UNIVERSITY OF GEORGIA
Beef Team

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UNDERSTANDING LATE EMBRYONIC MORTALITY AND ITS IMPACT ON COW PRODUCTIVITY

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In cow-calf operations, reproductive success is the primary driver of productivity. Each cow must produce a healthy calf every year to keep the herd economically sustainable. Most producers are familiar with the challenge of cows that fail to conceive, but fewer recognize the long-term effects of pregnancy losses that occur after a cow has already become pregnant. Most pregnancy loss in cattle occurs in the first 3 months of pregnancy. The term early embryonic mortality (**EEM**) is used to describe pregnancy loss that occurs within 30 days after conception. These losses are unfortunately common, affecting approximately 20 to 40% of pregnancies in beef herds. While undesirable, these early pregnancy losses are often manageable because cows experiencing EEM often have enough time to rebreed during a typical 60- to 90-day breeding season. Pregnancy losses that occur later in the first trimester of pregnancy, between 30 and 90 days after conception, are referred to late embryonic mortality (**LEM**). Although less frequent, affecting approximately 3-8% of pregnancies, these later losses can have lasting consequences for cow productivity and herd performance. Causes of later pregnancy loss can include reproductive diseases, handling stress, nutritional challenges, and other health issues that disrupt normal development. This article will provide an overview of a recent research study that evaluated how LEM impacts cow productivity commercial cow-calf operations.

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Research overview

Late embryonic mortality can reduce herd efficiency and cause long-term consequences to cow performance. To better understand the impact of LEM, our group conducted a large-scale study to characterize the production consequences of these losses. A total of 2,204 beef cows from six locations across Georgia, Mississippi, Tennessee, and Virginia were enrolled in this study. All cows were bred using a fixed-time artificial insemination (FTAI) program and then exposed to cleanup bulls for the remainder of the breeding season, which ranged from 67 to 86 days total.

Cows enrolled in this study were classified into three groups:

1. Maintained pregnancy: cows that conceived to FTAI and carried that pregnancy until the final pregnancy diagnosis.
2. Non-pregnant: cows that did not conceive to FTAI. Some of these cows never became pregnant, while others conceived within the breeding season to the cleanup bull.
3. Late embryonic mortality: ccows that conceived to FTAI but lost that pregnancy sometime between one and three months of gestation. Like the non-pregnant group, some of these cows failed to produce a calf, while others conceived within the breeding season to the cleanup bull.

Cows were monitored through calving and weaning and followed them again into the next breeding season to understand both short- and long-term impacts of LEM.

Key findings

Cows that experienced LEM had decreased ($P < 0.01$) final pregnancy rates, calving rates (Figure 1), and weaning rates compared with both cows that maintained their FTAI pregnancy and cows that were non-pregnant to FTAI. In the subsequent year, cows that experienced LEM calved later (Figure 1; $P < 0.01$) and weaned lighter (Table 1; $P < 0.01$) calves compared with both cows that maintained pregnancy and non-pregnant cows. Furthermore, both non-pregnant and LEM cows had decreased pregnancy rates to FTAI and final pregnancy rates in the following year compared with cows that maintained their FTAI pregnancy (Figure 2; $P \leq 0.03$).

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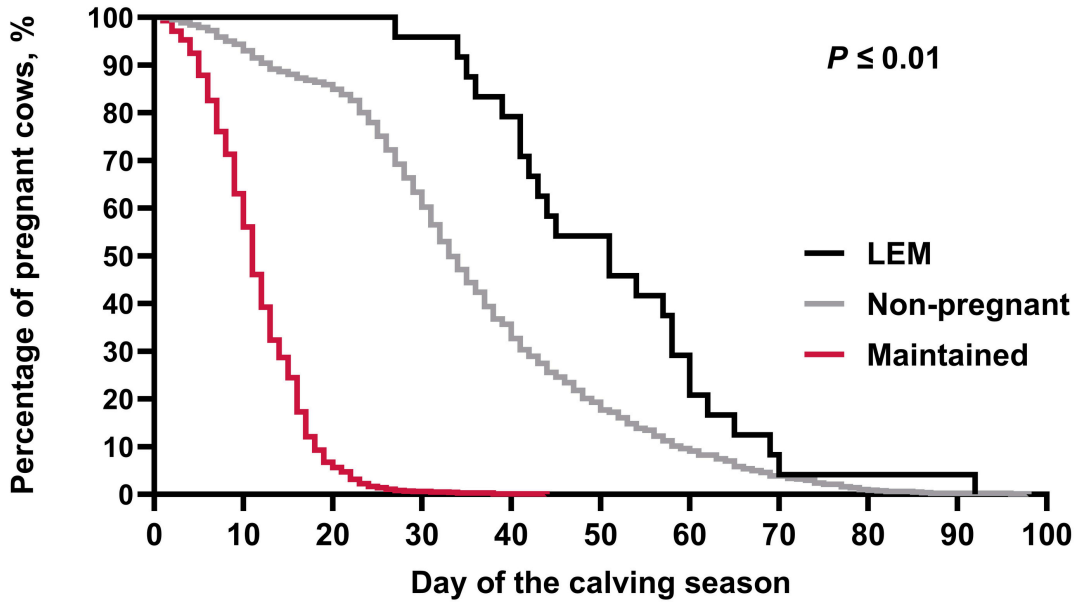

Figure 1. Calving survival curves for cows that either maintained their FTAI pregnancy, were non-pregnant to FTAI, or experienced late embryonic mortality (LEM) after FTAI. The lines move downward when the percentage of pregnant cows decreases as the calving season progresses. Cows that maintained their FTAI pregnancy calved earlier, while cows that lost their FTAI pregnancy or were non-pregnant to FTAI calved later. Differences among groups were significant (Log-Rank test; P ≤ 0.01).

