

A new concept in range cow supplement formulation

by Richard Waterman, Fort Keogh Research Animal Scientist

Why is this important?

Cattle grazing dormant rangelands often show yearly variation in response to supplementation and these variations perhaps are partially due to differences in glucose (blood sugar) availability and subsequent metabolism, which may be influenced by forage conditions (quality and quantity). Unlike humans, cows absorb minimal amounts of glucose from their diet and therefore must rely on their own bodies' ability to produce glucose. However, without proper precursors or precursors in appropriate amounts, glucose cannot be produced and production (return to estrus, weight gain etc.) can be compromised. Nutritional status of young cows with suckling calves varies by year depending upon the onset and duration of green vegetation. A study during two consecutive dry years, 2000 and 2001 (driest), evaluated range protein supplements differing in source and quantity of ingredients that could be used for glucose production in a cow.

What can be supplemented?

Supplements were fed to 87 Angus x Hereford two-year-old postpartum cows at 2 lbs per day and provided 0.7 lb crude protein (CP) per day. Three supplements, all 36% crude protein, were tested and they differed in ingredients that could be used to make glucose by cows. The first supplement treatment was a traditional good quality cottonseed meal based cube (36% CP) that has a low glucose potential (Logluc). The second contained cottonseed meal and bypass protein (feather meal), which would have a moderate glucose potential (Midgluc). The third supplement consisted of the Midgluc supplement with propionate salt (NutroCal™ Kemin Industries Inc) added to create a high glucose potential (Higluc). Supplements were individually fed two times per week at 11am on Mondays and Fridays for approximately 90 d following calving. Cows rotationally grazed three pastures during the study. Performance variables measured included cow and calf body weight change, milk production, days to first estrus, and pregnancy rate. In addition each supplement group of cows were subjected to a glucose tolerance test (a measurement of how fast cows can utilize a large dose of glucose) during the study. The effect of year and treatment (supplements) did not interact so the data was combined for both years. Some of the key results are listed in Table 1.

What does this mean?

Although fall pregnancy rates were similar for cows fed each supplement, the cows fed the Higluc supplement cycled 9 days earlier (half an estrous cycle sooner) compared to cows consuming the Logluc supplement. The

Meet Richard Waterman

As a new research animal scientist at the USDA-ARS Fort Keogh Livestock and Range Research Laboratory, Miles City, I would like to take this opportunity to introduce myself to the readers of *Beef: Questions and Answers*.



I originally come from Colorado and received my bachelors' degree at Colorado State University in 1998. While attending CSU, I was fortunate to have the opportunity to be involved in some undergraduate research with Dr. Tom Geary and Dr. Jack Whittier evaluating different synchronization protocols available to producers. After graduating from CSU I moved to Las Cruces, NM and began my graduate career working in range nutrition with Dr. Mark Petersen at New Mexico State University. In fact, I enjoyed my research so much that I received both my master's (2000) and doctorate (2003) degrees at NMSU working with Dr. Petersen.

The emphasis of my research evaluated the role of adding precursors into supplements that would support the synthesis of glucose. This effort was to improve puberty and conception rates for developing heifers and reduce the number of days to estrus for young postpartum beef cows following calving. I also had an opportunity to evaluate behavioral difference between cows familiar with conditions of the Chihuahuan Desert to cows that were recently introduced to the desert environment. This article is a brief summary of some intriguing results that were discovered from my graduate research.

Table 1. Young cows fed range supplements with higher glucose potential cycled sooner.

	Logluc	Midgluc	Higluc
Cow weight change (calving to breeding)	46.0 lb	22.5 lb	38.3 lb
Milk production	11.9 lb	14.3 lb	13.2 lb
Calf weaning weight	465 lb	480 lb	469 lb
Days to first estrus	119 d	114 d	110 d
Fall pregnancy	83%	92%	83%

continued on p. 7

Supplement formulation, continued

lowered glucose half-life (44 minutes lower) in the Higluc supplemented cows compared to the Logluc supplemented cows may partially demonstrate an improvement in glucose utilization for these cows. Cows that can clear glucose from their blood into tissues faster are an indicator that other nutrients may be utilized more efficiently. Identifying limiting nutrients and the timing (season) that nutrients become limiting may greatly enhance economical and production practices for the future.

