SUPPLEMENTATION PROGRAMS FOR THE COW-CALF HERD

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WHY SUPPLEMENT THE COW HERD?

Although Florida winters are mild, grass growth and its quality greatly diminishes in December and doesn't come back until April or May, as has been illustrated in the previous paper on management cycles in beef production. Let us specifically look at the yield and quality of bahiagrass, Florida's major pasture grass, during the production year. Figure 1 shows the growth of bahiagrass throughout the year in 9 south-central Florida counties (Sumner et al., 1991). Note that bahiagrass grows most in mid-summer and early-fall, but the quality of this growth is relatively good from April to December, containing about 10% CP and 52-57% TDN. Forage selectively grazed by cattle from April to December would be of similar quality. This quality more than meets the need of dry-pregnant cows (8% CP and 53% TDN), and comes close to meeting the needs of lactating cows of average milking ability (10% CP and 57% TDN), but is below the needs of lactating two-year-old cows (11% CP and 64% TDN).

The major problem occurs with stockpiled grass that is carried into the winter to provide forage for the cow herd. Figure 2 shows the quantity and quality of forage actually available for grazing from April to December. The December data represents the quantity and quality of forage that must be utilized from December to the following spring. Thus, forage available from bahiagrass pasture during the winter will contain about 7% CP and 46% TDN. Both energy and CP levels are far below the needs of cows nursing calves, or for that matter dry-pregnant cows.

Another consideration in terms of cow herd needs is that many cattlemen use a breeding season that includes most of the winter months of December through March. Of course the breeding season is the most critical time in terms of nutrient needs because cows are nursing calves and must begin cycling to be rebred.

KINDS OF SUPPLEMENTS USED

A 1990 survey of cattlemen in 9 south-central Florida counties showed that 55% used a molasses mix to supplement cows during the winter, 38% used mineral containing protein, 33% used a salt/protein mix, 33% used protein blocks and 31% used range cubes. Basically these supplements supply one or both of the two major nutrients most limiting in Florida pasture forages during the winter; energy and protein. The following discussion will center around the use of molasses-based feeds because they have been used in most studies conducted in Florida on supplementing the cow herd. By using relative energy and crude protein values other feeds and supplements can be compared to molasses or liquid feed formulas. The exception is that natural protein is superior to non-protein nitrogen as a crude protein source when supplemented with low to medium quality forages, and particularly when fed to young cattle. Otherwise, the energy and natural protein provided in a liquid feed, protein block, salt/protein mix, mineral mix containing protein or a dry supplement is of equal value based on their nutrient composition and the quantity fed.

HOW MUCH SUPPLEMENT TO FEED?

The quantity of supplement to feed depends on the severity of the winter and the condition of the cow herd. However, with a breeding season starting at anytime from December to March, as normally used in Florida, supplementation should begin when cows start calving and usually continued through the breeding season or the end of April. Supplements can be fed twice weekly with the quantity fed depending upon the condition of the pastures and the cow herd. It is best to feed supplement such that available grass is extended throughout the winter period. Do not wait until the grass is gone before feeding supplement, especially molasses, unless hay feeding is intended. From an economic point of view, it is preferable that cows lose weight during the winter as long as an average body condition score of 4 or higher is maintained.

It is recommended that mature brood cows grazing bahiagrass during a typical winter be fed 2.5 to 3.5 lbs of TDN/cow/day of a supplement containing 12 to 16% CP. Young cows, particularly first-calf heifers, should be fed 4 to 5 lbs of TDN/head/day of a supplement containing 16 to 20% CP, one-half of which is derived from natural protein.

WHAT WILL BE THE RESPONSE TO ENERGY?

Two long-term studies have been conducted on feeding molasses only to brood cows. Both were with cattle grazing Roselawn St. Augustinegrass pasture grown on organic soil at Belle Glade. Under this situation, St. Augustinegrass contains 13-15% crude protein in the winter which more than satisfies the crude protein needs of the cow. The digestibility of St. Augustinegrass is 55% during the summer and drops to 45% during the winter. Thus, this makes for an ideal situation to look at the value of an energy supplement for brood cows during the winter.

