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## Summer-grown Baleage Crops for Dairy Cattle

Mike McCormick and Catherine Coxe

**Introduction.** Annual ryegrass is the most widely used baleage crop in Louisiana, but many dairymen are unable to produce sufficient quantities of ryegrass baleage to meet their stored forage needs. The objective of the present experiment was to evaluate three warm-season crops stored as baleage. Ryegrass baleage was also produced and served as a positive control. The primary factors evaluated in this study were forage quality, storage losses, and lactation performance.

**Procedures.** The three summer-grown forages evaluated were common signalgrass (*Brachiaria decumbens*), 'Sumrall 007' bermudagrass, and 'NK-300' forage sorghum. All forages were managed for optimum yield and quality. Signalgrass and bermudagrass were harvested at early heading and sorghum was harvested in the vegetative stage (4 ft height). Forages were wilted in the windrows for 24-48 hours, baled (4 x 4.5 ft bales), and individually wrapped with six layers of white stretch film. Bales were sampled and weighed at the beginning and end of the six-month storage period. At opening, bales were scored for moldiness and ground. Ground (2-6 in length) baleage was individually fed to 40 mid-lactation Holstein cows (10 per forage). Cows were fed grain twice a day immediately before to milking. Cows were weighed and condition scored at two-week intervals during the eight-week feeding study. Milk weights were determined daily, and milk composition was evaluated weekly. Rumen pH and fatty acids were determined from fluid obtained via rumenocentesis on the final day of the study.

**Results.** The forage quality data for the baleage crops are presented in Table 1. The ryegrass and sorghum dry matter concentrations were considerably lower than optimum (40%-60%). Poor drying conditions were encountered after cutting the ryegrass, which necessitated baling before an ideal moisture level was achieved. In the case of the sorghum, drying conditions were excellent, but the inherent high moisture content of forage sorghum and the thick stem prevented adequate drying. Nevertheless, all crops stored well, with storage losses (shrink) equaling less than 2% for all crops. Protein and energy concentrations tended to be higher in the ryegrass and signalgrass than the bermudagrass and sorghum. The baleage pH level was lowest for sorghum, probably related to its high sugar content and low buffering capacity, and highest for ryegrass baleage. Little surface mold was detected on ryegrass and signalgrass bales. Bermudagrass was the moldiest of all crops evaluated, likely a consequence of its low sugar content (Table 2). Lactation performance related to the baleage crops is reported in Table 3. Cows consumed more bermudagrass baleage than signalgrass, but sorghum consumption was the lowest of all crops evaluated. The sorghum did tend to heat more than the other crops in the trough, which may have limited intake and performance. Milk fat percentage was highest for the bermudagrass and lowest for the sorghum. Lower fat percentage from sorghum-fed cows may have been related a higher grain to forage ratio. Fat-corrected milk yield was highest for the cows consuming ryegrass and signalgrass. Milk production was similar for bermudagrass and sorghum. No differences in rumen pH or fatty acid concentrations were observed. Data from this study suggests that signalgrass, when harvested at the proper maturity, will generate animal

performance similar to annual ryegrass. Bermudagrass and sorghum may be expected to elicit slightly lower performance.

Table 1. Forage quality analyses of warm-season baleage crops.

Item	Summer Crop Evaluated			
	Signalgrass	Bermudagrass	Sorghum	Ryegrass <sup>1</sup>
Dry matter, %	43.1	44.9	25.1	29.4
Protein, %	19.9	13.0	13.1	19.5
ADF, % <sup>2</sup>	29.6	31.3	40.9	33.9
NDF, %	61.3	73.2	68.5	61.4
TDN, %	63.3	60.6	59.4	65.7

<sup>1</sup>Ryegrass served as a positive control.

<sup>2</sup>ADF = acid detergent fiber, NDF = neutral detergent fiber, and TDN = total digestible nutrients.

Table 2. Yield, storage losses, and mold scores for summer-grown baleage crops.<sup>1</sup>

Item	Summer Crop Evaluated			
	Signalgrass	Bermudagrass	Sorghum	Ryegrass
Dry matter, %	43.1	44.9	25.1	29.4
Bale wt, lb.	1603	1352	1800	2020
Yield /acre, tons DM <sup>1</sup>	1.6	2.7	2.1	2.1
Storage losses, %	1.0	1.7	0.2	1.7
pH	4.69	4.89	4.32	5.04
Mold score <sup>2</sup>	1.0	1.83	1.58	1.00

<sup>1</sup>Yields based on single cutting, DM = dry matter.

