Disease Incidence Affects Fertility in Dairy Cows

By Donna M. Amaral-Phillips

Diseases, whether detected shortly after calving or during lactation, impact not only the health of dairy cows, but also future production and reproductive performance. All of the negative responses to illness increase a cow’s risk to be culled and, ultimately, the profitability within a dairy herd. Scientists continue to learn more about how a disease challenge impacts biological processes within the cow in hopes of understanding how to prevent these negative impacts on production and reproduction. This area has been actively investigated within the last few years. Here’s what we know, continue to learn, and what impact we know these processes have on cow fertility and milk production.

Fighting-off a Disease Is Costly

When a dairy cow’s immune system is challenged, a tremendous amount of energy is diverted away from milk production and used to fight the disease. Although the exact amount of energy used for a specific challenge is difficult to measure, scientists estimated that a substantial immune response may result in almost 5 lbs of glucose being diverted away from milk production and/or reproduction; the amount of glucose needed to produce 50 lbs of milk. Thus, a disease challenge can place a large energy drain on the cow with this energy no longer available to support milk production and reproduction. The exact amount of energy utilized by the immune system will continue to be debated by dairy scientists, but the fact remains, mounting an immune response to any disease is costly and reproduction and milk production most likely will suffer.

Disease Lowers Fertility

Cows with mastitis, retained placenta, metritis, respiratory, or digestive diseases have reduced fertility. Decreases in fertility are seen regardless of whether these diseases are uterine-related or not and have long-lasting effects on reproduction. Research has shown that estrus expression or ovulation are not affected. However, decreases in fertility have been traced to the fertilization of the oocyte or egg all the way through the survival of the developing fetus; thus, increasing pregnancy losses resulting in longer number of days to pregnancy, increased culling risk, and lower milk production over the lactation. Unfortunately, use of synchronization programs prior to AI does not improve embryo survival in these incidences. Thus, early detection and rapid, effective treatment of disease is needed to minimize the negative effects of disease on not only milk production, but also reproductive efficiency.

Detrimental Effects of Early Lactation Diseases Last for Months

Early post-calving diseases, with both clinical and subclinical signs, can detrimentally affect not only future milk production, but also reproductive performance. Researchers have shown an association between blood calcium concentrations on day 4 of lactation and milk production in mature cows. Researchers from the Cornell Vet School noted that mature cows, with lower blood calcium
concentrations (but not too low to cause hypocalcemia or milk fever) on day 1 of lactation and who recovered by day 4 of lactation, gave more milk. Mature cows that did not recover by day 4 had lower milk production compared to those that recovered. In first-calf heifers, these researchers did not find a correlation on days 3 and 4 between blood calcium concentrations and future milk production. But, like the mature cows, first-calf heifers with lower blood calcium on day 1 of lactation gave more milk over this lactation. Cows that quickly metabolically adjust to the demands of lactation are better able to milk well throughout the lactation.

Not only do these diseases or metabolic disorders around calving affect production, but they also shape future reproductive performance. Researchers have hypothesized that metabolic diseases seen around the time of calving negatively affect follicular development, the uterine environment, and early embryo development and this effect can last longer than 4 months post-calving. In dairy cows diagnosed with at least one clinical disease within 21 days after calving, fewer cows became pregnant when bred before 150 days in milk and less cows subsequently calved. Pregnancy losses were greater for cows with clinical diseases within the first 21 days of lactation, no matter when they were bred. Cows in this research trial gave 770 lbs less milk over a 305-day lactation if they had 1 clinical disease, and if they had multiple diseases the amount lost was doubled. Again, illustrating the importance of prevention and early recognition and treatment of metabolic diseases when needed.

**On-farm Message**

The biological processes that occur to decrease the effects of a disease challenge can negatively impact not only milk production, but also reproductive performance. The key to preventing these detrimental effects lies in the early detection, treatment if necessary, and then make changes or refinements in feeding and management practices to prevent or minimize future disease cases within the herd. Thus, prevention of metabolic diseases or disorders around the time of calving, as well as mastitis and other diseases throughout a lactation, can pay dividends not only in the health of dairy cows, but also production and reproductive performance.