

Heat stress during late gestation impacts multiple generations of dairy cows

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Climate change is exacerbating heat stress in dairy cows, posing a significant threat to the industry globally. Rising temperatures and increased frequency of heatwaves lead to heat stress, adversely impacting lactating dairy cows' health, milk production, and reproductive performance. Heat-stressed cows exhibit reduced feed intake, altered metabolic function, and compromised immune responses, resulting in lower milk yields and increased disease susceptibility. These challenges necessitate the continuous development and implementation of effective cooling strategies and management practices to mitigate the effects of heat stress and ensure the well-being and productivity of dairy herds in a changing climate.

Research conducted over the past 10 years highlights that dairy cows exposed to heat stress during the last trimester of gestation, a critical period of fetal development that overlaps with the dry period, negatively impact the physiology and productivity of the cow in her next lactation and also pass on adverse effects to their daughters and subsequent generations (i.e., granddaughters). Daughters and granddaughters of heat-stressed, dry-pregnant cows have reduced survival rates, particularly in early life, a reduced productive life, and produce less milk at maturity.

More recently, the effects of heat stress late in gestation have been observed in nulliparous (first-calf heifers). Even though they do not have a dry period, their mammary gland and fetus undergo significant active growth during this crucial phase.

Key takeaways and presentation discussion points:

1. Dry cows under heat stress produce less milk in their next lactation.
2. This deficiency is attributed to incomplete mammary regeneration pre-calving and carry-over cellular and molecular effects post-calving.
3. Daughters of heat-stressed, dry-pregnant cows have reduced productive life and longevity and produce less milk in their first, second, and third lactations
4. Granddaughters of heat-stressed dry-pregnant cows have reduced productive life and produce less milk in their first lactation.
5. Pregnant first-calf heifers experience heat stress in summer
6. Direct solar radiation on pasture should be minimized; shade provision is key.
7. Heifers respond positively to heat abatement via active cooling by reduced thermal indices, leading to more milk production in the next lactation
8. There is evidence of fetal programming in first calf heifers after late-gestation active cooling.