

The Digestive Tract

What's new in cow-calf nutrition research?

by Dan Shike, University of Illinois



I had the opportunity to speak in a cow-calf nutrition symposium titled “Current

and future perspectives on nutritional management in the beef cow-calf sector” at the American Society of Animal Science national meeting in July. Topics ranged from basic research aimed at understanding underlying biology to applied research evaluating different management strategies. Andrew Foote from Oklahoma State University (OSU) and Allison

Meyer from the University of Missouri (MU) co-chaired the symposium.

Scientific meetings provide a great chance to see what others are working on and to brainstorm new ideas or future work that needs to be done. Some of my favorite talks elicit more questions than provide answers. Hopefully, my recap will provide you a blend of both.

Maintenance energy

Harvey Freetly of USDA's Meat Animal Research Center (USMARC) presented “The Stochastic Cow: The variable coefficient for calculating

maintenance energy.” Freetly presented findings of his recently published work on the heritability of maintenance energy requirements.

Feed is one of the greatest costs of beef production. With approximately 70% of the feed utilized in the beef industry being attributed to the cow herd and 70% of the feed used by the cow herd going to maintenance, approximately 50% of the feed used in the beef industry is used to maintain the cow herd.

Freetly's data set included 887 5-year-old cows from a pedigreed population that represents the most prominent

breeds in the United States. The cows were individually fed for 85 days. The researchers determined metabolizable energy used for maintenance was variable, but it was also moderately heritable (0.31).

This is good news, because it suggests there is an opportunity to select for decreased cow maintenance energy requirements. The challenge will now be to collect more data on individual animal maintenance energy requirements. This is no small task, but look for more work on identifying low-maintenance cows to come in the future.

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Historically, the industry has worked under the assumption that cow size and milk production could be used to predict requirements. But this assumption ignores the fact cows at the same level of production could vary in their maintenance energy requirement.

Forage efficiency

OSU's David Lalman presented "Identifying forage-efficient cows." Lalman discussed several studies they have conducted related to cow efficiency. The majority of feed intake and feed efficiency evaluations have been done on mixed rations (often grain-based). However, the cow herd relies on forage.

They conducted feed intake evaluation of replacement heifers on unprocessed hay and mixed concentrate/forage diets to determine the relationship. Their results indicate intake and efficiency are correlated between the different diet types.

Lalman also reported on their work utilizing an open-circuit, gas-quantification system (GreenFeed, C-Lock Inc.). They documented a moderate correlation between methane and dry-matter intake.

He presented promising work utilizing heat production (calculated from emissions data from GreenFeed) and cattle performance to predict grazing intake. As I have discussed, to identify forage-efficient cows, we need to be able to determine grazing intake. This technology could allow more accurate predictions of grazing intake.

Cow and calf

Meyer presented "Nutrient use in the beef cow and calf: opportunities and challenges." She has conducted several studies evaluating the effects of

gestational nutrition on the cow and the developing fetus. She shared that despite a great deal of work in the last decade studying gestational nutrition, we still have a poor understanding of nutrient partitioning in the cow. She challenged us to question current assumptions on the hierarchy of nutrient use and partitioning.

She shared data and insight that would suggest maybe not all cows partition nutrients the same. This could explain the range in results observed when cows are nutrient-restricted during gestation.

Meyer pointed out current lactation curves and models for predicting milk production in beef cows may not be accurate. She challenged researchers in the room to collect more milk production data and at multiple time points, not just at peak lactation.

I believe we also need to collect milk production data under different nutritional management systems, as well. It is very likely cows in a grazing system that experience a decline in nutrition as they get further into lactation will have a different lactation curve than cows maintained on a constant plane of nutrition throughout lactation.

Grazing arid regions

Eric Scholljegerdes, New Mexico State University, presented "Management strategies for beef cows and heifers grazing arid rangelands." Scholljegerdes discussed the challenges of grazing cows on rangeland in arid regions. He discussed the importance of having adapted cows well-suited to a particular environment.

A well-adapted beef cow can be quite resilient. Scholljegerdes plotted nutritional requirements of a cow throughout the

production cycle and overlaid crude protein (CP) and total digestible nutrients (TDN) provided by forage in that region. There were far more months when the cows' needs were not met. Amazingly, these cows, despite being in "poorer" body condition than what many cows in different regions of the United States are maintained in, still had very acceptable pregnancy rates.

Scholljegerdes also presented data showing the benefits of targeted protein, or rumen-protected arginine supplementation, on cow-calf production. Research focused on targeted supplementation of specific nutrients continues to show potential for improved cow performance and reproductive efficiency, but also in fetal development and subsequent calf performance.

Drylot considerations

I presented "Confinement and drylot housing for cow-calf production: Advantages, challenges and future research needs." We conducted a two-year study comparing cows housed in drylot vs. a traditional pasture-based system.

One of the obvious advantages of a drylot system is cows are fed a total mixed ration (TMR); thus, it is much easier to consistently meet their nutritional needs. Not surprisingly, our drylot cows maintained body weight and body condition better than the pasture cows. Cow performance in pasture-based systems is highly sensitive to weather and forage availability and quality.

The drylot cows also had greater milk production than the pasture cows, which we attributed to the fact they were being fed at maintenance, and the pasture cows were in a negative energy balance and losing weight.

The drylot calves had access to the same TMR their dams were consuming. Consequently, the drylot calves were heavier at weaning.

In the upper Midwest, several cow-calf producers have adopted drylot or confinement systems, not just for winter, but also some extended feeding periods (year-round in some cases).

We have been getting questions from producers using these systems about how to manage the calf. Should they have creep feed? How long? What type? Last year, we conducted a study evaluating the duration of creep-feeding in a drylot.

There has been plenty of creep-feed work conducted in the past, but that has been in traditional pasture-based systems. In confinement systems, there is no forage for the calf to consume.

We fed creep for either 105 days or 21 days. The calves fed creep for the longer duration weighed about 70 pounds (lb.) more at weaning. The calves fed creep for 21 days had greater average daily gain (ADG) in the feedlot and were able to fully compensate. Ultimately, the two groups had identical final carcass weights and no differences in any other carcass measurements.

To summarize

The goal is simple: sustainable beef cattle production. We (researchers, industry, seedstock and commercial producers) need to continue to work to identify superior genetics and best nutritional management practices for improving efficiency and producing high-quality beef. **ABB**

Editor's note: "The Digestive Tract" is a regular column in the *Angus Beef Bulletin* focused on nutrition for the beef cattle life cycle. Dan Shike is associate professor in animal sciences at the University of Illinois.