



## Uses of Livestock in Biomedical and Research Fields

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### Description

Livestock, traditionally associated with agriculture and food production, has emerged as a crucial player in biomedical and research fields. The intersection of science and animal husbandry has opened new frontiers, offering valuable insights into human health, disease mechanisms, and innovative biomedical solutions. The multifaceted importance of livestock is in biomedical and research fields, exploring their roles in advancing medical knowledge, drug development, and biotechnological breakthroughs. Livestock, particularly rodents, pigs, and cattle, serve as indispensable model organisms in medical research. These animals share physiological and genetic similarities with humans, providing researchers with valuable platforms to study diseases, test new therapies, and gain a deeper understanding of complex biological processes. By utilizing livestock as models, scientists can bridge the gap between laboratory experiments and clinical applications, ultimately advancing medical knowledge.

The comparative anatomy of livestock, especially large animals like pigs and cattle, offers unique advantages in translational medicine. Researchers can study diseases and therapeutic interventions in these animals, making it easier to extrapolate findings to human physiology. This approach enhances the efficiency of preclinical studies, allowing for a more accurate prediction of how medical interventions will perform in human subjects. Livestock plays a pivotal role in the development and production of vaccines. Animals such as chickens, cows, and goats are used to produce vaccines through techniques like

recombinant DNA technology. Livestock-based platforms enable the cost-effective and scalable production of vaccines, contributing to the global efforts in preventing and controlling infectious diseases that affect both animals and humans.

Xenotransplantation, the transplantation of animal organs or tissues into humans, holds great promise in addressing the shortage of human organs for transplantation. Pigs, in particular, are being studied as potential donors due to their anatomical and physiological similarities to humans. Research involving livestock is instrumental in overcoming immunological barriers and ensuring the safety and efficacy of xenotransplantation procedures. Livestock, especially cattle and pigs, are valuable in stem cell research. These animals provide a source of pluripotent stem cells that can be utilized in regenerative medicine and tissue engineering. The study of livestock stem cells contributes to our understanding of cell differentiation, tissue regeneration, and the potential for therapeutic applications in both veterinary and human medicine.

Livestock models are crucial for studying and testing treatments for a range of diseases, including cancer, cardiovascular disorders, and infectious diseases. The use of livestock in drug testing allows researchers to assess the safety and efficacy of potential therapies in a living organism with complex physiological systems, providing valuable data before advancing to human clinical trials. Advancements in functional genomics and genetic engineering have been accelerated by research involving livestock. The ability to modify specific genes in animals allows scientists to investigate gene function, study disease mechanisms, and develop genetically modified livestock with enhanced traits. This research is instrumental in understanding the genetic basis of diseases and developing targeted interventions. Livestock, especially small animals like rabbits and pigs, are used in the development and testing of biomedical imaging technologies and diagnostic tools. These animals provide realistic models for assessing the performance of imaging modalities and diagnostic devices. The insights gained from these studies contribute to the refinement of medical diagnostics for both veterinary and human applications. As the fields of agriculture and medicine continue to converge, the collaborative efforts of scientists, veterinarians, and agricultural experts promise a future where the contributions of livestock to human and animal health are maximized, ushering in a new era of interdisciplinary progress.

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