How to use the NIRS/NUTBAL System To Monitor Nutrition for Beef Cattle

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Effective Monitoring Tool for the Beef Producer

The NIRS/NUTBAL system is an effective nutritional monitoring tool designed for ranchers. This system generates valuable information that enables you to make informed, timely decisions regarding animal nutrition and grazing management. Better informed management decisions can positively affect the nutritional status and body condition of livestock to enhance productivity and profit.

The NIRS/NUTBAL system is a two part system that helps you manage animal performance and evaluate forage quality. This diagnostic tool is designed for livestock operations where most or all of the animals' diet is derived from rangeland, pasture, or hay.

Near infrared reflectance spectroscopy, NIRS, is used to analyze livestock fecal samples to determine the protein and energy value of the forage consumed. The GAN Lab predicts percent crude protein (CP) and digestible organic matter (DOM). (DOM is a measurement of energy~DOM * 1.05 approximates Total Digestible Nutrients value). These results reflect the quality of the grass or hay consumed approximately 36 hours prior to defecating. The diet quality of concentrated feeds (grain, liquid feed, etc.) is not evaluated in the NIRS analyses. The impact of such supplements on animal performance is evaluated by the second component of the nutritional monitoring system, the Nutritional Balance Analyzer or NUTBAL Pro.

The computer model NUTBAL Pro estimates animal performance by incorporating NIRS results with animal attributes (breedtype, etc.), environmental conditions, feed supplements and pasture conditions. NUTBAL used this information to calculate how much protein and energy your animals need and how much of these nutrients they are consuming.

NUTBAL generates a report that tells you:
- Positive or negative plane of nutrition
- Weight gain or loss
- The nutrient limiting performance (protein or energy)
- Your most cost effective supplement
- Amount of feed needed
- Amount of forage consumed

The software also helps you determine if you have enough forage.

Now let's take a look at how you can use the NIRS/NUTBAL system as a nutritional monitoring program for cows, stockers, and heifers. We will discuss possible objectives, goals, and benefits of utilizing this system for each animal group.

Trickle-Down Concept

Management Decisions

effect herd's

Nutritional Balance

to maintain appropriate

Body Condition

for optimal

Cow Productivity

to maximize

PROFIT

Monitoring Cow Herd Nutrition Year Round

Production objectives to consider:
- ♦ higher pregnancy rates
- ♦ shorter narrow breeding/calving window
- ♦ heavier weaning weights

All of which correspond to producing the maximum pounds of beef at the least cost.

Goals could include:
- ♦ maintaining positive plane of nutrition during calving, breeding, and lactation
- ♦ entering calving season at a BCS 5+

Protocol for the cow herd:
A year-round nutritional monitoring program using the NIRS/NUTBAL system involves collecting a fecal sample each month and sending it to the GAN Lab for analysis. You or lab staff run the NUTBAL software to produce an animal performance report. Within a week of collecting the sample, you can make management decisions based on forage quality information and animal performance predictions.

Over 70% of clients surveyed felt that they gained a better understanding of their forage quality and nutritional requirements of cattle. Clients also expressed feeling more confident in their management and feeding decisions since using this system.

The NIRS/NUTBAL system helps you to decide when to rotate pastures, when you should supplement protein or energy, the most cost effective supplement, and how much you need to feed to meet nutritional requirements.

Benefits:
A major benefit of a year-round nutritional monitoring program is minimizing profit robbers or thin cows. The table below is an excerpt from "Effects of Inadequate Nutrition in Beef Herds" by Drs. S. Wikse, D. Herd, and J. McGrann published in the Texas A&M Beef Cattle Short Course 2001 Proceedings. It depicts the effects of low body condition on herd productivity (Santa Gertrudis herd, South Texas).

	Body Condition Score			
	3	4	5	6
Pregnancy Rate	51%	76%	92%	100%
Ave. Weaning Wt.	442	463	504	512

Other benefits of a year-round monitoring program include:
- ♦ Improving body condition more economically by recognizing periods of low nutritional requirements.
- ♦ Managing weight loss during drought more efficiently.
- ♦ Maintaining desired body condition scores during critical periods to enhance productivity.

Winter Feeding

Production objectives:
The same overall production objectives of a year round program would apply for a winter feeding program: high pregnancy rates, narrow breeding/calving windows, and heavy weaning weights.

Goals:
During winter, nutrition-related goals may differ depending on when you calve. Fall cows would need to maintain a positive plane of nutrition during calving, breeding, and lactation which occur over the winter months. Spring calving operations may want to enter calving season at a BCS 5 or higher. Other goals may be to manage weight loss and save on feed cost (or feed cost effectively).

A successful winter nutritional monitoring program starts by
- ♦ evaluating herd's BCS
- ♦ identifying what feed supplements are available
- ♦ evaluating pastures in terms of forage availability

Determine how much weight or body condition cows can afford to lose or need to gain in order to meet your overall production objectives. Example: Cows start the winter at BCS 7. Your desired BCS on March 1 is no less than 6. You can afford to lose about 80lbs over the winter.

