

Evidence-based decision making for management of feedlot animal health

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Abstract

Establishing a decision-making process is an important component of veterinary medicine, cattle production, and the interface of these 2 enterprises. There are various methods that can be employed for the decision-making process, with evidence-based decision making being a very common method. Many different types of evidence exist, and understanding the underlying strengths, limitations, and implications associated with each type of evidence utilized to make a decision is just as, if not more, important than the decision itself.

Key words: feedlot, evidence-based medicine, EBM

Résumé

L'établissement d'un processus de prise de décision est une composante importante en médecine vétérinaire, en production de bétail et à l'interface entre ces deux secteurs. Plusieurs méthodes peuvent être utilisées dans le processus de prise de décision. La prise de décision fondée sur des données probantes est certainement une méthode très courante. Il existe plusieurs types de données et la compréhension des forces, des limites et des implications associées à chaque type utilisé pour prendre des décisions est aussi importante, sinon plus, que la décision elle-même.

Introduction

Evidence-based decision making aims to apply evidence gained from the scientific method to certain parts of veterinary practice and animal production. Many systems have been developed to stratify evidence by quality. In general, these systems all follow a similar hierarchy, with the most valuable and highest-quality evidence being derived from properly designed, randomized, controlled trials.¹ Multiple trials following this design can be evaluated together through the use of meta-analysis and systematic reviews to provide an even higher level of quality and value. On the other end of the spectrum, the lowest level of evidence available is derived from expert opinion, bench research, first principles, and anecdotal observations. While not always useful in the decision-making process, these forms of evidence are typically the basis behind a great deal of research which eventually leads to the development of higher forms of evidence.

Hierarchy of Evidence

Casual observations are found at the bottom of the "pyramid of evidence"¹, but can still be used for the decision-making process. *Casual Observations*, anecdotal evidence or comparisons are used to make decisions and this requires extremely large differences to be present in order to be a useful method. *First Principles* uses foundational principles or assumptions from specific disciplines as the basis of a course of action with not much consideration for validation. Going one step further, *Decision Tree Analysis* begins to tie in the economics of a decision, and when available, uses known or expected probabilities of different outcomes to determine expected costs of each decision. *Benchmarking* can be useful for monitoring and forecasting, and has some value for making decisions in systems that are well-defined with little natural variability. However, this method becomes less useful as a decision-making tool in systems with a high degree of natural variability, such as those seen in cattle production.

Commercial Field Trial Results utilizes data from commercial field trials as the basis of the decision-making process. This method requires relevant data describing important production variables. Data generated from these trials can then be used to build economic models that accurately simulate all aspects of production to apply a dollar value to each decision. Results from small-pen field trials or trials performed in a research setting are useful for screening multiple options and/or refining the specific hypothesis to be tested in a large-pen commercial trial. The use of the large-scale commercial setting allows for strong external validity, meaning that results are more directly applicable to the environment and systems used in commercial cattle production. While the commercial field trial method provides a high quality of relevant evidence, this approach also requires a robust infrastructure for performing research in a commercial production setting and is costly to execute. As part of the economic modeling done with the observed results, an economic sensitivity analysis can be performed to further determine the relative value of different decisions in varying production and economic scenarios. Lastly, *Meta-analyses and Systematic Reviews* combine the results of multiple commercial field trials, which results in the strongest evidence available for the decision-making process.

Discussion

Various methods exist for use in the decision-making process for veterinary medical and cattle production enter-

prises. Each have underlying strengths and limitations, and each may be useful for the decision-making process in different scenarios. It is important that the strengths, limitations, and implications of the process by which each decision is made be known in order to ensure that the correct method is used for the scenario at hand.

Reference

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