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THE USE OF TECHNOLOGY TO IMPROVE COWHERD AND FEEDLOT EFFICIENCY

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Overview

The beef industry has made dramatic increases in production efficiencies during the past century. As one considers the adaption of technology, one has to carefully analyze the inputs required to obtain these increases in production. This paper will provide an overview of many of the advancements responsible for improvements in efficiencies we have observed.

Introduction

A classic paper, “Fifty Years of Pharmaceutical Technology and Its Impact on the Beef We Provide to Consumers,” was authored by Drs. Preston and Elam in 2004, and outlined the impact of many of the technologies that have led to a direct increase in the technology we use today. Beef cattle production has increased by 50% over the past 30 years alone. This increase can be attributed to advancements in genetics, nutrition, health, and growth enhancement technologies, as well as improved management and information gathering. While many notable improvements come with a cost, several have a much greater return on investment (ROI) than others. One should consider these high ROI technologies as the margin of improvement over cost to be worth the investment.

What questions do we need to ask ourselves as we read papers and think about the presentations from the conference? This paper will outline some of these questions and stimulate a greater interest in adapting the use of technology, no matter how simple it may be, in creating a more profit oriented operation that focuses on improving the efficiency of profitable production.

Genetics

If one were to ask cow calf producers what one improvement has made the most notable advancements in their operations, many would list improved genetics at the top of their list. It is easy to see/quantify the dramatic changes that have taken place since the 1950s and 1960s in the growth potential of the cattle we produce. Likewise, one can look at an increase in slaughter weights and realize the growth potential of today’s beef herd is quite large. The Nutrient Requirements for Beef Cattle (NRC) was last updated in 2000. Many feedlots today have pens of cattle where the performance is greater than the maximum values used in calculating the nutrient requirement of a feedlot steer in the 2000 NRC.

The genetic trend for cattle to grow faster and have heavier carcass weights is cause for us to evaluate how we handle this genetic potential. A weaned calf today is very different from 10 years ago. Managing the nutrients needed to maintain growth without hindering marbling development is an important issue that warrants further research.

To recognize the full potential of the genetic improvements the beef sector has made, calving periods need to be tightened. A few feed yards have devoted time in developing and implementing sorting protocols and supporting technology to produce uniform groups of cattle. While sorting technology has shown to be beneficial to identifying outcome groups, this benefit should be initiated prior to weaning by incorporating a tighter calving window. Load lots of similar genetics, age and ranch management could then be purchased or sent to feedlots with little to no need of sorting as they are already similar and will react to management in a similar fashion. Feedlots are redesigning pen space to accommodate load lots which allows for better tracking of data within a contemporary group rather than individuals being dispersed across a feedlot and co-mingled with cattle coming from a multitude of environments or management practices. Genetics and environment are two important factors in making uniform cattle. Control and documentation of these at the ranch with the proper technology is needed.

The incorporation of genetic markers by the purebred industry is resulting in large amounts of data that is not only improving the technology, but resulting in improvements in breeding selections made by breeders. Marker panels are being developed for the commercial sector and progressive feed yards are carefully experimenting and analyzing this technology. Ultimately, sorting will occur based on the genetic capabilities of the animal, which will be an improvement over the phenotypic traits we utilize now that are largely affected by the environment.

Artificial Insemination

Beef producers in a survey conducted by Beef Magazine in 2013, recognized AI as the second most important innovation developed. However, producers' recognition of AI is not related to the utilization/adaptation of the technology. The percentage of operations that utilize AI, reported by the National Animal Health Monitoring System (NAHMS, 2009), was only 7.2%. Over 60% of those that choose not to AI stated labor, time and the overall difficulty of initiating the process were reasons not to AI. As technologies have evolved, a superior support system has developed for many of these new technologies. Artificial insemination companies have done an excellent job training and placing technicians who can cost effectively inseminate cattle with the use of new synchronization protocols.

