Understanding the TDN and Net Energy System

Johnny Rossi
Extension Animal Scientist

Cattle can derive energy from many sources (starch, fiber, sugars, fat, and proteins). The energy value of a feed depends on the amount of fat, protein, and carbohydrate it contains. Calories are used to express the energy values of feedstuffs. When a feed is burned it gives off heat. The amount of heat generated is measured in calories. The animal obtains energy for maintenance and growth of tissue by burning the energy (calories) that if digests and absorbs.

Energy values are expressed in two different systems. Total digestible nutrients (TDN system) or as net energy for maintenance or gain (net energy system). Energy values are divided into several categories. First is gross energy, which is the total calories in a feedstuff. Gross energy varies little among most feeds, except those high in fat. For example, bermudagrass hay and corn grain contain about the same amount of gross energy (calories). Because the composition of carbohydrate, fat, and protein are similar in both feeds, they generate about the same amount of heat when burned. The second energy value is digestible energy, which is gross energy minus the feces. Corn is higher in digestible energy than bermudagrass hay because it is more digestible and thus less energy is lost as feces. The third step in the system is metabolizable energy, which is digestible energy minus energy lost as urine and gas (methane). Urine loss is accounted for in the TDN system, but methane loss is not. Therefore, TDN is gross energy minus energy lost as feces and urine. The TDN system stops accounting for losses at this point. The last step in the energy chain is net energy. Net energy is the metabolizable energy minus the energy lost as heat generated during the digestion and metabolism of nutrients. Feeds have two net energy values. One is net energy for maintenance, which is the energy needed for maintenance functions (such as maintaining body temperature, physical activity, heart beat). The second is net energy for gain, which is energy used for productive purposes (deposition of protein and fat). Net energy for maintenance is always higher than net energy for gain because heat can be used for maintenance, but not for tissue gain.

The primary difference between the TDN and NE system is how many losses associated with digestion and metabolism are accounted for. The NE system accounts for all losses. Losses of gas and heat are not accounted for in the TDN system. The TDN system greatly overestimates the value of energy in roughages relative to concentrates because there is much more heat lost during the digestion and metabolism of roughage compared with concentrates. The lack adjustment for increased heat loss in roughages is the primary flaw in the TDN system, and is the reason that use of the TDN system to formulate beef and dairy cattle rations has largely stopped.

The TDN value of corn is about 1.75 times greater than average quality bermudagrass hay. However, the NE for maintenance value is about twice as great for corn than hay. Differences in the two systems are not as pronounced when diets are fed at maintenance levels such as wintering cows diets, because the differences between TDN and net energy for maintenance are not as large.

However, the differences are much greater when feeding growing animals. Corn grain has about four times as much NE for gain than bermudagrass hay. When balancing diets for growing animals, the

net energy system is much more accurate than the TDN system.

Balancing rations using the net energy system is more complicated than the TDN system. You must know the net energy for maintenance and for gain of the diet, the weight of the animal, and the pounds of feed you will feed the animal. This information is then plugged into formulas that determine how much of the feed is used for maintenance. Finally, if there is feed left over (total feed minus feed used for maintenance) for gain, there is a formula that can calculate how much the animal will gain from the extra feed consumed. Fortunately, there are computer programs available that can do the calculations for you. Two ration balancing programs are available. One is for cow/calf producers that balances rations for brood cows. The other is designed for stocker, backgrounder, feedlot operators that balances rations for growing cattle. The cost is $75 for each program. For more information on these programs contact me at 229-386-3407 or email at jrossi@uga.edu.

DATES TO REMEMBER

June 1	4-H/FFA Lamb Workshop	Athens & Tifton
June 1	Ga. Club Calf Producers Assoc. Field Day and Show	Commerce
June 4	HERD Sale	Calhoun
June 8	State Livestock Judging Contest	Athens
June 8	Ga. Simmental Assoc. Field Day	Outback Simmental Farm
June 8-9	So. National Jr. Open Angus Show	
June 14-15	Ga. Polled Hereford Assoc. Field Day (Wahachee Creek Farm)	Elberton
June 14-15	SE Santa Gertrudis Jr. Heifer Show and Buy-Sell-Trade Days	Calhoun
June 15	Ga. Angus Field Day - Kahn Cattle Co.	Rydal
June 15	Charoalis Field Day	Hartwell
July 17	Ga. Jr. Cattlemen's Assoc Field Day	Perry
July 19-20	Ga. Jr. Beef Futurity	Perry
July 26-27	Limousin Assoc. Field Day	Athens
August 2-3	GCLPA Futurity	Athens
August 4	Block & Bridle Summer Classic	Athens