Both of the molasses feeding studies were similar in procedure. Brood cows were continuously grazed on St. Augustinegrass pasture. The breeding season was 90 days beginning on Jan. 15 in the first study and 70 days beginning on Jan. 1 in the second study. Molasses was fed twice weekly at a rate of 5 lbs/head/day (except during the summer in a year-round treatment when free-choice intake was much less).

The first study (Table 1) compared no molasses, seasonal molasses (Dec. to April 15) and year-round molasses feeding. Seasonal feeding resulted in a sizeable increase in calf weaning % and calf weaning weight over cows not fed molasses. Calf production was 42 lbs per cow higher for seasonal molasses feeding, with 15 lbs of molasses consumed for each lb increase in calf production. Year-round molasses feeding further increased calf production per cow to 52 lbs over cows not fed molasses, but cows consumed 22 lbs of molasses for each lb increase in calf production, a situation which would probably not be economical.

The second study (Table 2) compared no molasses, molasses fed only during the breeding season (85 days from Dec. 15 - March 10) and molasses fed during the calving and breeding season (145 days from Oct. 15 to March 10). Feeding cows molasses only during the breeding season increased calf weaning rate by 7% over no molasses. It did not improve calf weaning weight, but it did increase calf production per cow 36 lbs over cows not fed molasses and required a molasses intake of 11.8 lbs per each additional lb of calf produced/cow. Supplementation of cows during the calving and breeding season increased weaning rate, calf weaning weight and calf production per cow by 52 lbs over cows not fed molasses. Molasses intake was 13.9 lbs for each additional lb of calf production/cow.

MOLASSES SLURRIES FOR THE COW HERD TO PROVIDE ENERGY AND NATURAL PROTEIN

On sandland postures, both energy and protein supplementation are needed during the winter. To evaluate these needs a four-year experiment at the Ona AREC from 1984 to 1988 compared three molasses mixtures: 1. 6% crude protein (CP) standard blackstrap molasses, fed at 2.9 lbs/cow/day; 2. 20% CP standard blackstrap molasses-urea mixture fed at 3.2 lbs/cow/day (3 lbs molasses, .16 lbs urea, .16 lbs water); and 3. 18% CP standard blackstrap molasses-cottonseed meal-urea mixture fed at 2.8 lbs/cow/day (2 lbs molasses, .7 lbs cottonseed meal, .03 lbs urea; .03 lbs water).

Mixtures were fed to Braford-type brood cows (approximately 45 per treatment per year) grazing bahiagrass pasture. The breeding season was from March 1 to June 1. Cows were fed free-choice a low to medium quality stargrass hay (5.5% crude protein and 50% TDN) for an average of 100 days starting in December or January and ending in April or May, depending upon weather and pasture conditions. Molasses mixtures were fed twice weekly in open troughs from December 16 to April 22.

Cows fed molasses with urea weaned approximately 7 more calves per 100 cows and their calves weighed 12 pounds more at weaning compared to cows fed molasses only (Table 3). Cows fed molasses-cottonseed meal-urea weaned approximately 12 more calves per 100 cows and their calves were 12 lbs heavier at weaning compared to cows fed only molasses. Calf production per cow in the breeding herd was increased 40 and 62 lbs, respectively, by adding urea and cottonseed meal-urea to the molasses mixture. Cow weight differences were not large across treatments, but cows fed the molasses-cottonseed meal-urea supplement were 11 and 25 lb heavier than cows fed molasses or molasses-urea supplement, respectively. Note that there was little difference in the condition of cows fed the different supplements at any time of the year.

