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Feed efficiency — is it related to other important traits?

AT A GLANCE

Feed efficiency may affect the sustainability of beef operations. Many important production traits such as carcass quality and reproduction appear to be unaffected in efficient cattle.

The Situation

Feed costs comprise 60% to 70% of costs related to beef production. Selecting for feed efficiency (FE) could increase the economic and biological sustainability of beef production. In addition, more cattle breed associations have selection tools for feed efficiency. However, if selecting for feed efficiency negatively effects other important traits, then there may be little advantage to increasing feed efficiency.

Our Response

Since 2009, multiple experiments have been conducted by University of Idaho researchers to ascertain the relationship among feed efficiency and:

- Feedlot performance
- Final product quality
- Breed differences
- Reproductive performance

In addition, research efforts focused on understanding the genetic and mechanistic components of feed efficiency with hopes of finding improved markers to select animal for feed efficiency.

Warm season annuals can produce high tonnage for fall grazing. Photo by JB Hall.

All experiments used residual feed intake (RFI) as a measure of feed efficiency. Residual feed intake examines the difference between predicted intake for a given rate of gain and the actual intake of the animal.

Two experiments were conducted using calves produced from Red Angus sires that were divergent for Maintenance Energy EPD. The first experiment determined the relationship among feed efficiency, growth and final product. The second experiment examined potential mechanisms and genetic control of feed efficiency.

Waygu bull were evaluated for RFI and multiple growth and ultrasound carcass traits. It was unknown if this high marbling breed was different in the

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relationship between RFI and other traits compared to other Bos taurus cattle.

Over eight years, all replacement heifers at the Nancy M. Cummings center were tested for RFI. At 13 to 14 months of age, growth and fertility measurements were obtained. Indicators of fertility included reproductive tract scores, antral follicle count, estrus response and pregnancy rates.

Program Outcomes

Residual feed intake measured during the postweaning growth phase is a good indicator of FE during finishing — Since RFI is determined in bulls during the growth phase rather than at finishing, it is important that RFI determined while feeding a moderated energy diet will be an accurate estimate of finishing feed efficiency.

There were no negative relationships between RFI or sire maintenance energy EPD on carcass or final product quality. This indicates that producers can select for FE without risking a decrease in carcass value.

Genetic markers were not consistent across different sires and hormonal markers tested were not related to RFI — This may explain some of the difficulties with genetic markers accurately predicting FE. More research is needed to find better methods to predict FE without performing feed trials.

Efficient animals may be better at maintaining and building muscle compared to inefficient animals — Efficient animals may have more type I muscle fibers, but this does not appear to affect final product quality.

Although intramuscular fat (IMF) percentage in Wagyu cattle are negatively correlated to RFI, there is a population of Wagyu that excel in IMF and RFI (Figure 1) — This indicates that extremely high marbling breeds such as Wagyu could be selected for RFI, and some individuals would still possess the highly valued carcass traits. The current challenge is how to identify those individuals through genetic or other markers.

Indicators of reproductive efficiency do not appear to be affected by RFI — Feed efficient heifers are reproductively similar to inefficient heifers. Therefore, it appears producers may be able to select for feed efficiency without impairing reproduction.

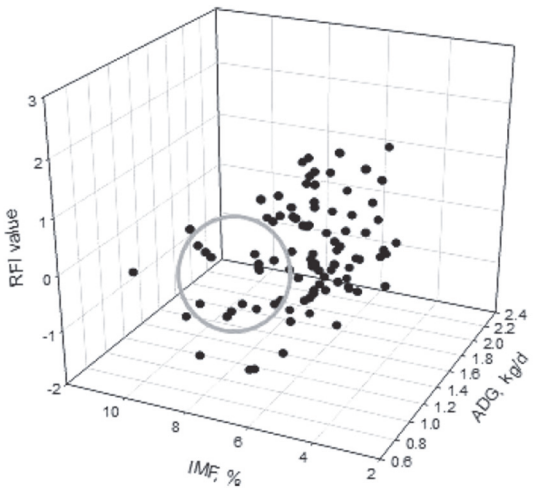

Figure 1. A scatter plot of the relationship among RFI, IMF and average daily gain in Wagyu bulls. Circle indicates population that excels in all three traits.

The Future

We will continue to use the information we have obtained on feed efficiency and reproduction to search for genomic or metabolic markers for feed efficiency.

Cooperators and Co-Sponsors

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FOR MORE INFORMATION

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