



Research Update

► Summaries of current beef cattle research

Alternate-day DDGS feeding model reduces winter feed cost

Recent research has shown that beef producers can reduce feed costs and maintain body condition of pregnant beef cows by feeding a diet alternating dried distillers' grains with solubles (DDGS) and forage.

The feeding model was developed by researchers at North Dakota State University (NDSU), according to Trent Gilbery, facility manager and animal care specialist at the NDSU Beef Cattle Research Center.

The recent feeding trial involved non-lactating, pregnant beef cows in their last trimester of pregnancy. They received one of four dietary treatments:

► Hay only Monday through Sunday.

► Hay and DDGS at 0.4% of body weight Monday through Sunday.

► Hay daily and DDGS at 0.93% of body weight Monday, Wednesday and Friday.

► Hay only on Tuesday, Thursday, Saturday and Sunday, and DDGS at 0.93% of body weight only on Monday, Wednesday and Friday.

There were several benefits with the alternate-day DDGS/forage feeding program. First, the method used fewer inputs and required less labor to deliver feed to the cattle. Also, the alternating diet decreased forage intake by about 20% compared to other treatments, giving producers a lower-cost ration.

The DDGS works well with low-quality hay, which is in greater numbers because of this year's drought. The DDGS provides protein and energy, makes the hay more efficient, and helps microbes break down and utilize the fiber from hay to provide more nutrition.

"The DDGS has been shown to be beneficial, even if only fed on alternate days," Gilbery said. "It makes the rumen more efficient in using forage."

Most importantly, the diet of DDGS on alternate days decreased forage eaten by the cows, but did not negatively affect the cow's body condition or the viability of her calf, Gilbery said.

With our limited forage availability this season and lower-quality forages being utilized for winter cow rations, the alternate-day feeding of DDGS has merit. Many producers are utilizing baled crop residues like corn and soybean stover. These feedstuffs

are generally lower in protein than cow requirements so DDGS supplementation may be advised to increase protein in the diet. The additional benefit comes from better utilization of the forage due to increased microbial activity in the rumen.

Adding DDGS to your winter cow diets does require additional management and adequate bunk space of 24 inches per cow during DDGS supplementation. This will ensure all cows have equal opportunity to consume the DDGS.

— Adapted from a release by Kevin Gould for Michigan State University Extension.

Economic analysis favors use of reproductive technologies

A new study shows the economic benefit

of utilizing estrous synchronization (ES) and timed artificial insemination (TAI) can be up to \$49.14* per cow. The study is the first of its kind to quantify the financial outcomes of using these technologies to increase the efficiency of cow-calf operations.

In this study, almost 1,200 suckled beef cows from eight locations were assigned randomly to one of two treatment groups: cows inseminated artificially after synchronization of ovulation followed in 66 hours with TAI vs. cows exposed to natural service without estrous synchronization.

For each herd, cows receiving the treatments were maintained together in similar pastures and exposed to bulls 12 hours after the last cow in the TAI treatment was inseminated. A partial budget analysis

NIH study uncovers details of early stages in muscle formation and regeneration

Researchers at the National Institutes of Health (NIH) have identified proteins that allow muscle cells in mice to form from the fusion of the early-stage cells that give rise to the muscle cells.

The findings have implications for understanding how to repair and rehabilitate muscle tissue and to understanding other processes involving cell fusion, such as when a sperm fertilizes an egg, when viruses infect cells, or when specialized cells called osteoclasts dissolve and assimilate bone tissue in order to repair and maintain bones. The findings were published online in the *Journal of Cell Biology*.

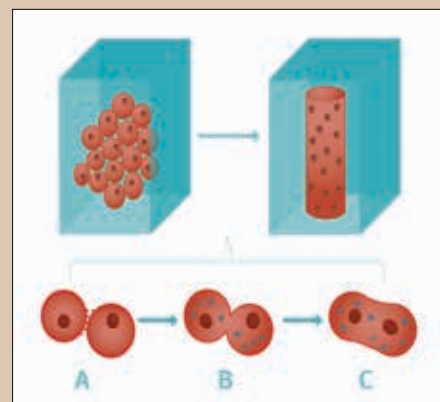
"Through a process that starts with these progenitor cells, the body forms tissue that accounts for about one-third of its total weight," said the study's senior author, Leonid Chernomordik of the Section on Membrane Biology at the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD), the NIH institute where the research was conducted. "Our study provides the first look at the very early stages of this fusion process."

Chernomordik conducted the study along with other researchers at NICHD and at Tel Aviv University in Israel.