<sup>2</sup> Mold score of 1 = no visible surface mold to 5 = surface completely moldy.

Table 3. Lactation performance of Holstein cows fed warm-season baleage crops.

Item	Summer Crop Evaluated			
	Signalgrass	Bermudagrass	Sorghum	Rye grass
Forage intake, lb DM	23.5 <sup>b</sup>	27.1 <sup>c</sup>	18.3 <sup>a</sup>	21.1 <sup>b</sup>
Grain intake, lb DM	24.6	24.6	24.6	24.4
Total DM intake, lb	48.2 <sup>b</sup>	51.7 <sup>c</sup>	42.9 <sup>a</sup>	45.5 <sup>ab</sup>
Milk yield, lb	61.6	60.5	61.6	65.8
Milk fat, %	3.52	3.58	3.31	3.37
3.5% FCM yield, lb	63.1 <sup>b</sup>	60.1 <sup>a</sup>	59.2 <sup>a</sup>	64.2 <sup>b</sup>

<sup>abc</sup> Values in a row with different superscript letters differ statistically.

## **Variation in the Male to Female Ratio in Calves Born on Selected Farms in Louisiana, Mississippi, and New York**

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Sperm cells determine the sex of the offspring in mammals. Sperm cells carry either an X chromosome, which produces a female, or a Y chromosome, which produces a male. Variation has been shown to exist in the number of X-chromosome carrying sperm cells versus Y-chromosome carrying sperm cells per ejaculate (lot). The difference is not by bull, but instead, by lot. When commercial collection facilities package and ship straws of semen, usually one cane holds 10 straws, with a high probability of their being from the same lot of semen. This could explain why some producers using artificial insemination seem to have so many of the same sex calves from purchased semen. It is important to further prove this finding by breeding several cows with the same ejaculate and determining the ratio of male to female calves for each ejaculate.

Thirty-nine ejaculates from eight different bulls (between 3 and 6 lots per bull) were used to breed many dairy cows. About 500 total cows were bred with different lots of semen. The cows bred live in Louisiana, Mississippi, and New York. When they calved, the sex of the newborn was recorded and reported to the researchers for analysis. As expected, a definite variation existed between lots. The percent male calves varied from 100 percent to 20 percent with the data collected at this time (Figure 1). More data is expected before a final conclusion will be made.

Further analysis of the lots will be done with conventional polymerase chain reaction (PCR) and Real-Time PCR before this work is published. PCR is a biochemical technique that allows the researchers to actually determine the percent X and Y chromosomes in the total ejaculate. The calf sex data, Real-Time PCR, and conventional PCR data will all be compared to confirm the final result.

If this data is correct, two conclusions could occur. First, different lots of semen from bulls should be mixed to produce a 50% chance of males and females. Second, PCR could be used to analyze a lot of semen for its sex percentage and the straws could be marketed as such.

