



Research Update

► Summaries of current beef cattle research; compiled by *Shauna Rose Hermel*, editor

Research suggests a useful predictor of embryonic or fetal mortality

Animal scientists recently determined that bovine pregnancy-associated glycoprotein (bPAG) may be a potentially useful predictor of embryonic or fetal mortality. The research was conducted at the University of Missouri-Columbia and the USDA-Agricultural Research Service (ARS) Fort Keogh Livestock and Range Research Laboratory, Miles City, Mont. The procedures and results of the study were published in the September issue of the *Journal of Animal Science*.

In the past, bPAG has been used to monitor embryonic or fetal viability as well as placental function in cattle. This recently published study determined a relationship between circulating concentrations of bPAG and embryo and fetal survival in beef cows.

The study includes data on 1,164 single ovulations in suckled beef cows that were synchronized with the CO-Synch protocol. Of the data collected, 810 cows were artificially inseminated (AIed) while live embryos were transferred into the remaining 354 cows. Throughout gestation, ultrasonography and blood samples were used to examine ovaries and determine pregnancy. Serum concentrations of bPAG were 98% accurate in diagnosing pregnancy on Day 28 (pregnancy was confirmed on Day 28 using ultrasound).

A number of confirmed pregnancies failed. Concentrations of serum bPAG were significantly less on Day 28 in cows for which pregnancy failed than in cows that remained pregnant. In addition to correlations with maintenance of pregnancy, the researchers determined the half-life for bPAG after embryonic mortality was 35.8 ± 21.9 hours.

This study is titled "Circulating bovine pregnancy associated glycoproteins are associated with late embryonic/fetal survival but not ovulatory follicle size in suckled beef cows." It can be read in full at <http://journalofanimalscience.org>.

Source: *Chelsey Johnson, American Society of Animal Science (ASAS) interpretive summary.*

Passive immune status within 24 hours of birth and long-term health and performance of calves

You have heard the warning: "What happens in Vegas, stays in Vegas!" Perhaps

you have not heard: "What happens in the first 24 hours, impacts the rest of a calf's life!"

Veterinary scientists with the USDA experiment station at Clay Center, Neb., monitored health events and growth performance in a population of range beef calves in order to identify associations of production factors with the passive immune status of baby calves.

Blood samples were collected at 24 hours after calving from 263 crossbred calves to determine the amount of passive maternal immunity that had been obtained from colostrum, the first milk produced by a cow upon giving birth. The baby calves were classified as having "inadequate" or "adequate" passive immune status based on that blood sample at 24 hours of age.

Growth performance and health events in the study population were monitored from birth to weaning, and after weaning throughout the feedlot phase.

The lowest levels of passive immunity were observed among calves that were sick or died prior to weaning. Calves with "inadequate" passive immunity had a 5.4 times greater risk of death prior to weaning, 6.4 times greater risk of being sick during the first 28 days of life, and 3.2 times greater risk of being sick any time prior to weaning when compared to calves with "adequate" passive transfer.

Based on 24-hour proteins (most of which are antibodies or immunoglobulins) in the blood, the risk of being sick in the feedlot was also three times greater for "inadequate" compared to "adequate" calves. Passive immune status was also indirectly associated with growth rates through its effects on calf health. Sickness during the first 28 days of life was associated with a 35-pound (lb.) lower expected weaning weight. Respiratory disease in the feedlot resulted in a 0.09-lb. lower expected average daily gain (ADG).

Thus, passive immunity obtained from colostrum was an important factor determining the health of calves both pre- and postweaning, and indirectly influenced calf growth rate during the same periods. Therefore, cow-calf producers can help themselves and the future owners of their calves by properly growing replacement heifers, providing a good health program for cows and heifers, and providing natural or commercial colostrum replacers to calves

that do not receive it in adequate quantities on their own.

Remember, most of the transfer of antibodies from colostrum to the calf happens in the first 6 hours. The first day sets the stage for the rest of its life. (Source: Wittum and Perino. 1995. *Amer. Jour. Of Vet. Research*. 56:1149.)

Source: *Glenn Selk, Oklahoma State University Cow-Calf Corner Newsletter*

Researchers evaluate maternal antibody levels in calves

Vaccines have been used to prevent diseases in animals by causing a protective response from the immune system. For a study published in the September 2013 *Journal of Animal Science*, researchers studied how maternal antibody levels affect vaccination responses in Angus calves.

Maternal antibody levels help prevent diseases in calves until their immune system develops. The researchers said the maternal antibody levels have been known to affect the antibody response to vaccinations.

The researchers evaluated the maternal antibody levels of 1,004 Angus calves. Before being enrolled in the study, the calves were tested for persistent infection with bovine viral diarrhea virus (PI-BVDV). The calves were given two shots of modified-live virus (MLV) vaccines. The researchers collected serum samples to evaluate the antibody levels.

The researchers found that age of dam affects the passively acquired maternal antibody levels in the serum of calves. The researchers discovered that the maternal antibody levels increased with the age of the dam until 6 years of age and then leveled off. The maternal antibody levels were passed to calves through colostrum.

"This finding is important because, while passive antibodies protect calves from disease until their own immune systems are ready to take over, the presence of passive antibodies may prevent calves from responding to vaccination," Julia Ridpath, USDA-ARS microbiologist, said.

Ridpath said this study can give producers a model for finding the balance between having enough maternal antibodies to prevent disease and allowing the immune system to respond to vaccinations.

Richard Tait Jr., USDA-ARS research

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geneticist, said the industry could coordinate vaccination protocols for first-calf heifers differently from older cows based on these results.

