

Stress Exposure Early In Life May Lead To Lifelong Negative Health Issues

Intestinal health, or gut health as it is commonly referred to, is important throughout an animal's life. But it's particularly important early in life when intestinal health contributes to the development of a number of critical systems and functions, including the gut itself. Poor intestinal health — which can be brought on by an array of microbial, social, environmental and physiological stressors — can lead to systemic health problems and reduced performance throughout an animal's life.

Early life is also an important stage for the development of gastrointestinal microbiota — the primarily bacterial colonizers of the gut whose establishment and balance are key to proper gut health and overall wellbeing. Stress early in an animal's life can have a significant impact on the microbiota. When faced with certain stressors, the microbial population in the gut becomes imbalanced and in turn, the animal becomes more vulnerable to other stressors and less capable of staving off illness related to pathogens. Ultimately, that can lead to inflammation, leaky gut and a range of other health problems that might otherwise be naturally overcome by a healthy animal.

Paying close attention to a few key conditions and health priorities in the early weeks of life of an animal can help to ensure proper gut health development and prevent these issues from occurring. Minimizing stressors that may impact your animals, for instance, is a major component of building a healthy gut and immune system.

"In pigs, calves and horses, this critical time window of gut health function development takes place in the first several weeks of life. This includes the establishment of a balanced microbiota, development of the intestinal barrier, mucosal immune system, enteric nervous system and hypothalamic pituitary axis," said Adam Moeser, MS, Ph.D., DVM, director of the Gastrointestinal Stress Biology Laboratory at Michigan State University. "The microbiome starts getting established early, and as the gut is developing in its new post-natal environment and getting exposed to new antigens and pathogens in the outside world, the gut is shaping itself for long-term function."



6 TIPS

TO MINIMIZE STRESS FOR BETTER LIFETIME HEALTH AND PERFORMANCE

- **1. Ensure consistent feeding schedules and hydration are a priority.**
- **2. Maintain a temperate environment with proper ventilation.**
- **3. Monitor and manage social stressors (e.g., overcrowding).**
- **4. Limit physically exhaustive events (e.g., trailering and loading/unloading).**
- **5. Enforce proper biosecurity protocols — limiting external disease or pathogen exposure.**
- **6. Consider additional nutrition supplements to improve health.**

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A LOOK AT KEY SYSTEMS THAT INFLUENCE INTESTINAL HEALTH AND IMMUNITY

The development of specific systems and physiological processes during early gut and microbiome development is important to a range of critical internal functions:

- **Microbiota:** While not an organ per se, a balanced microbiome is critical to prevention of pathogen entry, gut health and overall wellbeing throughout an animal's life. Imbalance leads to making the animal prone to other diseases.
- **Intestinal barrier:** Absorbs nutrients and prevents potentially toxic molecules from colonizing and damaging other internal tissues. The intestinal barrier and the tight junctions that reinforce it must be strong in order to prevent a "leaky" gut.
- **Mucosal immune system:** Provides a first line of defense against antigens and infections and prevents systemic immune responses to common bacteria and food proteins. In fact, about 70% of an animal's immune system resides in the gut.
- **Hypothalamic pituitary-adrenal axis:** Regulates the animal's hormonal, behavioral and physiological responses to stress.

Though these systems oversee different internal functions, they all have one thing in common: they are key components to an animal's ability to withstand stress without enduring any damage from invading pathogens. **Weak development of any of these systems early in life compounds the impact of stress throughout the lifetime of the animal and leaves them more susceptible to physiological damage later in life, leading to shortcomings in overall health and performance.**

"Because of the plasticity of the gut and its ability to change and develop over time, a lot of stress during these critical periods has the potential to alter the trajectory of gut development and basically rewire gut function to an inferior state," Moeser said. "It's most likely an adaptive function to survive and thrive in this stressful environment as the gut's being programmed. This altered function long term can lead to increased disease risk later in life."



MANAGEMENT CHANGES TO MINIMIZE LIVESTOCK STRESS IN BOTH YOUNG AND OLDER ANIMALS

The good news is that stress — and its adverse short- and long-term consequences — can be mitigated. Altering management practices to limit the amount of stress animals experience during transition periods like weaning and feed changes are especially crucial. Here are six tips to minimize livestock stress:

- 1 | Assure animals are hydrated and that feeding schedules are not interrupted
- 2 | Maintain a temperate environment (i.e., avoid excessive heat or cold) when possible and ensure proper ventilation
- 3 | Ensure social stressors — like overcrowding — are closely monitored and managed
- 4 | Limit physically exhaustive events — such as trailering and loading/unloading
- 5 | Enforce proper biosecurity protocols — limiting external disease/pathogen exposure
- 6 | Consider nutritional approaches to stress and gut health — such as chromium propionate for cortisol reduction and a butyric acid/zinc combination for improved intestinal integrity

It's crucial to remain attentive to these and other stressors and make management adjustments at key points in animals' lives — especially early on.

"Stressors during weaning, for example, not only have an impact in the immediate period, but also have long-lasting impacts that can carry into adulthood and subsequent production phases," Moeser said.

Hear more from Dr. Moeser and other intestinal health experts at kemin.com/intestinalhealthexperts.

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