Muscle cells originate from precursor cells known as myoblasts. Myoblasts fuse to form a single long tubular cell called a myocyte (a muscle fiber). Muscle tissue is composed of large collections of

these fibers. The fusion of myoblasts into muscle fibers takes place early in fetal development. With exercise and throughout a person's life, the process is repeated to form new muscle mass and repair old or damaged muscle.

It takes many hours for cells to prepare for fusion, but the fusion process itself is very rapid. To study myoblast fusion, the researchers first blocked the start of the



► To form muscle fibers, masses of cells merge to form long tubes with many cell nuclei (above). Recent research reveals two distinct stages in this process. First, proteins on the outside of the cells (shown as spikes in A) promote the fusion of the cell membranes. The blue squares in B and C represent proteins inside the cells that facilitate the development of a pore between them, so their contents can merge. This process of cell fusion is a basic part of the biology of muscle cell fusion and of several other types of cells, as well.

was used to determine the economic outcomes of estrous synchronization and TAI on the production of weaned calves.** Results demonstrated:

- ▶ The percentage of cows that weaned a calf was greater for TAI — 84% compared with the control cows at 78%.
- ▶ Weaning weights per cow exposed to treatments were greater for the cows in the TAI group.
- ▶ A greater percentage of cows exposed to TAI calved during the first 21 days than cows in the control group.

When all factors were evaluated, the study found a \$49.14 economic advantage per cow exposed to estrous synchronization and TAI compared with the control.* Location greatly influenced weaned calf weights, which may have been a result of differing management, nutrition, genetic selection, production goals and environment.

Having both the economic and production data for estrous synchronization and TAI technologies can help cow-calf

fusion process with a chemical. Ordinarily, the mouse myoblasts the researchers worked with fuse at varied intervals. By blocking fusion, and then lifting the block, the researchers were able to synchronize fusion in a large number of cells, making the process easier to study.

The researchers identified the two distinct stages of cell fusion and the essential proteins that facilitate these stages.

In the first stage, two myoblasts meet, and proteins on cell surface membranes cause the membranes to meld. In the second stage, a pore opens between the cells and their contents merge. This second step is guided by proteins inside the cells.

The work identifies two cell surface proteins that act at the start of myoblast fusion. These proteins belong to a large family of proteins called annexins. Annexins are also known to play a role in membrane repair and in inflammation.

The researchers identified the protein dynamin, found inside the cell, as essential to the second stage of the cell fusion process.

“Dynamin also has an unexplained link to certain rare and poorly understood myopathies — disorders characterized by underdeveloped muscles,” said Chernomordik. “We hope that further examination of the role of dynamin in cell fusion will lead to a greater understanding of these conditions.”

producers better evaluate these types of technologies for a reproductive management program unique to their operation. This information can help producers choose the right technologies for their operation, given the increasing number of options they have available for the synchronization of estrus.

The choice to use estrous synchronization and TAI affects many parts of the production system, and producers can use this study to help evaluate the success of reproductive management programs. Since management plays a significant role in both the economics and production outcomes of these technologies, it's important that producers have the right information and understand how their decisions can impact profitability.

Research for this study, “An Economic Evaluation of Estrous Synchronization and Timed Artificial Insemination in Suckled Beef Cows,” was completed as part of John Rodgers’ master’s degree from the University of Minnesota in 2008 under Cliff Lamb. It is currently providing a platform for a larger study, the Multi-state Reproductive Project, a collaborative research effort that involves 15 cow-calf producers across the United States; the academic institutions of South Dakota State University, University of Wyoming and the University of Minnesota; and industry representatives from Pfizer Animal Health. This program began in 2009 and will conclude in 2013. It is the first of its kind — in relation to size, and for its multiple locations, disciplines and collaborators — that will provide a large database of information for future research.

**Economic outcomes were measured using increased returns and decreased costs compared to decreased returns and increase costs attributed to the intervention of estrous synchronization/TAI in a commercial cow-calf production system.*

***Partial budget analysis calculations were based on two production outcomes: 1) weaning weight of calves from cows exposed to treatment as average weight weaned per cow treated and 2) average weaning weight of calves weaned.*

— Adapted from a release by John Rodgers, Cattle and Equine Technical Services, for Pfizer Animal Health.

Rewarming methods for cold-stressed newborn calves

Canadian animal scientists compared methods of reviving hypothermic or cold-stressed baby calves. Heat production and rectal temperature were measured in 19 newborn calves during hypothermia (cold stress) and recovery when four different means of assistance were provided.

Hypothermia of 86° F rectal temperature



was induced by immersion in cold water. Calves were rewarmed in a 68° to 77° air environment where thermal assistance was provided by added thermal insulation or by supplemental heat from infrared lamps.