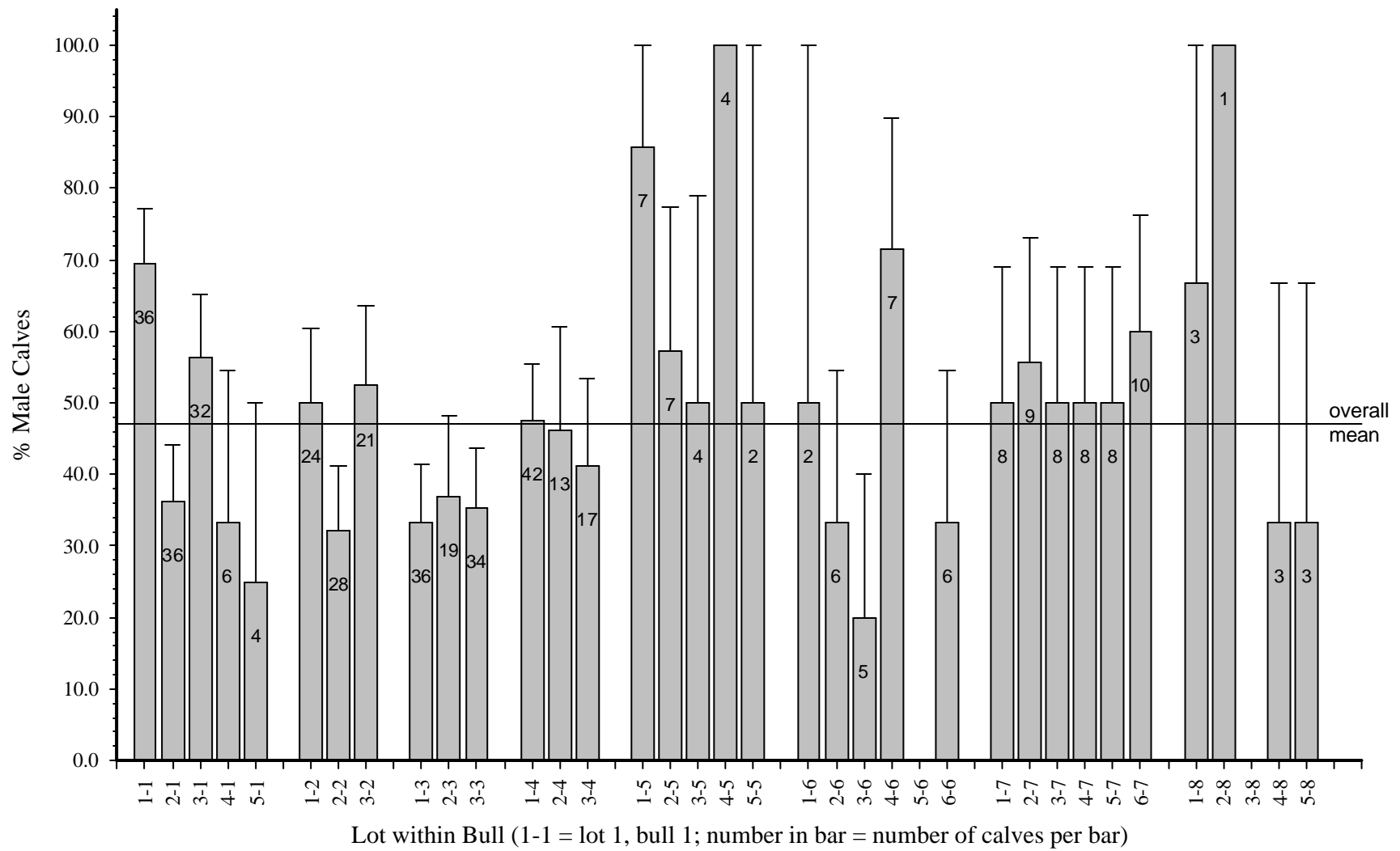


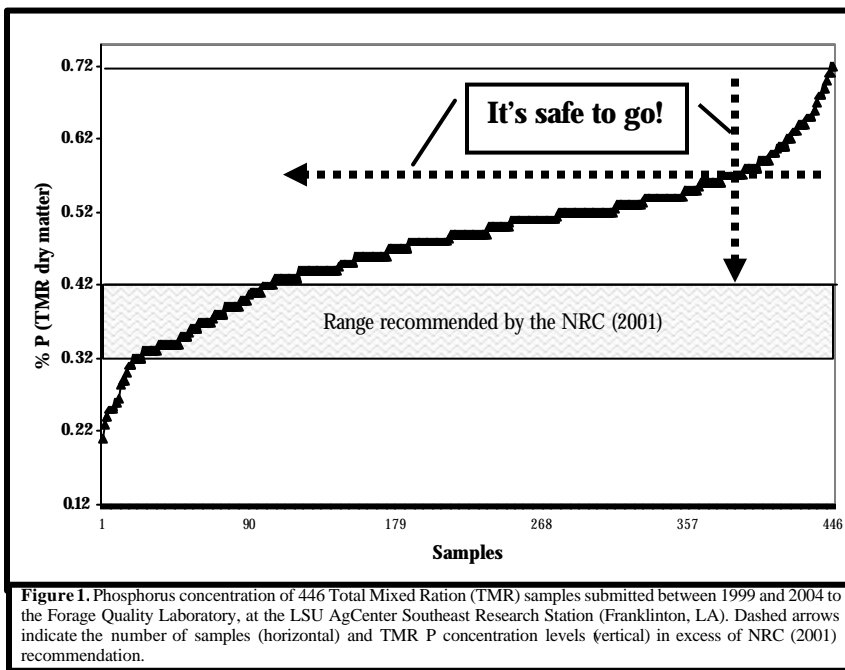
Figure 1

## Phosphorus Supplementation for Lactating Dairy Cows

Vinicius R. Moreira

**Introduction.** An adequate nutrient management plans should include a complete and accurate record of nutrient inputs and outputs from the various sections of the farm, such as a yard, a field, and the entire operation. Most phosphorus (P) is brought into dairy farms in feeds and fertilizer and leaves the property as cash crops, milk and animals sold. For instance, soils should be analyzed before spreading manure onto the fields to recycle nutrients. Only imbalances should be corrected with commercial fertilizers to supply the required nutrients for growing a specific crop. Likewise, dairy diets need to be prepared with extra caution to avoid overfeeding.