Managing Horses On A Few Acres - Part I

Gary Heusner
Extension Equine Specialist

Determining what are adequate physical facilities for maintaining a horse is often an over looked concept of horse ownership. The horse is an athlete and should be treated as such. The horse is also a non ruminant herbivore and a grazing animal. Therefore, the horse requires a minimum level of forage in the diet to maintain normal gastrointestinal function, as well as, normal behavior. There has been little research done on the space requirements of horses. One and one-half to two acres of open land per horse is the recommended starting point to supply adequate acreage for a pasture forage program. The one and one half to two acres is actual pasture area and does not include land for any type of buildings, barns, arenas, etc. One acre of land is 43,560 square feet or approximately 210 feet x 210 feet. Obviously many people keep horses on smaller amounts of land and do not depend on the land to provide any forage. The optimum land amounts per horse then is two acres for pasture and then whatever is desired for barn space, hay and equipment storage and riding area. The next question then is what is the minimum area needed for a horse for a turnout (exercise) paddock. In other words, the horse will be maintained solely on harvested forage (hay) and no pasture land will be provided. Again, little research has been done to determine the minimum area needed for a turnout (exercise) paddock. The Guide For the Care and Use of Agricultural Animals in Agricultural Research and Teaching recommends a minimum area of 0.1 (one-tenth) of an acre of open land per horse. This is approximately 4500 square feet. In most cases horse owners fall somewhere between the optimum and minimum open land levels for maintaining horses. Therefore, I will discuss "managing horses on a few acres" with one acre of pasture per horse. To make the discussion easier, one horse will be used as an example. The horse will be a mature horse being ridden three to four times a week at a light level of work. For "Part I" I will discuss the establishment and care of the one acre pasture. In "Part II" recommendations will be made relative to facility requirements and planning a year round feeding schedule, including recommendations for hay and feed. "Part III" will address tying parts I and II together and incorporating a monthly calendar of management practices to be done for an entire year.

Establishing a pasture on one acre can be done in certain situations by no-till planting of forages into existing sods. Ideally, pasture establishment should be done on well-prepared, clean tilled, seed beds. With the exception of hybrid bermudagrasses and perennial peanuts, most forages are established from seed. If possible purchase certified seed. Before pasture preparation for seeding is done, soil pH and fertility should be determined. Soil tests should be done several months before planting to determine the quantity of lime and fertilizers needed. Your local County Agent can advise you regarding proper soil sampling techniques, where to send the soil samples and how to interpret recommendations on soil test results. If limestone is required it should be applied two to three months in advance of planting and incorporated with tillage into the top six inches of soil. Phosphorus and potassium, if needed, should also be incorporated before planting. Grass seed will need 30-60 pounds of nitrogen at seeding or soon after seedling emergence.

What is the best grass for a horse on a one acre pasture? Little research has been done to

answer that question. Currently it appears that a summer perennial such as bermudagrass, over seeded in the late summer or early fall with an annual ryegrass, may provide a good quantity of forage and maintain a reasonable stand with heavy grazing pressure that one horse per acre would apply. What is the best bermudagrass for this situation? Most recommendations are to use an improved variety of common bermudagrass such as Cheyenne or Vaquero. Unlike the hybrid varieties of bermudagrass that must be established with vegetative sprigs, common is established with seed. Adequate moisture and frequent mowing to control weeds is required the first year to establish common bermudagrass. Once established and properly fertilized common bermudagrass will tolerate horse grazing and traffic better than any perennial. Depending on moisture and climatic conditions, the pasture may be grazed in late summer. Once established common bermudagrass pastures should have 100-150 pounds of nitrogen applied in split applications during the grazing season. Phosphors (P) and Potassium (K) should be applied as indicated by soil test results taken every other year. Annual ryegrass can be over seeded onto common bermudagrass in late summer or early fall. Moisture and climatic conditions along with growth of the bermudagrass should be used to determine when to best over seed with annual ryegrass. Ryegrass can be sod seeded or broadcast. Ryegrass is easily established and may be the best pasture grass available for horses. Most of the growth will occur in late winter and early spring and can provide grazing into may when bermudagrass growth should pick up again.

So often people who own or want to own a horse on a few acres do the planning backwards. That is, they decide to buy property, put up facilities and then decide what pasture space is left. Horses will be healthier and happier if less time and money is spent on planning and building facilities and more effort is put into optimizing pastures.