~Direction of future research~

One of the major concerns for livestock producers across the country and especially here in the Northern Great Plains includes increasing concerns about what can be done to control noxious weeds that are invading rangelands. Noxious weeds are invading rangelands and decreasing the amount of vegetation available to sustain livestock enterprises. Therefore, a position was created at the USDA-ARS Fort Keogh Livestock and Range Research Laboratory to investigate the role and interactions involved between livestock and noxious weeds. The primary (initial) direction for this research will include a collaborative effort dedicated to discover and implement practices that assist producers in controlling noxious weeds. This effort will strive to ensure the sustainability of livestock enterprises. Research will evaluate many aspect of livestock production which include grazing behavior, grazing systems, diet selection and preference, nutritional ramifications and how grazing can be manipulated with different supplements or dietary additives. In addition, the ecological impact will be evaluated in combination with livestock grazing to identify key interactions between noxious weeds and livestock that occur. As this collaborative effort progresses we hope to provide valuable information to producers that will aid in recapturing or preventing further infestation of noxious weeds on our valuable rangelands.

Other research projects will evaluate how season of year can impact the ability of grazing livestock to utilize dietary nutrients. One primary emphasis for this research will be to discover and implement supplementation protocols that optimize reproduction by targeting seasons of the year when nutrients becoming limiting or are supplied in insufficient quantities. One nutrient that comes to mind is protein, especially when cattle are grazing mature dormant vegetation. To go a step further would be to investigate the building blocks of proteins (amino acids) and determine whether or not a single amino acid or group of amino acids are deficient in diets consumed by livestock grazing rangelands during a particular season and livestock production stage.

For questions or comments please contact me:

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Livestock Forum and Nutrition Conference Agenda

Tuesday, April 6, 2004

Animal Health and Feed Safety

12:00: Registration
 1:00 – 1:15: Welcome, David Dooley
 1:15 – 2:00: The Rules Have Changed, TBD
 2:00 – 2:45 : A Dynamic Industry, Rex Runyan (Invited)
 2:45 – 3:30: Montana Feed Industry Perspective, Don Seifert
 3:30 – 3:45: Break
 3:45 – 4:30: Bioterrorism and Agroterrorism Preparedness, Bruce Hoffman
 4:30 – 6:00: Panel Discussion: Animal Health and Feed Safety – Moderator: Clint Peck
 6:00: Social and Cash Bar
 6:30 – 8:00: Dinner
 Welcome, Jeff Jacobsen and Update on Animal Bioscience Project, Jim Peterson
 Undergraduate Scholarship Awards Presentation, Shari Lee Kroon
 Keynote Address – Traceability in the Beef Industry, TBD

Wednesday, April 7, 2004

ID, Biosecurity & Impact Continental Breakfast

7:00 – 8:30: Competitive Poster Session
 8:30: Welcome, Doug Steele
 8:35 – 9:15: Fast Track to High Tech Food Safety, Bill Mies
 9:15 – 10:00: Identification Options, Jack Whittier
 10:00 – 10:15: Break
 10:15 – 11:00: Biosecurity for Your Ranch, Mark Mattix
 11:00 – 11:30: BSE, International Trade, and Cattle Prices, Gary Brester
 11:30 – 11:50: The Future of Our Industry, John Paterson
 11:55: Outstanding Graduate Student Poster Award and Conclusion, Mike Tess
 Noon: Adjourn

Other Offerings

Professional Animal Scientist Beef Cattle Exam
 Tuesday, April 6, 2004, 9 a.m., \$25 fee

Beef Quality Assurance (BQA) Training
 Tuesday, April 6, 2004, 10:30 a.m., Free

MSU Collegiate Cattlewomen Annual Educational Forum,
 Wednesday, April 7, 2004, 1 p.m., Free

Registration

Registration is \$40 for both days of the conference, including two breaks, dinner and the proceedings on CD. One-day rates are also available.

For more information, contact Anita Gray at MSU: (406) 994-3414 or email anitag@montana.edu.