Other calves were rewarmed by immersion in warm water (100°), with or without a 40cc drench of 20% ethanol in water.

Normal rectal temperatures before cold stress were 103°. The time required to regain normal body temperature from a rectal temperature of 86° was longer for calves with added insulation and those exposed to heat lamps than for the calves in the warm water and warm water plus ethanol treatments (90 and 92 minutes vs. 59 and 63 minutes, respectively).

During recovery, the calves rewarmed with the added insulation and heat lamps had to use up more body heat metabolically than the calves rewarmed in warm water. Total heat production during recovery was nearly twice as great for the calves with added insulation, exposed to the heat lamps than for calves in warm water and in warm water plus an oral drench of ethanol, respectively. This body heat production leaves the calves with less energy to maintain body temperature when returned to the cold environment.

By immersion of hypothermic calves in warm (100°) water, normal body temperature was regained most rapidly and with minimal metabolic effort; no advantage was evident from oral administration of ethanol.

When immersing these baby calves, do not forget to support the head above the water to avoid drowning the calf that you are trying to save. Also, make certain that they have been thoroughly dried before returning them to the cold weather and to the mother. With today's calf prices and high feed cost inputs, it is imperative to save as many calves as possible.

— Summary by Glenn Selk, Oklahoma State University, Cow-Calf Corner newsletter, Source: Robinson and Young, Univ. of Alberta. J. Anim. Sci., 1988.

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Missouri is steadily moving from a rural to an urban state

Missouri's northern rural counties continue to lose population while cities and a few small towns are steadily growing, research by a sociologist at the University of Missouri (MU) shows. Rex Campbell, professor emeritus of rural sociology at the MU College of Agriculture, Food and Natural Resources (CAFNR) since 1960, has been using census data to chart the state's population changes. His red-and-gray map details the long-term shifts in Missouri population (see below).

Almost all of the counties north of the Missouri River have lost population since 1900, Campbell's map shows. The steepest declines have been in Mercer, Sullivan and Chariton counties.

The continuing transition in agriculture to more mechanization and larger farms in the upper one-third and other rural parts of Missouri is behind much of the continuing population losses in these areas, Campbell said. Accentuating this trend are remaining elderly populations there who are beyond the age of having kids.

Some small Missouri towns in these areas have also been adversely affected by the arrival of big box stores such as Wal-Mart Super Centers, Lowes and Home Depot. "You can say that small businesses have been largely forced out of business by these big stores, leaving a shrinking and old population," Campbell said.

Population decreases are also being hastened by a lack of doctors and hospitals. "It's a desert in some areas as far as health care is concerned," he said.

Counties that have gained population



include Clay, Boone, Audrain and St. Charles counties. Platte, Calloway, Warren and Lincoln counties have grown since 1970, reversing their previous downward trends. Most of these counties have major population centers in or near them.

Not surprisingly, Missouri's larger cities — and the counties near them — have seen the greatest increases since 1960, Campbell said. The exception is St. Louis City, which has dropped in population in the last few years. The boundaries of St. Louis City were fixed in the late 19th century and annexation has not been possible as it has in all of the major cities of the state, Campbell said. St. Louis County to its west has boomed since 1900, but its population increase has flattened in the last few years. Cities such as Kansas City, Columbia and Springfield have had major annexations in the last 50 years.

Campbell said the gain in population in the suburbs and exurbia is due to improved transportation.

"The interstate highways plus improved autos and relatively cheap fuel has encouraged increased commuting for increasing distances," he said. "It is easy to trace the impacts of highways 70, 44, 29, 55, etc. These highways also provide a limited amount of local employment. Urban sprawl now reaches out 50 to 100 miles from the major cities along the major highways."

People are willing to commute longer distances to escape urban crime and maintain a rural lifestyle, too. Many areas see a noticeable increase in population because of their good schools, Campbell said.

Cities are also increasingly where the jobs are. Since cities are where most high-tech jobs are, they tend to grow more as the population becomes better educated, Campbell said. People prefer to live in or around cities to take advantage of better entertainment and health care opportunities.

While the bootheel area of Missouri is generally experiencing population rises, other southern counties like Texas, Wayne, Bollinger, Douglas and Ozark are seeing population drops.

Campbell notes strong population increases in the Branson, Springfield and Lake of the Ozarks areas.

"There has been steady growth in the recreation-retirement industry around the major lakes," he said. "There has also been a steady growth in second and retirement homes, especially around the Lake of the Ozarks. Throughout the Ozarks there has been in-migration of people wanting an affordable, high-amenities residence. This started 20 years ago."

— by Randy Mertens, University of Missouri CAFNR News