Younger cows exhibited a greater response to the addition of crude protein to molasses than older cows (Table 4). Three-year-old first-calf heifers fed molasses-urea had a 22.5 percentage point higher conception rate than heifers fed only molasses. First-calf heifers fed molasses-cottonseed meal-urea had a 32 percentage point higher conception rate than first-calf heifers fed only molasses. Even 4 to 6-year-old cows fed either molasses-urea or molasses-cottonseed meal-urea had a 10 and 13 percentage point higher conception rate, respectively, than cows fed molasses only. Seven to 13-year-old cows exhibited no response in conception rate to the addition of urea to molasses, and a slight response to the addition of cottonseed meal-urea to molasses (weaned about 4 more calves per 100 cows). A response to the addition of urea and a larger response to the addition of cottonseed meal-urea to molasses was observed in the weaning weight of calves from first-calf heifers.

SUPPLEMENTING COWS CONSUMING OTHER FORAGES

Pangola and hemarthria are two other perennial grasses that make a major contribution to winter pastures in south Florida. Both of these grasses are more digestible (55 to 60% TDN) than bahiagrass, but often contain low levels of crude protein (3 to 6%). In these situations, more emphasis should be placed on crude protein supplementation and less on energy supplementation. With these grasses, smaller quantities (1-3 lbs/head/day) of a high crude protein (20-35%) supplement might be fed to mature brood cows. It is also possible that higher levels of non-protein nitrogen could be used in supplements fed to brood cows grazing hemarthria or Pangola, particularly

when they are green and growing.

Many cattlemen feed grass hay during the winter. This is mainly stargrass, Pangola, and hemarthria hay in south Florida and bermudagrass hay in north Florida. The quality of perennial grass hay produced and fed in Florida is very variable, but tends to be in the low to medium quality range as discussed in the preceding paper. If poor quality hay is offered, larger quantities of both energy and natural protein will be required as a supplement to keep the cow herd in good condition. If hay is of excellent quality, no supplement may be required.

SUMMER SUPPLEMENT FOR THE COW HERD

The crude protein content of bahiagrass pasture forage tends to progressively decrease in quality from June to September. This coincides with the period when cows begin to nurse heavy calves prior to weaning in late summer and early fall. Calves also begin to eat significant quantities of grass. A study is in progress at the Ona AREC to determine if target feeding a molasses-protein mixture to cows and calves for 60 to 80 days prior to weaning in September will increase cow weights and/or calf weaning weights. Treatments were: 1. no molasses; 2. molasses-urea; and 3. molasses-feather meal-urea. Supplements were formulated to contain 30% crude protein. Sixty Braford cows were assigned to each treatment. Supplements were fed free-choice from lick-wheel tanks. Cattle were grazed on bahiagrass pasture.

Two years of data show that feeding molasses-urea resulted in a heavier cow and a heavier calf at weaning. Calves exposed to molasses-urea were 18 lb heavier in 1989 and 38 lb heavier in 1990 than calves not exposed to molasses. Molasses-urea intake was about 4 lb/cow/day; but calves were frequently observed consuming supplements and their intake of both supplements appeared to be significant. The response of cows and calves having access to molasses-feather meal-urea was about the same as cows and calves not fed molasses supplement in 1989 and the same as cows and calves offered molasses-urea in 1990. Intake of the molasses-feathermeal-urea supplement averaged 4 lb/cow/day in 1989 and 7.6 lb/cow/day in 1990 (Table 5). Phosphoric acid (6 % of supplement) was added to this mixture in 1989 to help limit intake, but not in 1990. The addition of phosphoric acid may have caused the poor performance of cattle consuming the molasses-feather meal-urea supplement in 1989.

These results indicate that cows and nursing calves will respond to molasses-based supplement fed during the summer immediately before weaning. However, natural protein was not superior to urea as a nitrogen source. It is possible that the response was due to energy supplementation from molasses, thus another series of studies will be conducted to determine if a similar response can be obtained with molasses alone.

