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### **New study: Heat stress in dairy cows damages health of calves**

*Researchers reporting in JDS Communications™ found that heat stress of pregnant dairy cows reduces fetal growth and influences performance and immune development of the offspring*

**Philadelphia, August 26, 2021** – As scientists continue to explore the wide-ranging effects of heat stress on the health of dairy cattle, a [new study](#) by researchers from the University of Florida, published in the September issue of *JDS Communications*, adds to the growing understanding of the negative influences of heat stress, not just throughout the lifespan but across generations.

With the goals of evaluating the effects of in utero heat stress on overall fetal and organ growth, particularly organs associated with immune function, and examining the cellular mechanism of altered passive immunity in neonatal bull calves after maternal heat stress, the team exposed pregnant Holstein cows to the extreme heat of the Florida summer and gathered data about the resulting offspring, comparing these against data on calves born to cows provided with cooling measures during late pregnancy. The team found that calves born to heat-stressed cows had lower birth weights, lower weights of organs, including the heart, liver, kidneys, thymus, and spleen, and higher rates of cell death in the intestine.

The lower birth weights observed by the researchers suggest reduced placental function and earlier delivery, with less progressed fetal development. The lower weights of the heart, liver, and kidneys among calves born to heat-stressed dams also suggest compromised placental and fetal development.

Senior author Geoffrey E. Dahl, PhD, of the University of Florida, Gainesville, FL, USA, explains that “Calves, like all young animals, are prone to elevated rates of mortality and morbidity in the neonatal

period, and preterm birth may further exacerbate that problem. Early-life losses may result from organ immaturity and dysfunction, notably of the gastrointestinal tract and the immune system.”

The team suggests that reduced weights of the thymus and spleen may be associated with slowed fetal growth and compromised immune function, as these organs play important roles in the development of a robust immune system. The higher rate of intestinal cell death among calves born to heat-stressed cows suggests that these calves may have a reduced ability to absorb immune factors from colostrum, essential to the transfer of maternal immunity to the immature and vulnerable calf, in the critical first hours after birth. “Passive uptake of immunoglobulins from colostrum is the only mechanism of immunoprotection in the bovine,” Dahl points out.



Caption: University of Florida researchers studied the effects of heat stress in dairy cows from mothers to calves (Credit: Jimena Laporta).

The authors speculate that decreased nutrient uptake and reduced immune function following gestational heat stress may lead to reduced health and growth of the calf in the long term. Dahl notes that “Acceleration of gut closure appears to occur even before birth and before colostrum consumption. Thus, it may be challenging to reverse after birth, so management efforts should focus on cooling pregnant

cows during late gestation.” As the dairy industry continuously strives to improve animal welfare and environmental and financial sustainability, such research is of greater importance than ever.

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### **Notes for editors**

The article is “Maternal heat stress reduces body and organ growth in calves: Relationship to immune status,” by B.M.S. Ahmed, U. Younas, T.O. Asar, A.P.A. Monteiro, M.J. Hayen, S. Tao, and G.E. Dahl (<https://doi.org/10.3168/jdsc.2021-0098>). It appears in advance of *JDS Communications*, volume 2, issue 5 (September 2021), published by FASS Inc. and [Elsevier](#).

The article is openly available at [https://www.jdscommun.org/article/S2666-9102\(21\)00072-7/fulltext](https://www.jdscommun.org/article/S2666-9102(21)00072-7/fulltext).

Full text of the article is also available to credentialed journalists upon request. Contact Eileen Leahy at +1 732 238 3628 or [jdsmedia@elsevier.com](mailto:jdsmedia@elsevier.com) to obtain copies. Journalists wishing to interview the authors should contact the corresponding author, Geoffrey E. Dahl, Department of Animal Sciences, University of Florida, Gainesville, at [gdahl@ufl.edu](mailto:gdahl@ufl.edu).

### **About *JDS Communications***

An official journal of the American Dairy Science Association®, *JDS Communications* is an Open Access, peer-reviewed journal that publishes short, concise original research in the form of short communications, technical notes, mini-reviews, and other scholarly works that relate to the production and processing of milk or milk products, derived from farm animals, intended for human consumption. Research published in this journal is broadly divided into animal production, physiology, health, and genetics and dairy foods for human consumption. [www.jdscommun.org](http://www.jdscommun.org)

### **About the American Dairy Science Association (ADSA)**

The American Dairy Science Association (ADSA) is an international organization of educators, scientists, and industry representatives who are committed to advancing the dairy industry and keenly aware of the vital role the dairy sciences play in fulfilling the economic, nutritive, and health requirements of the world's population. It provides leadership in scientific and technical support to sustain and grow the global dairy industry through generation, dissemination, and exchange of information and services. Together, ADSA members have discovered new methods and technologies that have revolutionized the dairy industry. [www.adsa.org](http://www.adsa.org)

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