Computer Record-Keeping:
THE fIRM
(*T*otal *H*erd *E*valuation *f*rom *I*mproved *R*ecords *M*anagement)

Timothy W. Wilson
Extension Animal Scientist – Beef Cattle

With the increased use of computers in the last 20 years, it is not surprising that computer software has been developed to assist beef cattle producers in keeping and analyzing records. Utilizing beef cattle records may be one of the most useful management tools available to producers. There are many software packages currently being marketed that maintain a variety of records that range from basic to intense record keeping.

The first step in keeping computer records is to decide which software package will meet the needs of your operation. Many factors must be considered when choosing a software package. How much time do you want to spend keeping records? What records do you want to keep? What do you want to know about your herd? How much are you willing to spend on a record-keeping program? These are just a few of the many questions that must be answered in order to determine which software package is right for you.

THE *Beef Cattle* fIRM (*T*otal *H* erd *E*valuation *f*rom *I*mproved *R*ecords *M*anagement) is a software package developed by the University of Tennessee specifically for beef cattle. This software focuses primarily on maintaining records to evaluate performance within the herd. Data maintained with this software includes general information such as: identification, ancestry, breed, EPD, pregnancy information, birth weights, weaning data, yearling data and sale information. These data can be used to generate a variety of reports to analyze herd performance.

Often when software is purchased, it may seem confusing or difficult to understand. The ability of the user to take a program and use it effectively is tested. It is important to maintain records properly when they are being used to make management decisions. When data is entered wrong or estimations are considered exact, data can be skewed and inaccurate. The University of Georgia offers assistance with THE fIRM through your local County Agent.

Knowing what kind of cattle you have is important in determining the value of your herd. Simply keeping records can help you determine where changes need to be made, and keep track of changes as they affect the overall performance of your herd. If you have any questions regarding this software or any others, please feel free to contact your local County Agent or me at (912) 681-5639.

Third Annual HERD Sale at Tifton, Sale Summary

Johnny Rossi
Extension Animal Scientist

The third Heifer Evaluation and Reproductive Development Sale was held at the Tifton Bull Evaluation Center in Irwinville on April 24, 2001. A total of 142 heifers sold for an average of $1,149. The average was $213 greater than last year's sale average of $936. There was a good crowd with a total of 18 buyers from Georgia, Florida, Mississippi, and South Carolina.

The top-selling heifer was a commercial Angus x Angus cross from Boggy Branch Farms that sold for $1,550 and was purchased by C.L. Lavely of McRae, GA. The largest number of heifers was purchased by Steve Hancock of the Creek Plantation is Martin SC, who purchased 43 head at an average of $1,197. Heifers that were confirmed pregnant to an AI date sold for $1,156. Heifers confirmed pregnant to a clean-up bull sold for $1,105.

In all, 24 consignors entered 173 heifers in the program at the beginning of October. Heifers were heat-synchronized using MGA/Lutalyse and bred A.I. for two heat cycles to a calving ease Angus bull. A clean-up bull was put with each group of heifers for two more cycles. The A.I. conception rate was 75%, and the overall pregnancy rate was 88%.

The test is designed to maintain a moderate growth rate so heifers will obtain at least 65% of their estimated mature weight by 15 months of age. The heifers averaged 1.55 lb/d, which allowed the heifers to achieve their target weight (65% of mature weight) by the beginning of the breeding season. Heifers were fed high quality Coastal bermudagrass hay plus 4.5 lb/d corn and 3 lb/d whole cottonseed. In addition, heifers were evaluated for reproductive tract maturity, disposition, pelvic area, muscle thickness, and frame score.

The HERD program would not be possible without the support of the HERD Team. This group of Extension agents forms guidelines, promotes the program and does a large portion of the work. This years program was a great success and many consignors and other cattle producers are beginning to use the HERD program protocol on their cattle at home.

Mark your calendars for the HERD sale in Calhoun on Tuesday June, 4. Heifers at Calhoun were developed using the same protocol as the Tifton program and an excellent sale is expected.

Plans will begin soon for the 2002-2003 HERD program with heifers being delivered in the fall. If you are interested, contact your local Extension agent or Johnny Rossi at 229/386-3407 or e-mail at jrossi@uga.edu.

