum, and nutrient requirements for maintenance and milk production postpartum. To meet their nutrient requirements cows then mobilize fat from body storage (adipose tissue), which results in increased circulating concentrations of non-esterified fatty acids (NEFA). Although this is a biologically normal process for most mam- (continued on next page)
Long lasting impact . . .
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that excessive reduction in dry matter intake and excessive fat mobilization preparatum affect health and productive performances of lactating dairy cows postpartum.

In our study, cows that lost BCS during the dry period were more likely to have retained placenta (5.5 vs. 3.3 percent) and metritis (15.8 vs. 10.9 percent) and were more likely to be culled by 30 DIM (4.8 vs. 2.9 percent) and 60 DIM (7.2 vs. 4.5 percent) compared with cows that did not lose BCS during the dry period. Smaller percentages of cows that lost BCS during the dry period were pregnant by 90 DIM (31.4 percent) compared with cows that did not loose BCS during the dry period (49.2 percent) and 150 DIM (59.2 vs. 63.5 percent) compared with cows that did not loose BCS during the dry period, and the interval from calving to conception was 10 days longer for cows that lost BCS during the dry period (157 days vs. 147 days). Loss of BCS during the dry period also affected milk production during the first 305 days of lactation, because cows that lost BCS during the dry period produced less milk than those that did not lose BCS during the dry period (86.2 vs. 89.1 pounds per day), which would represent approximately 880 pounds less milk during a 305-day lactation.

Other factors affecting BCS change during the dry period

Although BCS score at dry-off was the most important factor affecting BCS change during the dry period, we observed that length of the dry period, incidence of twin pregnancies, and delivery of bull calves also affected BCS change during the dry period. We observed that smaller percentage of cows that spent 50 to 60 days in the dry period lost BCS during the dry period (-0.09 on average). Cows delivering twins lost 0.21 unit of BCS during the dry period compared with 0.09 unit BCS loss of cows that delivered singletons. This means, on average, that cows delivering twins lost 20 pounds during the dry period (0.4 pounds per day). Further, 44.9 percent of cows that delivered bull calves lost BCS during the dry period (0.11 on average), whereas only 39.2 percent of cows that delivered female calves lost BCS during the dry period (-0.09 on average).

Management strategy to reduce the risk of BCS loss during the dry period

From the data described above it becomes obvious that poor reproductive performance will have a significant impact on health, production, and reproduction in subsequent lactations. Therefore, reproductive management of lactating dairy cows should be aggressive after the end of the voluntary waiting period in order to maximize the number of cows pregnant within 120 days postpartum. In herds with good estrus detection accuracy and efficiency, protocols based on prostaglandin (PG) P2a can be used to synchronize estrus. However, as a safety measure, even herds with good estrus detection should have a timed A.I. protocol for cows that are not observed in estrus and are not inseminated by 90 DIM to assure that all cows are inseminated at least once before 100 DIM.

Herd with reduced estrus detection accuracy and efficiency, however, should have