



Vet Call

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Innovations in animal health

Innovations in cattle husbandry and health have been taking place since cattle were first domesticated for human use. For many centuries, our understanding of cattle health and productivity were based only on observations, and innovations were few and far between. The rapid changes in cattle health and productivity witnessed in the last 150 years have been made possible by increased use of carefully designed experiments and the adoption of the scientific method in the early parts of the 20th century.

Land-grant benefits

Modern animal husbandry and health is based on a combination of art and science. The art component of cattle husbandry involves the practice of observing livestock well. Innovations often come as a direct result of observing cattle over time, in many situations, to become familiar with the range of behaviors that are normal, and being able to compare those cattle to others that exhibit different behaviors.

The science component of cattle husbandry builds on the art of observing, but goes further. It carefully measures not only the outcome of interest, but also other potentially biasing or confounding inputs so that important factors that change the risk of disease are not confused with other factors that affect neither health nor productivity.

The United States has benefited tremendously from the establishment of land-grant universities starting in 1863. This innovation in higher education provided university professors with experiment stations to undertake practical agricultural research. The development of the Extension Service greatly increased the impact of plentiful applied research with the mission to promote research findings to farmers and ranchers.

The land-grant mission allowed practical agricultural research to take place in every state of the union, and came about just as the scientific community was learning how to

conduct high-quality experiments that could identify subtle improvements while clearing away the clutter of variation due to weather, soil types, animal differences and other factors that may or may not be important for a particular question. In addition, during the

past 150 years, numerous animal-health companies have developed extensive research facilities, which add substantially to the number and types of innovations in agriculture.

Important advances

Some of the most important innovations in cattle health have come about in the areas of vaccine development against common disease-causing viruses and bacteria; improved diagnostic tests to identify infectious agents and toxins associated with diseases of cattle; genetic tests to identify carriers of undesirable traits; antibiotics to treat and prevent diseases

caused by bacteria; and chemicals to kill parasites such as worms, lice, scabies mites and flies. In addition, innovative methods to use biosecurity principles such as quarantine, age segregation and sanitation have led to important improvements in animal health and productivity.

The development of a systematic breeding soundness examination (sometimes referred to as a BSE) to evaluate bull fertility by combining a thorough examination of the bull's overall health with a microscopic

examination of semen and a thorough examination of the reproductive tract was an important innovation to minimize the risk of reproductive failure. Similarly, methods to accurately identify pregnant cows and to estimate the fetal age to predict breeding and calving dates has been one of the most important innovations to impact reproductive efficiency and herd productivity.

Predictions of the impact of mating decisions on the performance of calves based on the performance of potential sires and dams and their relatives [i.e., expected progeny differences (EPDs)], has allowed rapid genetic improvement for many economically important production and reproductive traits. These tools to impact animal selection, as well as other innovations in grazing management, forage supplementation, development of high-concentrate diets, and creation of growth promoters have increased beef production on diminishingly available agricultural land in the United States.

Even as the innovations of the past 150 years are celebrated for their impacts on the health and productivity of beef cattle, the potential for future innovations holds equal promise. Some of the innovations we may see in the near future include genetic markers for animals with particularly good or poor immunity to disease; genetic markers for highly fertile bulls and heifers; improvements in vaccine, parasite control and antimicrobial products.

Additionally, increased use of biosecurity tools such as carefully controlled herd/pen size; age segregation; treatments to clear cattle that are persistent carriers of infectious agents; and quick, chuteside diagnostic tests for many disease agents and production characteristics are potential factors.

No discussion of innovation would be complete without an acknowledgement that not all innovations stood the test of time. Some reasons that exciting innovations are introduced only to quickly fade away include other factors playing a bigger role in disease or production than the one we are targeting with technologies or management; microorganisms adapting to the pressure of new technologies and becoming much less susceptible to a promising innovation; side

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effects such as toxicities or unforeseen consequences outweighing the benefits of the innovation; or changes in management (human behavior) that reduce existing problems while leading to the emergence of new problems.

The causes of disease and production limitations are very complex. New knowledge and innovations can allow veterinarians,

cattle producers and researchers to attack some of these causes to limit the extent or timing of negative effects, but it is highly unlikely that we will ever be able to reduce the effect of all negative factors simultaneously. However, looking at the history of innovations in the cattle industry as a guide, if we maintain a holistic view to create and maintain a sanitary environment,

balance nutrients as needed, reduce stress, and identify and remove disease reservoirs where possible, we have reason to be certain that more exciting innovations are in our future.



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