Protocol:
Monitor the herd through the winter by collecting a fecal sample each month and sending it to the lab for analysis. Run NUTBAL to produce a performance report. Start sampling 30 days before and after the winter season. For example, South Texas would sample from October to March.

With forage quality information and animal performance predictions, you can make management decisions regarding when to rotate the herd to new pasture, when you should start feeding, which feed is the most cost effective for you, and how much to feed…just to name a few.

Benefits:
A winter monitoring program allows you to recognize when you do not need to feed and thus save money.

On the other hand, the system helps you realize when spring grasses are not as they should be. You may need to continue supplementing in order to meet your production objectives.

Grazing Stockers and Preconditioning Calves

Objectives:
Stocker operations and calf preconditioning programs strive to maximize beef production utilizing grass. For most operators, it is very important to know if your average daily gain is enough to make it pay. While the NIRS/NUTBAL system cannot make your decisions for you, it can provide valuable information telling you what is happening NOW.

Goals:
Your nutrition-related goals could include 2lbs daily gain or an end weight of 750lbs by a certain date, for example.

Protocol:
A successful nutritional monitoring program for stockers or for preconditioning young animals starts by:
♦ determining what you want to accomplish
♦ identifying forage resources
♦ deciding how long you are going to keep the animals.
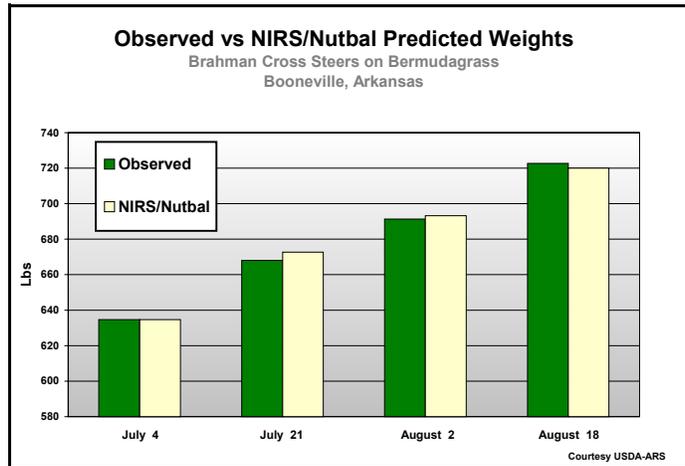Then, establish a timeline for collecting samples.

So far we have suggested sampling cows once a month in order to hit a fairly broad performance target. But in this case, your target or goals are very specific and usually have opportunity costs associated with poor gains.

Therefore when you are developing a timeline for collecting samples, consider:
♦ The higher the grazing pressure, the faster forage quality and quantity will change. (Affects the time lapse between sampling.)
♦ The more data points or sample results you have for a period, the better you can manage for specific goals. (Affects how often you sample from beginning to end.)
♦ Extreme weather changes impact forage quality and growth as well as animal productivity. (You may want to take an extra sample not in your original plan in order to capture the effects of this type of event.)

For example, you are preconditioning 500 steers for 50 days at a high stocking rate on improved pasture in a drought prone region. You calculate an average daily gain of 1.75lbs is needed to break even. Thus, taking a sample every 2 or 3 weeks may work better than monthly sampling.

Observed vs NIRS/Nutbal Predicted Weights
Brahman Cross Steers on Bermudagrass
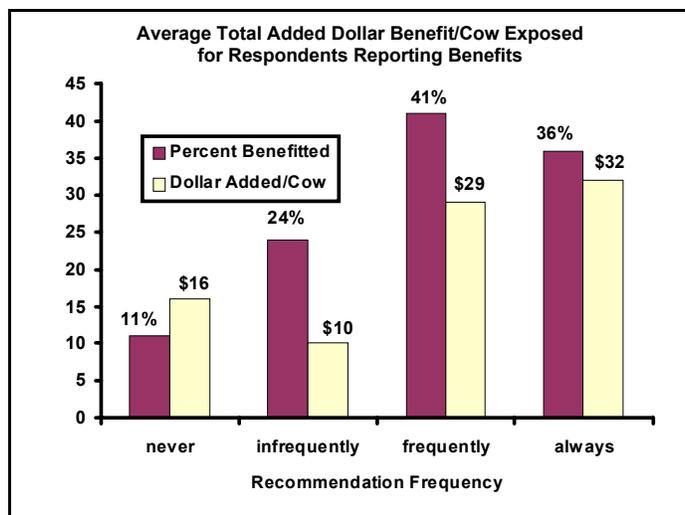Booneville, Arkansas

Courtesy USDA-ARS

Graph 1: Steer Trial. Brahman Cross steers grazed on bermuda. End weights predicted by NUTBAL deviated less than 1% from actual.

As with other animal classes discussed so far, use the forage quality results and animal performance report generated from the manure sample to help you make various management decisions between sampling.

