



Better livestock to feed mankind

Feed Efficiency –The Next Frontier in Dairy Genetics?

In the dairy industry, there are currently 31 traits which we have genetic evaluations available for. This includes five for production, seven for workability, and nineteen for conformation. Over the last twenty years, the scientists at USDA-AIPL have developed genetic evaluations for traits that allow us to breed more profitable animals than we ever have before. I would like to use this article to make the case that without selection for feed efficiency we are not doing our best to improve the profitability of our cows and our businesses.

The purpose of dairy cattle is to produce human food. Our responsibility is to produce that food by making the most effective use of the resources that we have. In a business situation, this is often called long term profitability. A very simplified definition of profit is outputs minus inputs. In a dairy operation, milk and calves make up the bulk of outputs and most inputs are made up of feed and labor.

So do we have genetic evaluations to select for more milk and calves while using less feed and labor? We can easily select for more milk production by using a combination of the five production traits (milk, % fat, % protein, fat, and protein). More calves can be produced with less resources if we place emphasis on daughter still births (DSB) because more calves will be born alive. Additionally, selection for female fertility (DPR) will result in more calves because cows that breed back sooner will produce more calves per unit of time. Labor needs can be reduced by selecting for traits to reduce assistance needed at calving (daughter calving difficulty or DCD), reduce mastitis (SCS), reduce the effort needed to get cows pregnant (DPR), improve longevity (PL), and make cows easier to milk (udder depth).

Today, feed accounts for over half of all costs to produce milk. If we could select for cows that more effectively use the feed made available to them, we would greatly improve profitability. Select Sires has developed a selection index (FeedPro™) that estimates the feed efficiency of a bull's daughters by using genetic evaluations to estimate production, body size, and condition score in order to predict his daughters' feed intake. This selection index is the best tool available to select bulls whose daughters will produce more milk using less feed. However, it assumes that two animals of the same size that are producing the same amount of milk and maintaining the same body condition score will eat the same amount of feed.

The feed that an animal eats is used for three purposes. The three purposes are maintenance, weight change (loss or gain), and milk production. A trait called Residual Feed Intake (RFI) is used to measure the ability of an animal to utilize its feed. RFI is the difference between an animal's actual feed intake and its predicted intake based on the animal's requirements for maintenance, weight change, and milk production. Cattle with lower RFI values consume less feed than expected for a given bodyweight and level of production. RFI measures differences in the ability of animals to use their feed for biological processes such as digestion, heat production, methane production, protein turnover, ion pumping, and mitochondrial function. An advantage of RFI is that unlike ratio-based feed efficiency measurements, such as milk produced per pound of feed, RFI is independent of bodyweight and production. Therefore selection for RFI will reduce feed inputs with minimal effects on mature size, production, or body condition score.

Has there been any research done on RFI in dairy cattle? There were three research papers published in the early 1990s that estimated the genetic component (heritability) of RFI in dairy cattle to be from 18 to 30 percent which is similar to the heritability for milk production.

In order to estimate an animal's RFI, it is necessary to collect data on feed intake and body weight as well as milk production over a 90 day period. This sounds impossible to do without individual animal feeding stalls but there are already companies that manufacture equipment that measures individual animal feed intake and body weight on a daily basis for animals housed in groups. In addition, the same SNP technology that is used to predict genomic evaluations for our current 31 traits could make it possible to collect feed intake and body weight data on fewer animals and still produce accurate genetic evaluations for RFI. If we are going to make any genetic improvement for feed efficiency, we are going to have to measure the daily feed intake of some animals in our seed stock population.

Obviously, genetic evaluations for RFI will not be available in the immediate future. However, those dairy genetic suppliers that take the initiative to develop a system to select cattle for lower RFI will have the ability to make themselves and their customers much more profitable. In addition, they and their customers will have done a great service to mankind by producing more human food with less.

Profit = Outputs - Inputs

Profit = (Milk + Calves) - (Feed + Labor)

Why Is Our World So Messed Up?

Another way of asking this question is, “Why is there evil in the world?” Our culture tells us that human beings are basically good and that social institutions and cultural influences are what cause human problems and evil behavior. Our culture suggests that if we will follow our heart, get in touch with our inner self, and practice self fulfillment there will not be evil in this world.

I recently read an interesting book entitled, “10 Books that Screwed Up the World and 5 Others That Didn’t Help” by Benjamin Wiker. Some of the books reviewed by this author were written by Marx, Mill, Darwin, Nietzsche, Lenin, Sanger, Hitler, Freud, Mead, and Kinsey. Dr. Wiker begins the book by saying that bad books should not be burned but that their false ideas should be exposed. He ends the book by stating that the carnage and confusion caused by these books was because of the idea that the world, rather than human beings, needed to be saved from something.

Is there any evidence that human beings are basically good? Has this thought caused a culture of “blame” and “victim mentality?” If I am basically good, then isn’t anything bad that happens to me caused by someone or something outside of me? Even though our surroundings and circumstances influence us, can’t we choose how we will respond? If human beings are basically good, wouldn’t we have to teach our children to be naughty rather than how to be good? Is it possible that the evil in this world comes from human beings because they have a selfish, sinful nature? Does the problem with the world begin with us? If so, is there a solution?

Your Own Personalized Bull Ranking

Are you dissatisfied with the weightings and traits that are used to calculate the selection indexes currently used to rank bulls (Net Merit, Cheese Merit, Fluid Merit, TPI, or PTI)? Is so, contact Metzger Dairy Genetics to help you create your own bull ranking based on the traits most important to the profitability of your operation.

Metzger Dairy Genetics

Livestock were created to produce human food. Our business is helping your food production business be more profitable. Metzger Dairy Genetics is owned and operated by John Metzger and provides genetic improvement services for livestock producers. Services include sire selection, semen purchasing, breed selection, breeding systems, and female selection. For help with your livestock genetic improvement program contact:

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