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Editorial
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JDS Communications special issue: Advances in Dairy Cow Fertility—Introduction

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Fertility in postpartum dairy cows is improving due to several developments, including synchronization- and resynchronization-timed AI programs (Fricke and Wiltbank, 2022), automated systems for estrous detection (Cerri et al., 2021), better veterinary care and management (Daros et al., 2022), and a greater emphasis on fertility in genetic selection indices (Lucy, 2019). Synchronization and resynchronization programs have addressed abnormal ovarian function by effectively controlling follicular growth, regression of the corpus luteum, and time of ovulation relative to AI. Automated systems for estrous detection can reduce the effects of poor estrous expression on reproductive efficiency. Genetic selection indices are improving overall fertility as well as cows' productivity (milk production) and longevity. Despite the progress that has been made, we have not overcome the substantial effect that calving and subsequent lactation have on the fertility of postpartum dairy cows, which is typically 10% to 20% lower than a virgin heifer (Meier et al., 2021). In response to the need for new information on dairy cow fertility, we called for papers that specifically addressed this issue. Topics of interest included feeding transition and early postpartum cows; estrous cycle control, including resynchronization and systems for monitoring estrous behavior; improved methods of pregnancy diagnosis; uterine health; early embryonic development and placentation; early embryonic loss; and the genetic improvement of fertility traits. We accepted 14 articles primarily centered around periparturient disease, genetics, nutrition, embryo development, and pregnancy loss. These articles, which were submitted from North and South America and Europe, address some of the most important topics in dairy cow fertility.

Periparturient disease of any type (metabolic, uterine, or ovarian) significantly affects the interval to pregnancy postpartum, as does the interval from calving to first ovulation (Gilbert, 2019). Two articles in this special issue address uterine disease and the treatment of postpartum uterine disease, another article highlights the important interaction between cyclicity and disease, and a third article focuses on subclinical hypocalcemia, a metabolic disease that is common in dairy cows (Couto Serrenho et al., 2021) and was found to affect their reproduction in the long term.

Postpartum nutrition is important for successful reproduction, but the mechanisms that link nutrition and reproduction are often unclear (Cardoso et al., 2020). These mechanisms, including the amount of starch and forage in the lactating cow's diet, were explored in a large study of 48 dairy farms, and revealed potential mechanisms through which the diet can affect reproduction. The possibility that chromium supplementation could improve reproduction postpartum was tested in a second study that identified an important relationship between chromium and immune function postpartum.

Embryonic development following breeding and the mechanisms that dictate embryonic loss are of keen interest to the dairy community (Ealy and Seekford, 2019), which is reflected in the fact that nearly one-half of the accepted articles address embryonic development or pregnancy loss. The possibility that embryos fail to develop because they have abnormal chromosomal content is addressed. Two studies present new data on hormonal treatments that were designed to improve embryo transfer success. The magnitude of pregnancy loss over time is accurately defined in an article that employed a meta-analysis of 19,723 diagnostic records from 46 studies. The time of pregnancy loss relative to the function of the corpus luteum has been a question on the minds of reproductive biologists for some time. New data in this special issue bring clarity to this question by defining the time of embryonic loss relative to regression of the corpus luteum. Finally, the possibility that pregnancy loss can be detected remotely by using sensor technology was tested.

Novel fertility traits were proposed in an article on activity measurements. These new traits are defined by fertility phenotypes collected by remote sensing technology. Trait development from data collected remotely will likely see greater emphasis in the future (Fleming et al., 2019). In this study, a new trait, "calving to first high activity," was defined.

In addition to regular research articles, we received 2 review articles: the first on antral follicle counts, and a second titled "The high fertility cycle." The former reviews the interesting relationship between the number of antral follicles present on the ovary and the fertility of the cow. The latter examines the importance of the timely establishment of pregnancy postpartum to maintaining an appropriate body condition that supports the overall health of the cow.

This collection of papers will serve as a resource for those interested in dairy cow fertility and will benchmark several important topics. We appreciate the efforts of the authors, reviewers, and editors in the creation of this special issue.

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