Benefit:
The major benefit of monitoring the nutritional status of stockers is the ability to monitor or track weight gain. Weight gain decides your profit.

> **Two skills that enhance your monitoring program...**
> ♦ **Body Condition Scoring**
> ♦ **Estimating Forage Standing Crop**

Average Total Added Dollar Benefit/Cow Exposed for Respondents Reporting Benefits

Recommendation Frequency

Graph 2: Client Survey. Results indicate that producers collecting samples and receiving NUTBAL advisories monthly realize $36 additional revenue on average per exposed cow. This survey was conducted over a variety of management types and herd sizes nation wide.

Developing and Managing Replacement Heifers

Production objective:
Your main objective would be to develop weanling heifers into productive cows. The NIRS/NUTBAL program addresses the nutritional aspects of this challenge.

Goals and protocol:
Nutrition plays an important role in successfully managing females from weaning to second breeding season. Each phase of development has unique goals. Your goals may resemble those mentioned in a Texas Agricultural Extension publication by Drs. L.R. Sprott and T.R. Troxel, "Management of Replacement Heifers for a High Reproductive and Calving Rate." Let's take a look at some of these goals and how the NIRS/NUTBAL system would benefit the costly task of developing replacement heifers.

♦ First breeding season: Heifers need to be at least 65% of their mature body weight for adequate conception rates.

Appropriate weights at first breeding positively affects rebreeding and reduces calving difficulty. Start your monitoring program by calculating the average daily gain needed to reach the target weight. Monitor the weaning heifers to breeding by collecting a composite sample each month, sending it to the GAN Lab for NIRS analysis and running a NUTBAL animal performance report. The report will tell you how much the heifers are gaining. It will also help you decide whether or not to make changes, feed or less supplements, or to rotate pasture, etc.

Nutritional Monitoring Success

Setting your goals
Include not only what you want to happen but what you do not want to happen. For example, your goal may be a herd BCS of 6.5 by calving season, and you do not want to exceed your budget.

Applying new skills
Learning to body condition score cattle and estimate forage standing crop will greatly enhance your ability to monitor cattle and pasture. These two skills also help you effectively utilize this technology.

Training offered
We are planning another producer-oriented workshop at Texas A&M University this August. Similar to workshops we conduct for USDA-NRCS personnel, training includes running NUTBAL software, evaluating body condition score, and estimating forage.

♦ Calving time: Heifers should weigh at least 85% of expected mature weight and have a body condition score of at least 5 or 6 for good conception rates during the second breeding season.

As with mature cows, body condition also affects the milking ability of first-calf heifers. Again, calculate the average daily gain needed to reach these targets. Collecting samples once a month would be appropriate for this phase of development also.

Observed vs. NIRS/NUTBAL Predicted Weights of Breeding Heifers
South Dakota 1999
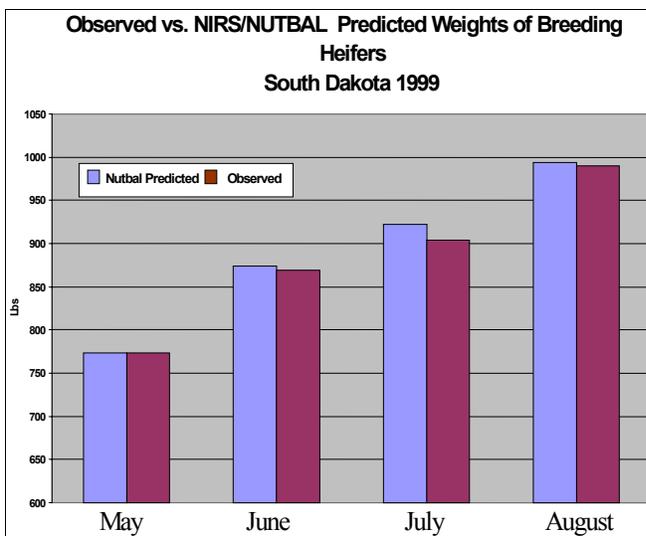
Graph 3: Heifer Validation. AngusX on improved pasture. End weights deviated at most 2% of actual weight.

♦ Second breeding season: First-calf heifers need to have a nutrient rich diet to meet their high nutritional requirements and to breed back.

Cattlemen have often noted that heifers calving for the first time tend to have lower pregnancy rates and breed back later in the breeding season following their first calf. A number of factors attribute to this problem. First-calf heifers perform all the functions of mature cows while they are still growing. Translation: high nutritional requirements. Incisor teeth are also shed at this time. Because of their smaller size, heifers have less capacity for feed. Result: limited ability to consume roughages. So, in order to avoid sacrificing reproduction, heifers with calves should have a more nutrient dense diet, i.e., high quality forage or supplementation.

Benefits:
The NIRS/NUTBAL system helps you to decide how to cost effectively allocate resources (feed and grass) and to make nutrition management decisions in a timely manner to maximize heifer productivity.