COST AND RETURNS OF SUPPLEMENTING THE COW HERD

An important question is will supplementation pay? Table 6 shows the costs and returns of feeding molasses as an energy supplement to brood cows grazing organic soil pasture. These figures show that returns above molasses feed cost are very good with the current feeder calf market. It should be pointed out that a better response would be expected from an energy supplement fed to brood cows grazing sandland pastures because of the general poorer quality of grass grown on sandland as compared to that grown on organic soil.

Table 7 summarizes the cost and returns of adding urea and cottonseed meal-urea to a molasses supplement. Using experimental production data the figures show that the respective cost of adding urea and cottonseed

meal-urea to molasses was only $2.33 and $2.96/cow/winter. Positive net returns were obtained from adding either urea or cottonseed meal-urea to the molasses supplement. With urea, net returns were $26/cow fed with a $70/cwt feeder calf market and $38/cow fed with a $100/cwt feeder calf market. By adding cottonseed meal-urea to the molasses supplement net returns were $40/cow fed with a $70/cwt feeder calf market and $60/cow fed with $100/cwt feeder calf market.

LITERATURE CITED

Chapman, H.L. Jr., R.W. Kidder, M. Koger, J.R. Crocket, and W.K. McPherson. 1965. Blackstrap molasses for beef cows. Fla. Agri. Expt. Sta., Bulletin 701.

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ADDITIONAL REFERENCE

Pate, F.M. and W.E. Kunkle. 1986. Weaning beef calves at a later age to increase production. Fla. Agri. Expt. Sta. Circular S-328.

Table 1. Response of Brood Cows Grazing St. Augustinegrass Pasture Grown on Organic Soil to Seasonal (125 days) and Year-Round Supplementation with Blackstrap Molasses (4 Years Data, 1959-1963; Chapman et al., 1965).

Item	Molasses Supplement		
	None	Seasonal[a]	Year-round[b]
Weaning, %[c]	83.2	87.7	91.2
Weaning wt., lb	340	370	372
Calf production/cow, lb	283	325	339
Response to molasses, lb of calf/cow	---	42	56
Pounds of molasses/inc. lb of calf	---	15.0	22.8

[a]Cows fed 5 lbs/head/day of heavy millrun blackstrap molasses on a twice weekly schedule (633 lbs over all).

[b]Cows fed 5 lbs/head/day of heavy millrun blackstrap molasses on a twice weekly schedule during the winter and free-choice molasses during the summer when intake was less than 5 lbs/head/day (1274 lbs/cow over all).

[c]Cows bred for 90 days from Jan. 15 to April 15.

Table 2. Response of Brood Cows Grazing St. Augustinegrass Grown on Organic Soil to Seasonal Supplementation with Blackstrap Molasses (5 Years Data 1979-1985; Pate and Kunkle, 1989).

Item	Molasses Supplementation		
	None	Breeding[a] **Season**	**Calving and[b] Breeding Season**
Weaning, %[c]	77.2	84.0	82.9
Weaning wt., lb	553	551	577
Calf production/cow, lb	427	463	479
Response to molasses, lb of calf/cow	---	36	52
Pounds of molasses/inc. lb of calf	---	11.8	13.9

[a]Cows fed 5 lbs/head/day of heavy millrun blackstrap molasses on a twice weekly schedule from Dec. 15 to March 10 (425 lb over 85 days).
[b]Cows fed 5 lbs/head/day of heavy millrun blackstrap molasses on a twice weekly schedule from Oct. 15 to March 10 (725 lbs over 145 days).
[c]Cows bred for 70 days from Jan. 1 to March 10.

Table 3. Performance of Crossbred Brood Cows Fed Different Molasses-Based Mixtures During the Winter While Grazing Bahiagrass Pasture and Fed Low-Quality Hay (4 Years Data 1984-1988; Pate and Kunkle, 1989).