Practical applications

Cow productivity decreased substantially in cows that experienced LEM. Both cows that maintained their FTAI pregnancy and those that failed to conceive performed considerably better than cows that experienced LEM. This occurred predominantly because only approximately 40% of LEM cows calved in the subsequent calving season. Among the cows that did rebreed after losing their FTAI pregnancy, a large proportion of them became pregnant later in the breeding season. Consequently, more than 70% of these cows calved in the second half of the calving season. Later calving resulted in younger calves and lighter calves at weaning. In fact, calves from LEM cows were 64 pounds lighter at weaning compared with calves from cows that failed to conceived to FTAI and 125 pounds lighter compared with calves from cows that maintained their FTAI pregnancy.

Table 1. Overall productivity of beef cows classified by pregnancy status in year one.

	Maintained	Non-pregnant	LEM	P-value
Calving rate, %	97.5[a]	72.2[b]	40.3[c]	< 0.01
Weaning weight, lbs	557.8[a]	497.6[b]	433.2[c]	< 0.01
Weaning weight per cow exposed, lbs	505.7[a]	388.2[b]	209.7[c]	< 0.01
Gross income per cow exposed, $*	1,663.7[a]	1,277.2[b]	689.9[c]	< 0.01

*Gross income per cow exposed was estimated based on the USDA Georgia Livestock Report (August 15th, 2025) and feeder calf prices of $3.29/pound.

The effects of LEM carried over into the next breeding season. Because LEM cows calved later, they had less time to recover before the next breeding season, they were less likely to conceive to FTAI the following year. This effect highlights that LEM is not just a problem within the breeding season in which cows experience pregnancy loss, but also negatively impacts productivity in the subsequent year.

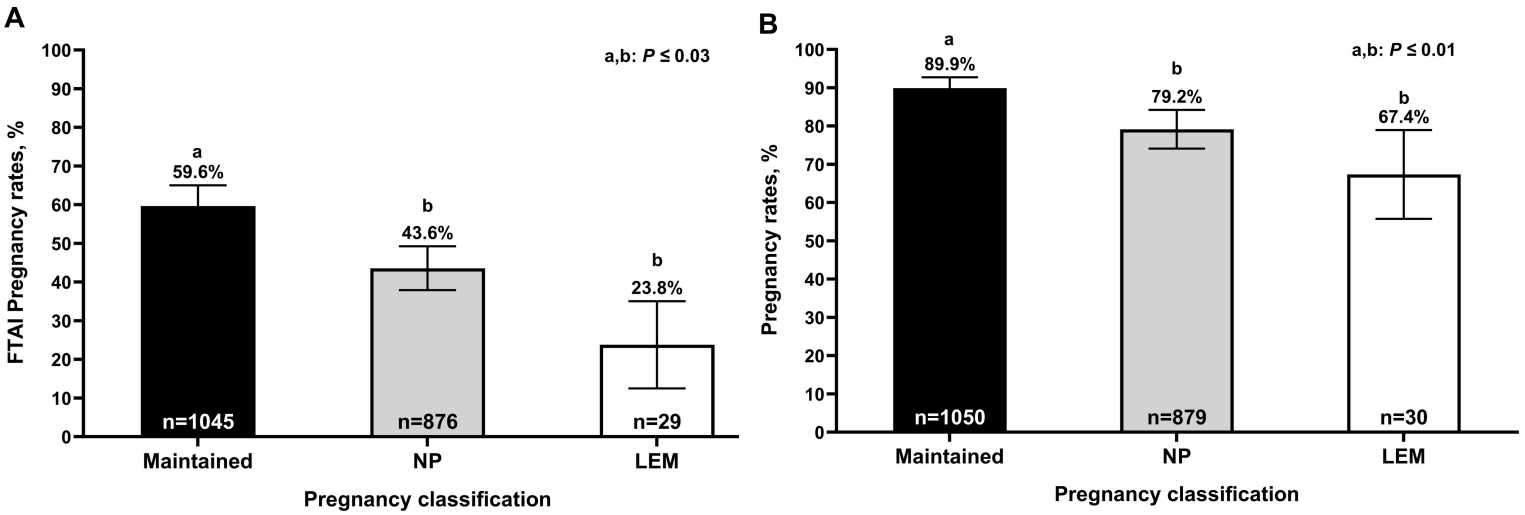

Figure 2. Year two pregnancy outcomes in beef cows that were classified by pregnancy status in year one. (A) Fixed-time AI pregnancy rates. (B) Final pregnancy rates after exposure to cleanup bulls. Different letters indicate statistical differences (P ≤ 0.03).

Conclusions

Our findings indicate that cows experiencing LEM had decreased performance not only compared with cows that conceived and maintained their FTAI pregnancy, but also compared with cows that failed to conceive to FTAI. Cows experiencing LEM produced fewer calves, calved later in the calving season, and weaned lighter calves. Based on the current USDA Georgia Livestock Report (August 15th, 2025), assuming feeder calf prices of $3.29/pound, cows that experienced LEM resulted in a loss of approximately $963.8 per cow exposed compared with cows that maintained their FTAI pregnancy and $587.3 per cow compared with cows that failed to conceive to FTAI. These differences highlight the importance of minimizing pregnancy loss to maintain herd profitability.

Acknowledgments

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