Cost effect methods can be utilized to effectively synchronize a cowherd and then utilize the vast amount of genetics available to meet herd goals. It is evident the competitiveness for securing top commercial bulls is increasing as sale averages set records this past spring. The option to utilize the most suited genetics for an operation matched to an individual cow may be more cost effective than ever through AI. We all are well aware of the level of usage of AI in the swine and dairy industries and how effective it has been in improving their product.

Nutrition

Nutrition is a deal breaker. An improvement of 0.1 lb in feed/gain (F/G) is worth \$10 per head at the feedlot, but it is at the end of a feeding period we know if we have made strides in improving feed efficiency as we have no "real time" method of quantifying this valuable component. In an effort to keep costs down, more by-products are being fed which contribute to the complexity of the diet requiring greater technical support. Not always can we focus on a lower F/G, as the cost of many by-products may improve our cost of gain even though our F/G is not improving. In the last couple of years, new methods in feed fabrication have allowed

companies to pelletize and cube distillers grains effectively. The University of Nebraska took a leading role in researching the use of calcium oxide in the treatment of cornstalks and has quantified the use of the feedstuff.

The purebred industry has had the ability to focus on many traits, and over the years and recently, it has put a large selection emphasis on improved feed efficiency captured with the GrowSafe system. This technology, when used in conjunction with growth and body composition data, will prove to be a beneficial tool as improved genetics are identified.

As the genetic potential of cattle improves, greater emphasis on matching cattle to proper nutrition will be needed to accurately program cattle to a specific endpoint. While there is a renewed interest in putting more calories in front of calves earlier in life, those that are grown appropriately will maximize growth and have greater hot carcass weights with more pounds to merchandise.

Pharmaceuticals

We are constantly hoping for the “silver bullet” to serve as a cure-all to use. However, we must realize the pharmaceutical industry has empowered us with a great set of tools we can use to improve health and enhance growth while simultaneously improving animal welfare.

Vaccines.

The use of vaccines has gained wide use as an important component to prevent the onset of disease. Just 20 years ago, data from Superior Livestock Auction reported a majority of calves they sold were not vaccinated (Lalman and Mourer, 2012). In 2012, only 1.2% of the calves marketed through Superior were not vaccinated. One can attribute this increase in vaccinated calves to a greater premium, \$5.26/cwt in 2012, but it has also been well documented in the Texas Ranch to Rail project (McNeill and McCollum, 2000) sick calves have reduced gains and reduced quality grades. The next generation of vaccines will focus not only on animal health but also on animal welfare. New technologies are being developed to elicit specific immune responses, increasing the success of the vaccine (Meeusen et al., 2007).

Implants.

Considered to be the earliest and most revolutionary “technologies” the industry has developed, it still is considered the most impactful yet today (Preston and Elam, 2004). It has been documented to be an effective tool in increasing production from the ranch to the feedlot (Pritchard, 1999). Estimated returns can range from 30 to 67 dollars per head. (Preston and Elam, 2004). Economists at Iowa State University, Lawrence and Ibarburu (2007), in an extensive analysis, reported the value of implants to cow/calf operations at \$34/hd and in the feedlot at \$71/hd. The large return on investment, including product and labor, can be captured with little infrastructure.

In a summary of the literature, Lawrence and Ibarburu (2007) reported studies that utilized calfhood implants increased weaning weight from 0.3% to 10.7%. The variation from year to year can be directly tied to the environment. Mathis (2009) reported variation in implanted calf weights over those not implanted over a five year period from 3 lbs to 32 lbs, which equated to value per head difference of \$5.84 to \$16.53/animal. Studies at South Dakota State University reported little weight gain in calves receiving an implant at branding time during a drought, but

in a normal year calves on mature cows were on average 40 lbs heavier at weaning. A premium of \$3 to \$5/cwt is needed to make up for a 20 lb advantage in weaning weight.