Current P feeding recommendations for high-producing dairy cows range from 0.32%-



**Figure 1.** Phosphorus concentration of 446 Total Mixed Ration (TMR) samples submitted between 1999 and 2004 to the Forage Quality Laboratory, at the LSU AgCenter Southeast Research Station (Franklinton, LA). Dashed arrows indicate the number of samples (horizontal) and TMR P concentration levels (vertical) in excess of NRC (2001) recommendation.

0.42% of the diet dry matter (NRC, 2001). However, most dairy farmers seem to feed well above this range, with Total Mixed Ration (TMR) P contents averaging 0.49% of the dry matter (Figure 1, adapted from Moreira and Walz, 2004). Many trials evaluating overfeeding lactating cows suggest that excess P does not translate into extra benefits in production

or reproduction (Lopez et al., 2004ab, Wu et al., 2001).

On the other hand, one of the major concerns of dairy nutritionists is that the P availability varies with different types of feedstuffs and therefore overfeeding could be justified to avoid the risk of deficiency. The ongoing research project is aimed at improving P feeding efficiency by manipulating dairy diets to take advantage of cows' natural ability to mobilize calcium (Ca) and consequently P from their bones during early lactation.

**Current experiment.** Serum Ca levels are tightly controlled by hormones that influence bone mobilization and/or intestinal absorption. That is because Ca participates in very important body functions such as muscle contraction and milk protein secretion (casein). For this reason, Ca metabolism is particularly important in the first few weeks of lactation. During that period, Ca is mobilized from the bones along with P, mainly as hydroxyapatite. The question is that, in a practical situation, do we need to feed low Ca

diets to promote P bone mobilization in early-lactation dairy cows or can bone mobilization be stimulated by low dietary P content alone?

**Materials and Methods.** The approach chosen to evaluate that hypothesis was to draw blood samples from 48 third-lactation cows during the transition period (days -10, 1, 15 and 30 relative to calving date) and analyze serum for markers that indicate bone mobilization. Cows are brought to the Calan gates barn in groups of eight and remain confined from at least 20 days before calving until the last cow reaches 30 days in milk. Each cow is assigned to one of four diets containing either 10% below or 15% above Ca and P recommended supply, according to the NRC (2001). Treatments are fed twice daily as TMRs. Feces are collected for three consecutive days when a group of cows averages 20 days in milk, to confirm that rations are supplying Ca and P according to the designed levels. Additionally, dry matter intake, milk production and composition, body condition scores and body weights are recorded as complementary information.

**Results.** Currently two groups of cows have completed the protocol. We expect to complete a third group at the end of the spring.

**Table 1.** Current averages across treatments.

	<b>Intake fresh wt. (lb/d)</b>	<b>Milk (lb/d)</b>	<b>Butterfat (%)</b>	<b>Protein (%)</b>	<b>SCC (,000)</b>	<b>BCS Loss</b>	<b>BW loss (lb/d)</b>
Averages	76.4	93.7	3.40	3.00	245.4	0.5	5.23

**Conclusions.** At this moment we know that feeding excess P is an unnecessary cost to farmers, not only directly related to P supplementation, but also indirect economic, social and environmental costs. We estimated that 2,165 lb of P, costing approximately \$2,244, is over-supplemented yearly in an average dairy farm and 362 tons of P inputs could be avoided in Louisiana if current feeding practices are adjusted. Additionally, reducing dietary P could limit indirect expenses, such as increased hauling costs for manure spreading over larger areas and manure removal from the farm boundaries. It may also reduce the need for fertilizer purchase, provided that N conservation measures are taken to maintain N to P ratio closer to crop requirements (~7:1). Finally, along with management practices to reduce soil erosion, lowering manure P content will reduce P load into public waters from agriculture.

