

## Feedlot Marker Assisted Management

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### Abstract

Feedlot management strategies are often focused on improving production efficiency and/or managing carcass endpoint. These strategies may be as simple as an implant program or as complex as a multi-technology sorting program. A number of technologies are available to provide data to make sorting decisions and are as simple as chute weights, breed type, hide color or visual appraisal or as complex as ultrasound based measures of body composition, external body measurements, or genetic information. However, any technology used needs to be responsive to shifting population trends and changes in management set points.

Unlike a seed stock or commercial cow/calf producer our feedlot population is diverse and is subject to seasonal and geographic trends. In addition, our population comes from many different backgrounds (wheat pasture, grow yards, and ranches across the country). In order to account for these varied environmental and genetic backgrounds our approach to marker assisted management has been to combine information from live animal evaluation with genetic information to make management decisions.

Cargill Cattle Feeders, while being focused on efficiency and cost of gain, has an even greater focus on endpoint management due to our relationship with Excel. Due to this intensive focus on carcass endpoint, we have developed a management system based on an animal's condition at reimplant and genetic information obtained from marker panels for economically important traits. This allows us to account for both environmental effects and the genetic potential of the animal. At the feedlot level it is very difficult to manage individuals but managing groups of similar individuals is feasible. By grouping individuals we create pens of cattle that have a specific endpoint target. This grouping allows growth promoting technologies to be applied in order to improve production efficiency while still meeting our specific endpoint targets. The goal being to produce a high quality product for our customer while maximizing production efficiency.

### Discussion

The management of cattle in the feedlot is often focused on improving production efficiency and/or targeting a particular endpoint. Production efficiency is universally important, however, the degree to which an operations focuses on endpoint is often determined by their relationship with a packer. Cargill Cattle Feeders works closely with Excel to produce high quality cattle for use in Excel's branded beef programs making endpoint management a highly focused component of our operation. Cargill Cattle Feeders is also unique from many other feeding operations in that all animals in our feed yards are tagged with an electronic identification tag upon arrival. Electronic identification tags are key in allowing technologies to be tested and utilized,

improvements to our production system to be made and progress to be tracked. In addition, our relationship with Excel allows for carcass data collection on all animals harvested, further strengthening our ability to track, benchmark, and improve production practices. This ability to make data based decisions is one of the greatest strengths of our business.

Single trait genetic markers have been available to seed stock producers for a number of years and the ability to make management decisions based on that information, while complex, has been simpler than using that information in a feedlot setting. Typically seed stock producers are working with a relatively similar population which was managed under a single management system. Frequently management decisions are simply to retain or cull an animal or to provide information to a prospective buyer. However, compared to seed stock producers and other segments of the beef industry, marker assisted management in the feedlot posses a number of challenges. The population in the feedlot is in a constant state of flux and the environmental impact differs over time. In a large scale feeding operation, cattle are sourced from across the country and are comingled in differing proportions depending on the season. Also, cattle are obtained from different production systems (i.e. ranch origins, pasture growing systems, wheat pasture, grow yards and sale barns) which may or may not impact the ability of the animal to reach its genetic potential. In addition, we have to manage individuals in a group environment. Historically, feeding operations have managed pens of cattle and therefore, all of the production systems are setup to manage groups (i.e. – lots) and not individuals. Management decisions are often more complex in the feedlot, because we have to manage every individual and do not have the ability to send poor performing or genetically inferior animals to the sale barn. Some of those management decisions include an endpoint decision for the animal (i.e. – high yield vs. high quality), and what technologies are we going to use to get there. For Cargill Cattle Feeders this decision may include to implant or not to implant an animal, the potency of the implant (if implanted) and the type of beta-agonist that is fed. Marker assisted management allows for an individualized approach within a group managed system.

Due to the diversity of the population that we feed, it is difficult to obtain any genetic information prior to arrival at the feed yard. Our data collection therefore, begins upon arrival at the feed yard. At arrival an animal is processed (vaccinated, dewormed, tagged (EID and visual), etc.). Following these standard practices we take a nasal swab to collect DNA. In the past we collected blood via a tail bleed which slowed down processing considerably, however, nasal swabs allow for a safe and efficient way to collect DNA. The DNA is transferred to a bar-coded FTA card and the barcode is scanned linking the unique sample number with the EID of the animal. The animal is returned to its home pen and the DNA is then sent out to be processed. The marker assisted management decisions are then made at reimplant. At reimplant a measure of body composition is obtained to account for environment factors which impact the ability of the animal to reach its genetic potential. That information, along with genetic information, is used to determine how we will manage that animal.

A number of management decisions are made using the genetic information and body composition of each animal. First, we need to determine how much longer we are going to feed this animal. Second, we decide if we are going to give any growth promoting technologies to the animal and if we are, what products we are going to use. Based on the answers to these questions, the animals will be sorted into one of four groups, the goal being to allow the animal the ability to reach its genetic potential while being managed within a group setting.

Four groups allow for efficient management within a group production environment by preventing groups with too few animals, while still allowing us to come close to maximizing the genetic potential of each animal. The reimplant and carcass characteristics of each of the four groups are shown in table 1. Group 1 is characterized by cattle that perform well early in the feeding period and therefore, are heavier and fatter than their pen mates. The management focus of this group is to prevent them from becoming too fat. Technologies are used to promote lean mean yield. Group 2 is characterized by average performing cattle. This group is of moderate weight and fatness at reimplant, and tends to have carcasses of average weight, grade and yield. Group 3 is characterized by small or immature cattle. They are smaller and leaner at reimplant and require longer to reach a mature weight. However, they tend to produce large carcasses which grade and yield. Group 4 is characterized by cattle that are genetically superior in their ability to marble and produce high quality carcasses. This group also contains cattle that have above average marbling characteristics but with an implant a large percentage will produce a high select carcass. Therefore, a significant proportion of this group will not receive an implant. This group has a large number of carcasses that qualify for premium programs, thereby offsetting any reduction in carcass weight loss due to the removal of an implant. The net result of this grouping is to produce a consistent product that readily fits into Excel's branded program.

Our goal with marker assisted management is to optimize the capability of an animal and do so in a manner in which we add value to our customer. While managing cattle in this manner adds complexity to a feeding operation, it is far outweighed by the consistency and quality of the product delivered to the plant. We envision that in the future this technology will encompass a greater number of economically important traits, while continuing to become more cost effective. Marker assisted management will allow for feeding operations to improve production efficiency and the consistency and quality of the product they produce.

Table 1. Reimplant and Carcass Characteristics of the four sort groups.

	Group 1	Group 2	Group 3	Group 4
Reimplant				
Weight	1109	1071	987	1096
Level of Fatness	+++	++	Avg.	+++
MS MGV	2.9	1.48	-1.59	23.0
Carcass				
HCW	831	883	908	863
REA	13.2	14.1	14.6	13.2
BF	0.47	0.45	0.43	0.53
MS	398	407	418	486
Yield	63.0	63.9	64.8	63.8
YG	3.0	2.9	2.8	3.3
% Choice	40.0	42.7	45.7	77.4

Data is based on 88,090 head.