Item	Molasses[a]	Molasses-Urea[b]	Molasses-Cottonseed Meal-Urea[c]
Weaning rate, %	**63.8**	**70.9**	**75.7**
Calf weaning weight, lb	**443**	**455**	**455**
Calf produced/cow in breeding herd, lb	**283**	**323**	**345**
Increased calve production/cow over molasses alone, lb	**---**	**40**	**62**
Cow weights at different times of year, lb			
November (pre-calving)	**1092**	**1091**	**1106**
March (start breeding)	**936**	**927**	**949**
June (end breeding)	**988**	**983**	**1002**
August (weaning)	**1027**	**1011**	**1036**
Cow condition at different times of year			
November 25	**5.5**	**5.7**	**5.7**
March 1 (start breeding season)	**4.2**	**4.3**	**4.5**
June 1 (end breeding season)	**4.4**	**4.5**	**4.6**
August 23 (weaning)	**4.9**	**4.9**	**5.1**
Molasses mixture fed/cow, lb[d]	**368**	**406**	**356**
Hay fed/cow, lb	**1816**	**1753**	**1856**

[a]Standard blackstrap molasses, 79.5° Brix; 6% crude protein (2.9 lbs/cow/day).
[b]Standard molasses, 90%; urea, 5%; water, 5%; 20% crude protein (3.2 lbs/cow/day).
[c]Standard molasses, 73%; cottonseed meal, 25%; urea, 1%; water, 1%; 16% crude protein.
[d]Molasses mixtures were fed for 127 days with an average starting date of December 16 and average ending date of April 22.

Table 4. Performance of Different Age Cows Fed Molasses-Based Mixtures During the Winter While Grazing Bahiagrass Pasture and Fed Low-quality Hay (4 Years Data 1984-1988; Pate and Kunkle, 1989).

Item	Molasses[a]	Molasses-Urea[b]	Molasses-Cottonseed Meal-Urea[c]
Conception rate for different age cows, %			
3 year olds	37.5	60.0	69.6
4, 5 and 6 year olds	**66.1**	**76.1**	**79.3**
7 to 13 year olds	**78.1**	**78.7**	**82.7**
Weaning weight of calves from different age cows, lb			
3 year olds	**392**	**405**	**423**
4, 5 and 6 year olds	**437**	**454**	**440**
7 to 13 year olds	**460**	**464**	**465**

[abc]See footnotes in table 3.

Table 5. Response of Cows and Their Calves to Molasses Mixtures Fed Free-Choice in Lick-Wheel Feeders for about Two Months Immediately Prior to Weaning (Pate, unpublished).

Item	No Molasses	Molasses-Urea	Molasses-Feather Meal-Urea
1989 (58 days)			
Supp. intake, lb/cow[a]	---	3.6	4.0
Cow gain, lb	**42**	**53**	**29**
Steer calf gain, lb	**123**	**140**	**121**
Heifer calf gain, lb	**102**	**120**	**114**
1990 (79 days)			
Supp. intake, lb/cow[a]	---	**4.3**	**7.6**
Cow gain, lb	**13**	**40**	**47**
Steer calf gain, lb	**139**	**183**	**180**
Heifer calf gain, lb	**132**	**165**	**170**

[a]Molasses mixtures were consumed by both cows and calves.

Table 6. Cost and Returns from Molasses Fed as a Winter Supplement to Brood Cows Grazing Organic Soil Pasture[a]			
Item	None	Breeding **Season**	**Calving And Breeding Season**
Supplement cost, $/cow[b]	**0**	**19.13**	**32.63**
Net return above feed cost from increased calf production, $/cow			

***$70/cwt feeder calves**	---	**6.07**	**3.77**
***$100/cwt feeder calves**		**16.87**	**20.00**

[a]Production data obtained from table 2.
[b]Molasses priced at $90/t.
[c]Net return = $ obtained form increased calf production/cow - cost of molasses supplement.

