

Dialing into your Best Dairy: Reaching your Herd's Genetic Potential Involves a Focus on Reproduction, Gestation and the Dry Period

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Numerous management considerations can affect the ability to dial into your best dairy and reach your herd's genetic potential. Some key management decisions focused on nutrition, cow comfort, and behavior during reproduction, gestation, and the dry period are summarized here.

Nutrition is an important component for reproductive success which requires monitoring and adjusting throughout the aforementioned periods. When a first lactation animal is ready to be bred back, she will typically be on a standard lactation diet formulated to meet her energy and protein requirements and to support a growing fetus, but as pregnancy progresses her energy demands will fluctuate. As she approaches dry off, the key is to keep her in a healthy body condition score (BCS) range, which can be done by breeding back on time, preventing extended lactations, and by feeding a low lactation diet if cows are over-conditioned prior to dry off.

Once the cow is dried off another set of challenges may arise. Farms should aim to have cows calving at a BCS of 3.0-3.25. Excessive loss and gain of BCS during the dry period are both associated with poorer health post-calving, which highlights the importance of maintaining BCS during this time. One concept that is gaining popularity to achieve maintenance of BCS, is to feed controlled energy dry cow diets. These diets incorporate low nutrient forages, such as wheat straw, while being formulated to meet 100% of the cow's dietary energy needs during pregnancy. With these diets, the cow is able to physically consume as much feed as she wants without running the risk of gaining excessive body condition, resulting in better metabolic health after calving. There are, however, many nutritional and management considerations with these diets, and this approach should not be tested without consultation first. Sorting, for example, is one area that should receive attention when feeding these types of diets; pay attention to any holes dug in the feed and the composition of refusals. The risks associated with sorting during lactation are well known, but it can also be harmful in the dry period if cows are constantly sorting in favor of the more energy dense components and gaining excess body condition. Sorting is also a learned behavior that can be carried over after calving.

Monitoring BCS can tell you a great deal about the nutrition and health of a herd, especially when troubleshooting transition period issues. Best practice would be to record BCS measurements at time of breeding, confirmed pregnancy, dry off, half way through dry off, 7 days prior to calving, and 14 and 28 days post-calving. These measures can help ensure that cows aren't losing or gaining excessive body condition during these times.

In addition to nutrition, successful reproduction is an important area to focus on as it has a strong influence on productivity and profitability. Getting cows in calf with as few services as possible will keep the herd at a lower average days in milk (DIM), and can improve profitability. The value of a pregnancy varies and is dependent on certain market factors such as milk price, replacement costs, and cull price, but it can range from about \$250-500. One study calculated the cost per cow for added days open to be \$2-5 per day beyond 90 days open. Industry average pregnancy rates for mature cows are about 20-21%, with excellent programs achieving over 30%. Regardless of which breeding strategy a herd uses, one of the biggest effects on reproductive success is management of the program and the facilities. For example, higher stall stocking densities in the breeding pen have been associated with lower conception

rates, while 14 inches or less of bunk space in breeding pens is associated with fewer pregnant cows at 150 DIM. In the Northeast, benchmarks for freestall high pens average about 16-17 inches due to 3-row pen designs and overcrowding, indicating this may be a bottleneck for reproductive success on some farms.

Throughout lactation, the demands on the cow and her time budgets will change. Cows decrease lying time on the day of calving and then increase resting time over the next few days. During peak lactation, her lying time is a bit lower, around 11 hours per day, due to the demands of milking and consuming TMR. As she decreases production, time spent resting increases and during the dry period cows can average 14-15 hours per day lying down. Cow comfort is an important consideration for reaching those ideal resting times. For comfort, stalls need to be larger as the cow gets bigger throughout her pregnancy. This can be managed through various grouping strategies. Cows also prefer larger stalls that are wider and longer, with a less aggressive brisket board and neck rail. With these stalls, they will lay down more and stand more in the stall rather than the alley, but this can require more work to maintain bedding cleanliness.

Stocking density should also be monitored as it often increases over time. Every facility will have its own maximum, but research shows negative effects on lying time, behavior, production, and lameness when stocking density gets above 115% in lactating pens, and above 100% in transition cow pens. Farms should aim for a lower number since peaks in calving and seasonality will lead to higher density throughout the year. It is important to keep cows comfortable throughout the whole lactation including during the dry period, as cows that had lower lying times pre-fresh tended to have more hoof lesions in the next lactation.

To perform a self-evaluation of your management, check lactation peaks and reproduction rates and benchmark yourself to your own farm's data as well as industry benchmarks. Monitor cow comfort throughout these stages of lactation by using lameness and leg injury scoring. According to the National Dairy FARM Program, you should have <5% severe lameness and <5% severe hock and knee injuries. Measure stall dimensions and stocking density to make sure they are suitable as these can influence cow-based outcomes.

When managing cows, it is important to also consider how the cow experiences her environment. By observing cow behavior and looking for changes or abnormalities, underlying issues can often be detected earlier on. For example, changes in feeding behavior or rumination can indicate the cow is experiencing some type of issue. Behavioral changes can also alert producers to variations in thermal comfort such as heat stress.

As cows experience increased heat load, they will exhibit a variety of responses such as increases in respiration rate and body temperature, panting or breathing with an open mouth or protruding tongue, bunching around water troughs, standing near spray water, and decreased feed intake and rumination. Longer term indicators of heat stress can include decreased milk production and fertility, and by the time these physiological responses are seen, the economic losses due to heat stress cannot be recovered. Focusing on earlier animal based measures, such as long stringy drool, panting, and increased respiration rate, to identify heat stress is essential.

Despite economic challenges in the industry, research still shows that investing in heat abatement is financially beneficial. Cows begin experiencing increased heat loads around a temperature humidity

index of 65-68, which takes into account both air temperature and relative humidity. Economic modeling suggests production losses from heat stress could be decreased by 43% if cows are provided spray water and fans in addition to shade. Lameness is not accounted for in these economic models, so additional savings are likely. Financial benefits of heat abatement will continue to increase as weather patterns change with more warm days each year and higher temperature peaks.

Furthermore, recent research has focused on the benefits of heat abatement for dry cows and youngstock. Animals that experience heat stress during the dry period or as a heifer have more issues with reproduction, and calves born to heat stressed cows have lower production in their first lactation compared to their genetic potential. The growing body of research shows all ages and classes of animals should have adequate heat abatement on the farm.

These are just a few key considerations and there are always more things to think about and act upon to ensure cows are getting in calf, maintaining pregnancy, and freshening successfully. For additional resources contact your local CCE Regional Dairy Specialists or visit the PRO-DAIRY website (<https://prodairy.cals.cornell.edu/>).