The article is titled “An evaluation of circulating bovine viral diarrhoea virus type 2 maternal antibody level and response to vaccination in Angus calves.” It can be read in full at <http://journalofanimalscience.org>.

Source: *Laci Jones, ASAS interpretive summary.*

Remote sensors help establish relationship between short-term temperament tests and long-term traits

A study conducted at the Scotland Rural College (SRUC) Easter Howgate beef unit has examined the relationship between behavior observed in a short-term temperament test and the cattle’s long-term behavior in the home pen using remote sensors. Results of this study, originally published in the *Journal of Animal Science*, are the first to demonstrate that short-term temperaments are related to long-term temperament data.

Animal behavior characteristics are often quantified through temperament assessments — short-term tests of behavior in response to a standardized stimulus. It has been widely regarded that these tests inform the underlying components driving behavioral variations; however, it is not known how these traits relate to how cattle behave in their home pen.

It was hypothesized that if the “temperament tests measured an underlying general trait, correlations would exist between the short-term and home-pen activity; yet, if the temperament tests measured a context-specific trait, there would be no relationship with home-pen behavior” (MacKay et al.). This study uses new development of remote sensors to test the authors’ hypothesis, characterize certain elements of cattle unobtrusively, and estimate how cattle budget their activity without human intervention.

This study was performed at the SRUC Easter Howgate beef unit for 57 days in Fall 2010. Seventy-four steers were divided into four groups and balanced for weight and breed. Each group was placed in identical pens bedded with straw. Activity of the steers was recorded via remote sensors for two periods of 14 days. Each steer was scored on four measurements of temperament, adapted in order to measure feeding aggression, feeding dominance, handling temperament, and motivation to leave the handling area. Each test was repeated four times.

Results of this study “are the first to demonstrate that short-term temperaments

are, in fact, related to long-term temperament behavior data in beef steers” (MacKay et al.). The results have contributed to the long-time general belief that temperament assessments are indicators of underlying traits. This study, along with its results, could have implications on the use of temperament tests as a proxy for general behavior and should be taken into consideration for future research.

The study is titled “Short-term temperament tests in beef cattle relate to long-term measures of behavior recorded in the home pen.” It can be found at <http://journalofanimalscience.org>.

Source: *Anne Zinn, ASAS interpretive summary.*

Immunological castration improves animal welfare and reduces stress

Castration methods have become a hot topic in animal welfare internationally. As researchers and producers look for alternatives to physical castration, immunological castration is a solution that keeps popping up.

Numerous research trials have found immunological castration to have a wide range of potential benefits, including reduced stress. A recent study published in the *Journal of Animal Science* suggests immunologically castrated pigs are less susceptible to stress than physically castrated pigs. An indicator of this is the immunologically castrated pigs were much less vocal when workers entered their pens than pigs that were physically castrated. Kimberly Guay, a coauthor of the study, said high levels of vocalization in hogs are a generally accepted indicator of elevated stress.

Other behavioral differences around humans included immunologically castrated pigs showing a more inquisitive interest in their handlers.

“They spent more time interacting with the humans — licking their boots, less shying away, and approaching handlers more quickly,” said Guay. “They were certainly less shy.”

The amount of time spent on pig-human contact did not differ between immunologically castrated pigs and physically castrated pigs, but the behavior of immunologically castrated pigs was more intense.

“That could indicate that they were less stressed about being handled,” said Guay.

During transport to market, no immunologically castrated pigs were found “dead or down.” Among the physically castrated pigs, the dead-and-down rate was about 1%. Other studies have reported similar dead-and-down rates, but a large-scale field study with proper replication is

needed to determine whether immunological castration reduces mortality and injury rates during commercial transport.

The research article is titled “Behavior and handling of physically and immunologically castrated market pigs on farm and going to market.” It can be read in full at <http://journalofanimalscience.org>.

To learn more about immunological castration, read “The benefits of immunological castration” at <http://takingstock.asas.org/?p=9782>.

Source: *Samantha Walker, ASAS interpretive summary.*

Novel method makes FMD vaccine production safer

Foot-and-mouth disease (FMD) vaccines can be produced safely using a new patent-pending technology developed by USDA scientists.

A highly contagious disease, FMD affects cloven-hoofed animals such as cattle, swine, sheep and goats. The United States has not had an outbreak of FMD since 1929, but the disease is still prevalent in other countries, can be debilitating in adult animals, and can cause death in young animals.

Microbiologist Elizabeth Rieder with the ARS Foreign Animal Disease Research Unit, located at the Plum Island Animal Disease Center at Orient Point, N.Y., designed a technique to make FMD vaccine without the need for virulent virus. She and her colleagues identified a virus DNA sequence that, if removed, makes the FMD virus harmless to animals, but still allows it to grow in cell culture.

The researchers used this DNA sequence to alter the FMD virus, which allowed them to learn more about how the virus functions. They studied how the virus amplifies itself, interacts with host animals, and inhibits the animal’s defense mechanisms.

The technology was used in studies to produce a novel marker FMD vaccine that does not require virulent virus. Instead, it uses an attenuated, or weakened, FMD virus that does not cause disease. It is safer than traditional vaccine production methods (chemical inactivation) that use naturally occurring FMD virus strains.

Rieder also labeled the virus used in the new vaccine so that it can be distinguished from other naturally occurring viruses found in outbreaks.

A private company is in the process of developing the ARS technology for vaccine production.

Read more about this research in the October 2013 issue of *Agricultural Research* magazine.

Source: *Sandra Avant, ARS.*