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## **The Effects of Dietary Anion-cation Difference on Component-fed Dairy Cattle during the Summer**

**Jerry Ward and Laura Zeringue**

Four trials (1997, 1998, 1999, and 2001) were conducted to determine the effect of increasing dietary cation-anion difference (DCAD) on animal performance of cattle during hot weather. DCAD was increased by adding sodium bicarbonate and potassium carbonate. These two ingredients were added so that half of the increase in DCAD came from each source. The sodium bicarbonate and potassium carbonate were added to the grain mix, which was fed separately from forage. Grain was fed twice a day, before each milking, and forage was offered for ad libitum consumption. Milk production and DMI were measured daily. Milk component analyses were conducted on composite samples collected from two consecutive milkings at 14-d intervals. All trials were conducted during the summer. Amount of grain fed was determined by milk production.

In 1997 mid- to late-lactation cows were used. The forage consisted of corn silage and grain was fed at the rate of 0.4 lbs of grain/lb of milk produced. The study was initiated August 27 and was terminated September 24. In 1998 the corn silage was used as the forage and the study was conducted May 29 through September 3. Grain was fed at the rate of .28 lb/lb of milk produced. Mid-to late-lactation cows were used. In 1999 mid- to late-lactation cows were used and ryegrass haylage was used as the forage source. Grain was fed at the rate of .33 lb/lb of milk produced. In 2001 cows were placed on dietary treatment the day of calving and left on respective treatment for 56 d. Forage in this study consisted of (DM basis) 52.4% corn silage, 11.2% ryegrass haylage, 15.1% alfalfa hay, 15.5% whole cottonseed, and 5.3% soybean meal. Eighteen pounds of grain/d was fed. DCAD of the grain treatments in the four trials were 20 meq/kg, 44 meq/kg and 68 meq/kg. When corn silage was fed as the forage that made the final total DCAD of the three treatments approximately 25, 34, and 42 meq/kg. When ryegrass was used as the sole forage, final DCADs were 48, 58, and 68 meq/kg. This was done to see if there was a threshold DCAD that had to be met before increasing DCAD would be beneficial. In the final experiment with the mixed forage, the final DCAD of the control diet was approximately 28 meq/kg and the diets containing increased DCAD were about 45 meq/kg.

Calculations showed that as sodium bicarbonate and potassium carbonate were added to the grain mix, net energy decreased in the ration. This could have potentially masked any positive effects of increasing DCAD in the first three experiments. In the fourth experiment fat was added such that the diet containing both increased DCAD and fat had similar net energy to the control diet.

The results of these four experiments show that when grain is fed separately from forage, increasing DCAD had no beneficial effect. One benefit typically seen in TMR fed herds with increasing DCAD is increased butter fat because of the buffering ability of sodium bicarbonate and potassium carbonate. The results of urine pH analysis during 1998

showed that the increased DCAD was altering systemic acid-base balance and the metabolically increased DCAD was active; however, none of the studies showed economic responses or improved production because of increased DCAD.

Table 1. Effects of DCAD on animal performance during 1997.

Treatment	1	2	3	Std Err	Significance
Butter fat, %	4.33	4.40	4.01	0.11	NS
Milk protein, %	3.52	3.44	3.48	0.03	NS
Milk production	62.8	57.0	62.3	0.5	NS
FCM, lbs	71.8	65.3	67.5	1.1	NS
DM intake, lbs	45.3	42.2	44.7	0.2	NS

Table 2. Effects of DCAD on animal performance during 1998.

Treatment	1	2	3	Std Err	Significance
Butter fat, %	3.60	3.67	3.64	0.08	NS
Milk protein, %	3.14	3.20	3.18	0.05	NS
Milk production	64.5	65.5	64.3	1.5	NS
FCM, lbs	64.6	66.3	64.2	1.2	NS
DM intake, lbs	42.6	43.7	43.8	0.8	NS
Urine pH	7.93	8.19	8.24	0.08	Linear

Table 3. Effects of DCAD on animal performance during 1999.

Treatment	1	2	3	Std Err	Significance
Butter fat, %	3.29	3.33	3.37	0.07	NS
Milk protein, %	3.05	3.02	2.98	0.05	NS
Milk production	61.6	62.3	61.9	1.6	NS
DM intake, lbs	44.0	43.7	44.0	0.9	NS

Table 4. Effects of DCAD and fat on animal performance during 2001.

