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Extending Animal Health span: Advances in Veterinary Physiology and the Future of Animal Well-Being

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Abstract

Veterinary physiology is experiencing a transformation in 2025, with new research and innovations shaping how veterinarians understand and manage animal health. From the development of anti-aging drugs for dogs to the creation of India's first animal stem-cell biobank, scientists are unraveling physiological processes that govern aging, disease, and welfare. At the same time, novel approaches to monitoring stress and health in both companion and livestock animals—such as non-invasive biomarkers and pervasive sensing technologies—are redefining welfare standards. This article reviews these timely advances, explains their physiological underpinnings, and discusses their impact on veterinary medicine, livestock productivity, and the One Health initiative.

Introduction

Veterinary physiology, the science of how animals' bodies function at the cellular, tissue, and systemic levels, has always been fundamental to animal health care. Traditionally, the discipline has focused on basic mechanisms such as digestion, reproduction, and endocrinology. Today, however, veterinary physiology is entering a new era—one shaped by biotechnology, digital innovations, and global health perspectives.

In 2025, multiple breakthroughs highlight this shift. An FDA-recognized anti-aging pill for dogs promises to target metabolic physiology and extend lifespan. India has launched its first animal stem-cell biobank, opening new frontiers in regenerative medicine. At the same

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time, researchers are refining welfare assessment tools beyond cortisol and harnessing sensor-based technologies to monitor livestock physiology at scale. Together, these developments mark a turning point where physiology meets technology and global health.

1. The Anti-Aging Pill for Dogs: Physiological Longevity in Practice

2. Stem-Cell Biobanks: Preserving the Future of Animal Physiology

Another major breakthrough came in February 2025, when India's first **animal stem-cell biobank** was launched at the National Institute of Animal Biotechnology (NIAB) in Hyderabad (Times of India, 2025).

Stem cells are undifferentiated cells capable of transforming into various tissue types. Physiologically, they play a vital role in repair and regeneration. By banking stem cells from different animal species, researchers now have access to invaluable biological material for:

- Regenerative therapies (healing injuries, repairing organs).
- Reproductive support (assisting endangered species breeding).
- Disease modeling (studying animal disorders in controlled lab settings).
- Personalized veterinary medicine (developing targeted therapies for individual animals).
- This biobank not only supports domestic veterinary science but also reduces India's reliance on international resources. In the future, such facilities could enable veterinarians to treat conditions like arthritis, muscular degeneration, or even certain cancers using stem-cell-based therapies.

3. Moving Beyond Cortisol: Redefining Welfare Assessment in Dogs

For decades, cortisol—the "stress hormone"—has been the gold standard for assessing animal welfare. While useful, cortisol levels are influenced by many factors, including time of day, environment, and individual variability.

A 2025 study highlights the limitations of cortisol as a single biomarker and advocates for **systems-based welfare assessment** (arXiv, 2025). This approach combines multiple physiological measures such as:

- **Heart Rate Variability (HRV):** reflects autonomic nervous system balance.
- **Oxidative Stress Markers:** reveal cellular damage under chronic stress.
- **Individual Characteristics:** age, sex, breed, and body weight.

By integrating these indicators, veterinarians and animal behaviorists can obtain a more accurate picture of how animals experience stress, comfort, and positive well-being. Such assessments may soon become part of routine clinical practice and welfare research, improving both pet care and scientific validity.

4. Smart Farms: Physiological Monitoring with Pervasive Sensing

The livestock industry is also undergoing a transformation. Farmers and veterinarians are increasingly using **pervasive sensing technologies**—including wearable devices, cameras, vibration sensors, and radio-frequency (RF) signals—to track animals' physiological states in real time (arXiv, 2025).

These systems can detect subtle changes in:

- Body temperature (fever detection).
- Activity and rest patterns (early lameness identification).
- Feeding and rumination (nutritional monitoring).
- Heart and respiratory rates (health surveillance).

Physiologically, these parameters reveal much about stress, disease progression, and productivity. By using continuous, non-invasive monitoring, farmers can intervene early to prevent illness, reduce antibiotic use, and optimize animal welfare—aligning with both economic goals and ethical farming standards.

5. Veterinary Physiology in the One Health Framework

Veterinary physiology no longer exists in isolation. The **One Health** approach emphasizes the interconnectedness of human, animal, and environmental health. With 60% of emerging infectious diseases being zoonotic, veterinarians are now frontline defenders of public health.

Advances in physiological surveillance—whether monitoring stress responses in pets or immune profiles in livestock—contribute directly to disease detection and prevention. For instance, changes in livestock physiology can act as early warning systems for zoonotic outbreaks, antimicrobial resistance, or food safety threats (Business Insider, 2025). Thus, veterinary physiology not only enhances animal care but also protects human communities in a rapidly changing world.

Conclusion

The year 2025 marks a turning point for veterinary physiology. Breakthroughs like the anti-aging pill for dogs and India's first animal stem-cell biobank showcase how biotechnology is reshaping our understanding of aging and regeneration. At the same time, advances in welfare assessment and livestock monitoring are pushing the field beyond traditional methods into high-tech, individualized, and data-driven approaches.

These innovations underscore a broader truth: veterinary physiology is central not only to animal health and productivity but also to global public health. By deepening our understanding of physiological processes and harnessing technology, veterinarians and

scientists are creating a future where animals live healthier, longer, and more comfortable lives—while contributing to the well-being of human societies.

References

Washington Post. (2025). *Anti-aging pill for dogs clears key FDA hurdle*. Retrieved from: https://www.washingtonpost.com/technology/2025/02/26/antiaging-pill-dogs-fda

Times of India. (2025). *India's first animal stem-cell biobank opens in Hyderabad*. Retrieved from: https://timesofindia.indiatimes.com/city/hyderabad/mos-unveils-new-biotech-innovations-opens-countrys-first-animal-stem-cell-biobank

arXiv. (2025). *Beyond Cortisol: Systems-based physiological welfare assessment for dogs*. Retrieved from: https://arxiv.org/abs/2502.11384

arXiv. (2025). *Pervasive sensing in livestock management: monitoring health and activity at scale*. Retrieved from: https://arxiv.org/abs/2503.15674

Business Insider. (2025). *How your pet's vet visit can help protect your health, too*. Retrieved from: https://www.businessinsider.com/sc/how-your-pets-vet-visit-can-reveal-public-health-trend