Why do producers choose not use this proven technology? Only 11.9% of all cow calf operations used an implant prior to weaning (NAHMS, 2009), down from 14% reported in NAHMS 1997). Michael King, a research assistant for Kansas State University, analyzed data from 11,350 lots which represented 11.1 million cattle sold through Superior Livestock Video Auctions in 2011 and 2012 where 31% of the calves received an implant. The researcher reported no difference in price of implanted versus non implanted calves (Ishmael, 2014).

Beta-adrenergic agonists.

The newest growth promoting technology to be used in the beef industry is Beta agonists. In 2003 Elanco received labeling for the use of Ractopamine, marketed as Optaflexx, in beef cattle, followed in 2006 with Merck receiving approval to market Zilpaterol under the brand name Zilmax. Both of these compounds are classified as repartitioning agents as they increase muscle hypertrophy and decrease protein degradation, but they do not act upon the same muscle receptors. Zilmax acts upon the beta-2 receptors which elicits a greater response than Optaflexx which acts upon the beta-1 receptor. The benefit to using beta-agonists is well documented with increases in hot carcass weight of up to 30 lbs with improved feed efficiency.

On August 7, 2013 Tyson Fresh Meats announced it would no longer accept cattle fed Zilmax and other packers have followed. Merck has since voluntarily suspended the sales of Zilmax so more research could be conducted on its effect on mobility. Optaflexx is still widely used during the last 28-42 days of the finishing period.

Information Technology

We have seen vast improvements in the farming sector in their ability to effectively incorporate information technology to cropping systems in a cost efficient manner. The beef industry has not yet been as successful in the use of this new and fast moving computer IT. It is important as one evaluates information captured through improved technological advancements the data be put in a usable format. The beef industry has seen extraordinary amounts of data, and we sometimes find ourselves managing this data at the micro level when in reality the macro side will allow us to find trends, identify optimums and be able to focus on eliminating those extreme populations that are not profitable. Quality data is important. One must know what they are looking at and decisions can only be made after comparing to multiple sets or years of data. New skills will be needed to analyze this data which will open the door to a new generation of data gurus.

Looking Forward

Low Stress Handling.

A renewed interest in “low stress” handling has improved feedlot health and is playing a bigger role in ranches. Progressive ranches demand employees adhere to strict rules on handling and provide training opportunities. The “Bud Box” has revolutionized processing facilities and is commonly seen at ranches across the United States. The late Bud Williams’ skills have been picked up by many industry leaders who have taken newborn calf care and weaning to a greater level. Tom Noffsinger’s approaches to handling calves have greatly reduced morbidity at the yard and improved efficiency. Going forward, the aspect of “low stress” handling will play a greater role than ever before.

Grazing Management Systems.

A greater appreciation and interest in grazing management has started to take place with the help of University Extension Specialists, the Nebraska Grazing Lands Coalition and grazing experts such as Jim Gerrish who operates American Grazing Lands Services LLC. Rotational grazing with periods of rest are being adapted by many across the state with many ranchers in the Sandhills seeing vast improvement in stocking rates and drought resistance when a rest rotation program is implemented. New and innovative fencing technologies that make it easier to move cattle daily are being incorporated by progressive ranches. High density stocking rates referred to as “Mob Grazing” are being used with success across a wide range of environments. New research is needed on when and how to incorporate the powerful tool of grazing meadows into a system that will allow more animal units to be run on a ranch.

Utilizing the Unwanted.

The beef industry has capitalized on adding value to underutilized feedstuffs. The beef cow has added value to over 50% of the land mass of the US which cannot be farmed. The advent of the ethanol industry resulted in distillers grains, which was initially considered a by-product feed, but because of research and utilization by the beef industry, it is now referred to as a co-product where the unit price often supersedes the price of corn.

As corn acreage increases, the opportunities to incorporate residues into a component of the commercial beef cattle sector are imperative for both the grain farmer and the cattle producer. In 2013, UNL Extension faculty hosted a conference on the “Sustainable Use of Crop Residues on Cow/Calf and Yearling Operations.”

