



Review

Genetic analysis of longitudinal data in beef cattle: a review

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ABSTRACT. Currently, many different data types are collected by beef cattle breed associations for the purpose of genetic evaluation. These data points are all biological characteristics of individual animals that can be measured multiple times over an animal's lifetime. Some traits can only be measured once on an individual animal, whereas others, such as the body weight of an animal as it grows, can be measured many times. Data such as growth has been often referred to as "longitudinal" or "infinite-dimensional" since it is theoretically possible to observe the trait an infinite number of times over the life span of a given individual. Analysis of such data is not without its challenges, and as a result many different methods have been or are beginning to be implemented in the genetic analysis of beef cattle data, each an improvement over its predecessor. These methods of analysis range from the classic repeated measures to the more contemporary suite of random regressions that use covariance functions or even splines as their base function. Each of the approaches has both strengths and weaknesses in the analysis of longitudinal data. Here we summarize past and current genetic evaluation technology for analyzing this type of data and review some emerging technologies beginning to be implemented in national cattle evaluation schemes, along with their potential implications for the beef industry.

Key words: Beef cattle; Longitudinal data; Random regression;
Genetic evaluation