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Residual Feed Intake as a Selection Tool

J. Crozier and ***D.R. ZoBell***

When deciding upon which sires and dams to utilize to obtain superior genetics, as well as production traits, the residual feed intake of each animal can be a determining factor. Residual feed intake, or RFI, is merely the difference between the expected intake of the animal and what they actually consume. Another definition is the feed required to maintain body weight and allow for additional growth (Herd et al., 2003). An animal with a low or negative RFI value is very feed efficient while an animal with a high RFI value will be less efficient than its counterpart.

Heritability of residual feed intake is fair to moderate, so it is a trait worth selecting for. However, there are many factors that affect individual RFI values. Some of these factors are choice of breeds, crossbreeding and selection within already determined breeds in a herd (Herd et al., 2003). RFI values vary dramatically among different breeds so it is recommendable to approach breed associations to determine what each breed is doing with RFI values.

The largest impact for ranchers when using RFI values in a selection program is reduced feed costs. This occurs because cattle with low RFI values consume less feed. It has been demonstrated in numerous studies that "selection for lower RFI will decrease feed intake by young cattle and cows, with no detrimental effects on growth or size of animal" (Herd et al., 2003). Thus, this benefit is twofold. Not only will cattle consume less, but at market time they will still stand up at market conditions and standards. As an example, in contrast to high RFI value steers, low RFI value steers had more lean meat and less fat in their carcasses (Richardson et al., 2001).

In another study, heat production of the cattle was measured. It was illustrated that steers with high RFI values produced more heat than low RFI value steers. Heat production is a waste of energy and can be decreased by selecting for low RFI value animals. Along with lower heat production, cattle selected for low RFI values produced less methane emissions, as well as less manure (Residual Feed Intake (Net Feed Efficiency) in Beef Cattle, 2006). This may help satiate environmentalists and help producers reduce the possibility of contamination through fecal materials.

Another point in favor of low RFI values is progeny from low RFI value parents. It has been demonstrated that low RFI value sires and dams are more likely to produce low RFI value progeny (Richardson et al., 2001). This links back to how heritable the trait is. Illustrating that progeny will show low RFI values is a strong incentive to producers to implement selection for such animals to decrease costs and also perpetuate the trait within their herds.

The issues that make utilizing RFI values in selection difficult vary, but a major one is a lack of research. Much more needs to be done to make this a viable selection tool for every producer. Education also plays a large role in this process. Producers need to understand how this type of selection can help in individual situations. For instance, "80-90% of genetic improvement in the herd comes through sires" (Residual Feed Intake (Net Feed Efficiency) in Beef Cattle, 2006). Thus, one bull selected for a low RFI value can

improve a herd's feed efficiency drastically if done correctly in conjunction with a proper breeding program.

Another roadblock to the success of RFI selection is the cost of testing cattle. The process of testing is expensive and time consuming. Often cattle are in the testing facility for up to 320 days (Herd et al., 2003). This can be economically taxing for producers. There is also a limited capacity at each facility. This determines how many animals can be tested at any given time.

Another option many producers utilize besides testing is other selection criteria that are less expensive to test for or to implement in the herd. Many producers do not see the long term benefits of testing animals for RFI values, so they lean towards short term solutions for long term problems. Once again, more research needs to be performed to discover less expensive, more efficient methods for testing cattle. After this has been accomplished, RFI testing may become more appealing to producers.

Although there have been extensive studies on the effect of utilizing low RFI values in feedlot situations, there is little research demonstrating how range cattle with low RFI values will perform. This is mostly due to the nature of grazing situations. They are difficult to collect and analyze data from. There are, however, many opinions on how range cattle with low RFI values will perform, though most are conflicting. Many propose that range cattle will be better at utilizing range forages that may not have high nutritional values. Others say that because animals with low RFI values tend to be less physically active, selecting range cattle with low values may impede their ability to forage well (Herd et al., 2003).

A substantial influence on RFI selection as a tool is the management style being implemented in each situation, as well as time investments. Poor management discourages the use of most selection tools strictly because they require time and labor. Having high-quality management implies that there are objectives in place and selection tools, such as RFI values, can help meet these goals. Good management is often the key to success in any situation and is crucial to the progress of any herd toward better quality animals and products.

In summary, residual feed intake values can prove to be very useful as a selection tool in a breeding program. Producers must take into account individual situations and management styles before utilizing RFI values. Both are determining factors in how well selection for RFI values in cattle will benefit the herd and the producer. Ranchers with range cattle must be especially careful with low RFI value animals because the cattle may not do as well in foraging situations. It may be more profitable to wait until more research has been done to conclude whether or not low RFI value cattle will perform as well on the range as high RFI cattle.

Another problem is the cost of testing. It may be more productive for a producer to test a few bulls and improve genetics within their herd in this way, at least until testing becomes more economically feasible.

To conclude, RFI values are another option to utilize during selection. Each producer or rancher must analyze individual situations to determine if this tool will be beneficial. Cost analysis is also very important, but producers need to be informed of the long term investments they are making now by paying more for tested animals or to have their own animals tested. The profits will often be higher than the costs if done properly while looking to the future. Still, more research needs to be undertaken to make RFI values even more profitable. As of now, residual feed intake values are another means of selection, but should not be the only criteria utilized to select sires and dams.

Literature Cited

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