Contributors to biological variation in net feed intake in beef cattle

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Net feed intake (NFI) is a measure of feed efficiency and is calculated as actual feed intake less expected feed intake for maintenance and growth. Recent research has shown that selection for low NFI measured in young cattle post-weaning can reduce feed eaten for liveweight gained with minimal effect on other important production traits (Richardson 2003). Identifying the biological basis for variation in this trait may lead to a more efficient method of selection for NFI (e.g. other traits correlated with NFI). This information is important to enable balanced breeding decisions and to ensure that selection for improved feed efficiency will not have unforeseen detrimental effects.

A series of experiments were conducted on high and low NFI steers resulting from a single generation of divergent selection. Feeding patterns, difference in body composition, variation in physical activity and the heat increment of feeding all make small contributions to the difference in NFI (2%, 5%, 10% and 9% respectively; Richardson 2003; Richardson et al. 2001). Variation in digestibility has been examined on several occasions and the results suggest that it contributes to at least 10% of the variation in NFI (Richardson 2003). Blood parameters examined show variation reflecting differences in susceptibility to stress and in immune function (Richardson et al. 2002). Indirect metabolite measures indicative of protein turnover, tissue metabolism and stress indicated these contributed to at least 37% of the variation in NFI (Richardson et al. 2003). Approximately 27% of the difference in NFI between the selection line steers could not be attributed to the above processes.

It is hypothesized that variation in the susceptibility of cattle to stress is a driver for many of the biological differences observed following selection for NFI. Further research is required to test this hypothesis and to accurately quantify the contribution of protein turnover, tissue metabolism and ion transport to variation in NFI in cattle.

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