Key points presented regarding corn stalk residue grazing:

- Dr. Klopfenstein - Crop residues are a great opportunity for Nebraska agriculture
- 6 million acres of irrigated corn produce over 30 million tons of residue
- Estimated all Nebraska beef could utilize up to 4.68 million tons
- Conservative estimate of maximum use would be 15.5% of acres

- Dr. Wortmann - 40 bu. yield produces 1 ton of residue per acre
- Keep 2 ton of residue on field per acre
- Yield improves with 60% of residue removal on irrigated no-till acres

If 50% of the residual from irrigated corn ground was removed to leave two tons per acre, the industry would still have the capacity to triple its use of this commodity. The true value comes in the reduction of cost in running a cow per year. While setting grass aside for winter grazing or haying meadows to feed hay is still done by many and will continue to be a resource, one needs to calculate the use of this underutilized commodity. With the increase in trucking costs, transportation will play a large role in this calculation. To aid producers in making this decision, the “Cornstalk Grazing Calculator” was developed (Stockton and Wilson).

Calving Season.

While labor will become a greater issue as we move forward, and as ranchers make every effort to run more cows with less labor, one needs to look at when calving is taking place. Burke Teichert, renowned ranch management expert, recommends calving season should match up with Mother Nature because fewer feed and labor resources are needed. The National Animal Health Monitoring System surveyed beef cattle operations in 2007-2008 and reported 78.1% of all operations calve before May 1 with 49.3% calving before April 1. Of all calves born alive, 3.6% died before weaning with 2.7% dying in the first 24 hours. The January 2014 beef cow inventory was 29,042,400. If 91.5% of the cow herd calves (NAHMS, 2009) and 2.7% of the calves born alive die in the first 24 hours, this would equate to approximately 717,500 calves. How many of these calves could be saved by calving in a better time of year?

Enterprise Diversity.

How can one diversify when all you have is grass and cows? A short look around will find many ranchers that have embarked on expanding their ranch take on enterprises that involve different segments of the industry. Expanding on the current need for females in the industry by growing and developing bred heifers, rebreeding open cows, running yearlings and putting in embryos are just a few of the opportunities that exist to expand the enterprise. Others are focusing on utilizing unwanted forages through drylotting and/or extensive grazing. Some are even challenging the current mindset and going back to our forefathers by incorporating sheep into a grazing rotation. These ranchers are adding one ewe to every cow without changing the number of cows on their ranches. This increases the output of the ranch by 20%. The amount of red meat produced per acre can increase as much as 30% while improving the plant diversity.

Why pull bulls?

While cull cow prices have “cleaned” the country of problem cows, it has also put a strain on beef cow numbers. What is the value of a cull cow in the fall vs a late bred cow come mid-winter or spring? Bred cow prices have increased by over 50% since 2012. Fall calving cows were selling for \$2,750 to \$3,100 at Ogallala in August. Selling an open cow now would be when she has the lowest possible value. Seasonally cull cow prices rise by 10 to 15% from the seasonal low (Oct/Nov) to February/March. It will be hard to predict this increase given the historic high prices for cows, but with lower slaughter numbers and continued demand for ground beef, we may see cull cow prices over \$140. Breeding open cows gives the owner the option to sell them as culls or breds if market conditions continue to improve.

Summary

Burke Teichert spent 18 years as the general manager of the Rex Ranch. He stated, “It was the Nebraska years that solidified my understanding of management and knowing how to ranch profitably. My coworkers at the Rex Ranch and a group of very good ranchers in the Sandhills became mentors and a sounding board for providing new and good ideas.”

It is these ideas generated here in the heart of cattle country that will make us all more profitable. While some think these ideas are crazy or too far out of the box, others will embrace these ideas and find options that will make their operations more profitable. Profitability is a goal for all of us but increasing cow numbers and bringing young people into the industry should be something we take very seriously given our continued shrinking of the industry.

While technology has proven to be a useful tool within the industry, it will be our innovation in developing production schemes that focus on profit that will keep the industry moving forward.

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