Table 7. Cost and Returns from Adding Urea and Cottonseed Meal-Urea to Molasses Supplement Fed to Brood Cows Grazing Bahiagrass Pasture[a]			
Item	Molasses	Molasses-**Urea**	**Molasses-Cottonseed Meal-Urea**
Supplement cost 127 days, $/cow[b]	**16.57**	**18.89**	**19.53**
Supplement cost over molasses, $/cow	**-----**	**2.33**	**2.96**
Net return above increased supplement cost from increased calf production, $/cow[c]			
***$70/cwt feeder calves**	**-----**	**25.67**	**40.44**
***100/cwt feeder calves**	**-----**	**37.67**	**59.04**

[a]Production data obtained from Table 3.
[b]Molasses @ $90/t; urea @ $240/t; CSM @ $175/t.
[c]Net return = $ obtained form increased calf production/cow - added $ required to feed either urea or cottonseed meal urea.

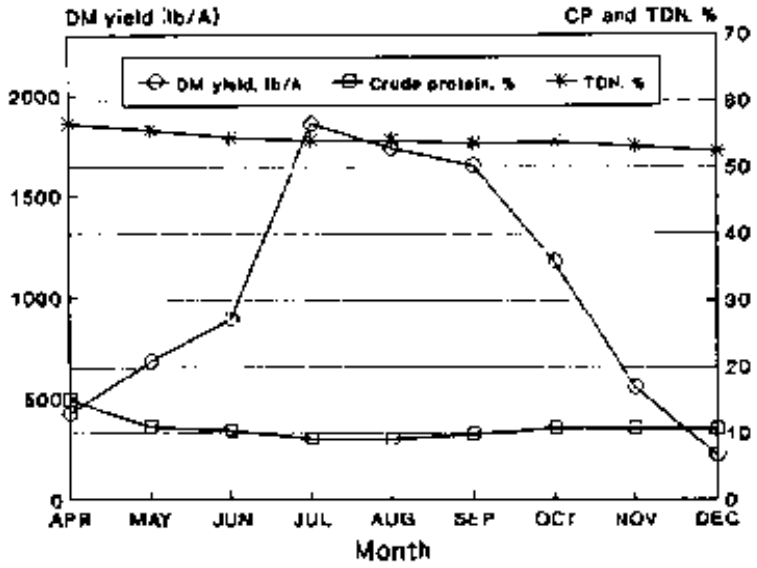

Figure 1. DM yield, Crude Protein and TDN Content of Bahiagrass Regrowth.

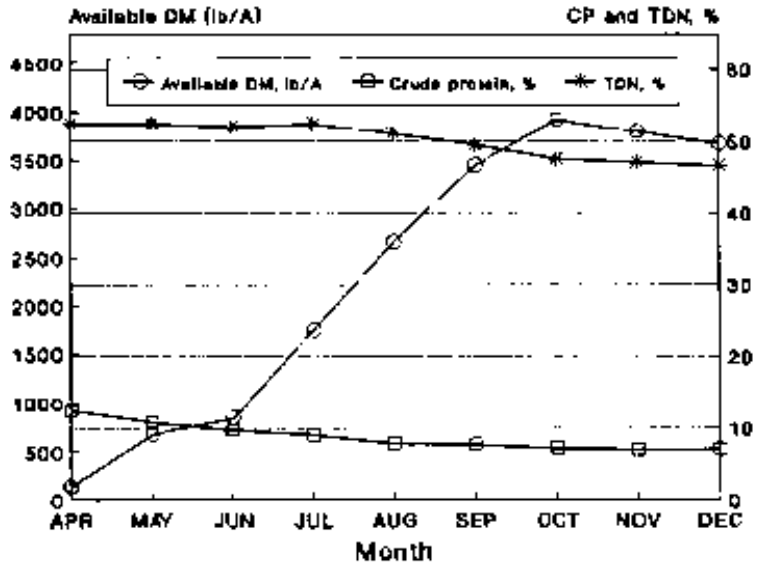

Figure 2. Available DM, Crude Protein and TDN Content of Bahiagrass Pasture.