

Understanding Feed Efficiency and Residual Feed Intake

Feed is a major expense for cattle producers, second only to fixed costs. With 60-plus percent of the total feed cost used for maintenance in breeding cows, improving feed efficiency can have a big economic impact. A 5% improvement in feed efficiency could have an economic effect four times greater than a 5% improvement in ADG.

What is residual Feed Intake? Residual Feed Intake (RFI) or “net feed efficiency” is defined as the difference between an animal’s actual feed intake and its expected feed requirements for maintenance and growth. RFI is the variation in feed intake that remains after the requirements for maintenance and growth have been met.

RFI is calculated as the actual intake of the animal minus its expected intake. A negative RFI number of 2 (-2) would mean the animal consumed 2 lbs. less feed per day than the average of the group it was tested with (its contemporary group). Likewise, a positive 2 RFI value (+2) would mean that the animal consumed 2 lbs. more feed than the average animal did in the test group.

Efficient animals eat less than expected and have a negative or low RFI, while inefficient animals eat more than expected and have a positive or high RFI. *Just like a golf score, you’re looking for the lowest number or the animals with negative RFI numbers.*

Why is RFI significant? Research has shown that intake by cattle will vary by 1 to 4 times in a group of calves. For example, if a pen of 100 calves weighing 1000 lbs. has an average pen intake of 25 lbs., the expected range in individual feed intakes would be 20 to 30 lbs. with no difference in gain among the calves. Estimating feed costs at \$160 per ton and 600 lbs. of gain in the feedlot, average feed costs would be \$278 per head. The most efficient calf in the group will consume \$223 of feed, \$55 less than the pen average. Through selection, how much of this potential feed savings can be realized?

A group of Angus-Simmental heifers were RFI phenotyped and divergently mated to RFI phenotyped and divergently mated to RFI phenotyped bulls. Heifer progeny were then placed in the feedlot to measure the effect of dam and sire selection on progeny performance. Progeny from efficient (negative RFI) dams consumed 12% less feed than heifers from inefficient (positive RFI) dams. Likewise, progeny efficiency differed among sire groups. Heifers from efficient sires consumed 14% less feed than progeny from inefficient sires. No difference in gain occurred among dam or sire efficiency groups. Using the diet cost scenario detailed above, a 12% improvement due to dam selection would reduce progeny feed cost \$33 per head, \$234 per dam cumulatively over 7 calves. A 14% improvement due to sire selection would reduce feed costs of 35 progeny by \$1,364. Significance progress can be made to reduce feed cost via selection for efficiency.

How is Feed Efficiency Measured? The data required to measure RFI are individual animal intake, ADG and average on-test metabolic body weight. Animals are measured in a GrowSafe equipped station for a period of about 70 days. ADG and average body weight are both computed from body weight data of animals measured during the on-test period. ADG is computed as the change in body weight per day during the intake test period.

A GrowSafe feed intake system electronically monitors the feed bunk each second of the day recording all cattle feeding activity at the bunk. Data records cannot be changed or altered. *Good or bad, GrowSafe numbers don’t lie.* A GrowSafe System is an advanced data acquisition that:

- reads animal and non-animal activity at the bunk every second of the day.
- reads an EID (animal RFID ear tag) every second when an animal is consuming feed.
- identifies when feed is consumed and a tag is not recorded.
- records feed disappearance from the trough load cells every second of the day.
- records substance appearance into the trough (feed, rain, snow).
- uses data auditing software and system diagnostics automatically and continuously to confirm whether the data is valid.

A third party scientist or technician computes RFI from the measurements taken according to a standard protocol that meets at least the minimum guidelines established by the USDA Process Verified Program.