Junior Update

Ronnie Silcox

Gwinnett County Fair - September 12-22

The Gwinnett County Fair in Lawrenceville offers a number of livestock events. Following are a few dates of interest:

September 12	Meat Goat Show
September 13-22	Beef Breed Shows
September 14	Market Lamb Show
September 15	Breeding Sheep Show
September 18	Swine Show
September 20	Steer and Commercial Heifer Show
September 21	Dairy Goat Show
September 22	Commercial Dairy Heifer Show

For more show information contact the Gwinnett County Fair at 770-963-6522.

Friday, September 13	1:00 pm	Barn open for early arrivals
Saturday, September 14	7:30 am	Lamb check in begins
	10:30 am	Arrival deadline for lambs
	11:30 am	Lamb show begins with showmanship
		Lambs released following show on Saturday
Sunday, September 15	10:30 am	Breeding sheep arrival deadline
	12:30 pm	Breeding sheep show begins with showmanship

Any lamb entered and tagged for the state show is eligible for the market lamb show. A photocopy of the state show entry card can be used to enter this show. Entries should be sent to the Gwinnett County Fair by August 10.

2002 Georgia Junior Beef Futurity - July 18-20

Steers and heifers entered in the Junior Beef Futurity in Perry will check in on Thursday, July 18, before 4:00 pm. Showmanship is Friday morning. Steer show Friday afternoon and heifers show on Saturday.

More information and entry materials are posted on the Georgia Agricultural Education web page at: Http://www.gaaged.org

ORDER FORM FOR EAR TAGS AND ENTRY CARDS
(To be ordered by County Agents or Agriculture Education Teachers)

Please send the order below to:

NAME_____ **PHONE**_____

COUNTY/CHAPTER_____ **Circle one: 4-H or FFA**

ADDRESS_____

UPS ADDRESS (if different) _____

CITY_____ **ZIP**_____

SHOW NAME	NO. TAGS REQUESTED ($1.25 each)	NO. ENTRY CARDS REQUESTED* (1 per exhibitor) (no charge)	AMOUNT DUE
2002 STATE LAMB EAR TAGS @$1.25 each AND ENTRY CARDS (available now)			
2003 STATE STEER SHOW EAR TAGS @$1.25 each AND ENTRY CARDS (available now)			
2003 STATE MARKET HOG SHOW EAR TAGS @$1.25 each AND ENTRY CARDS (available now)			
2003 STATE HEIFER SHOW ENTRY CARDS (available now)	N/A		-0-
2003 COMMERCIAL BEEF HEIFER SHOW EAR TAGS @$1.25 each AND ENTRY CARDS (available now)			
2003 COMMERCIAL DAIRY HEIFER SHOW EAR TAGS @$1.25 each AND ENTRY CARDS (available now)			
2003 COMMERCIAL BREEDING EWE SHOW EAR TAGS @ $1.25 each AND ENTRY CARDS (available now)			
2003 STATE BREEDING SHEEP SHOW ENTRY CARDS (available now)			
2003 BEEF QUIZ BOWL ENTRY FORMS AND INFORMATION (available 12/1/02)	N/A		-0-
2003 SWINE QUIZ BOWL ENTRY FORMS AND INFORMATION (available 12/1/02)	N/A		-0-
2002-2003 RULES AND REGULATIONS FOR ALL STATE SHOWS	N/A		-0-
TOTAL AMOUNT DUE			

NOTE: You will only need to order one (1) entry card per exhibitor, per show. Please keep this in mind when ordering.

Order all of the above entry cards, tags and rulebooks from:

Ronnie Silcox
Animal & Dairy Science Building / UGA
Athens, GA 30602-2771

Make checks or money orders to Georgia 4-H Foundation (DO NOT SEND CASH). ABSOLUTELY NO PHONE/FAX ORDERS WILL BE TAKEN. Make additional copies as needed of this order form.

GEORGIA JUNIOR STATE LIVESTOCK SHOWS
ENTRY DEADLINES

2002 State Market Lamb Show - Perry, GA . . . . . July 15, 2002

2003 State Steer Show - Perry, GA . . . . . October 1, 2002

2003 State Heifer Show - Perry, GA . . . . . October 1, 2002

2003 State Junior Commercial Dairy Heifer Show - Perry, GA . . . . . November 15, 2002

2003 State Market Hog Show - Perry, GA . . . . . December 1, 2002

2003 State Breeding Sheep Show - Perry, GA . . . . . December 1, 2002

2003 Beef and Swine Quiz Bowls . . . . . February 1, 2003

2003 Junior National Banquet Adult Ticket Reservation . . . . . February 6, 2003
(Order Form will be sent in January, 2003)