Treatment <sup>1</sup>	D <sup>-</sup> F <sup>-</sup>	D <sup>-</sup> F <sup>+</sup>	D <sup>+</sup> F <sup>-</sup>	D <sup>-</sup> F <sup>+</sup>	Std Err	Significance
Butter fat, %	3.21	3.34	3.22	3.39	0.18	NS
Milk protein, %	2.73	2.82	2.74	2.88	0.07	Fat P<0.10
Milk, lbs	79.1	78.3	77.6	71.7	4.2	NS
DM intake, lbs	42.6	43.9	45.0	44.0	1.6	NS

<sup>1</sup> D = DCAD, F = Fat, <sup>+</sup> = increased, <sup>-</sup> = not increased.

## Sprinkler Cooling of Lactating and Non-lactating Holstein Cows.

**Jerry Ward and Laura Zeringue**

In an effort to minimize water usage while maintaining cooling efficiency, a study was conducted to determine the effects of using a humidistat to control the sprinklers rather than strictly time of day. Cows were separated into two groups based on parity, DIM, and milk production. All cows were housed in the same free-stall barn, and the only difference in management between the two groups was sprinkler control. Cows were fed a corn silage-based PMR that contained whole cottonseed, soybean meal, and alfalfa hay. All cows were fed a 20% CP (as is basis) concentrate twice daily based on milk production.

When the sprinklers were operating, they were on for 2 minutes and off for 13 minutes in a 15-minute period. One group had its sprinklers turned on at 7 a.m. and turned off at 8 p.m. The other group's sprinklers were turned on anytime the humidity fell below 80%. This was controlled with a humidistat. Groups were assigned to treatment and allowed a two-week adaptation period with data collected during the third week. Groups were then switched to the treatment for a two-week adaptation period with data collected during the third week. The results are shown in the following two tables.

Table 1. Effects of humidistat control of sprinklers Aug. 7-13.

Parameter	Standard control	Humidistat control	Prob
AM body temperature	101.5	101.4	NS
PM body temperature	101.7	102.0	P<0.04
Milk production	59.6	57.7	P<0.01
Sprinkler operation., hrs	13	8.1	
No heat stress, hrs	8.4		
Mild heat stress, hrs	11.6		
Moderate heat stress, hrs	4		

Table 2. Effects of humidistat control of sprinklers Sept. 4-10.

Parameter	Standard control	Humidistat control	Prob
AM body temperature	101.9	101.4	P<0.06
PM body temperature	102.4	102.6	NS
Milk production	51.5	55.4	P<0.001
Sprinkler operation, hrs	13	11.6	
No heat stress, hrs	4.2		
Mild heat stress, hrs	15.6		
Moderate heat stress, hrs	4		

During the first data collection period, the sprinklers remained on less time than the timed sprinklers. This caused an increase in body temperatures during the evening and decreased milk production in the group that had sprinklers controlled by the humidistat;

however, during the second data collection period the amount of time the sprinklers remained on was more similar and the cows in the humidistat group had lower a.m. body temperatures and higher milk production. The results of this experiment indicate that relying on humidistat control can decrease water use for cooling by limiting the amount of time the sprinklers remain operating. This can lead to decreased animal performance, however. The data from the first period indicates that even during times of high (more than 80%) humidity, sprinklers that completely wet the cow can cool the cows. This is probably through heat transfer from the animals to the water that is running off the cows. Eight p.m. was chosen as a cut-off time for the sprinklers in the control group because we felt that as humidity increased at night, sprinkler efficiency would decline. The data from this experiment shows that this assumption needs to be investigated further and that leaving the sprinklers on later in the evening could increase cow cooling and production. This would increase costs associated with sprinkling and waste water disposal but may provide economic benefits of cooling. More research is needed.

A third experiment was conducted to determine the effects of cooling during the 28 d prior to expected calving. Cows were divided into two groups based on parity and expected calving date. Half were provided shade and half were provided shade with fans and sprinklers. Before calving, all cows were fed bahiagrass hay free choice and 10 lbs of a 20% (as is basis) concentrate. After calving, all cows received a PMR containing corn silage, alfalfa hay, and whole cottonseed free choice. In addition, primiparous cows were offered 9 lbs of the above concentrate before each milking, and multiparous cows were offered 12 lbs of the concentrate before each milking. After calving, all cows were provided with shade, sprinklers, and fans. Before calving, rectal body temperature was recorded a.m. and p.m. every Monday, Wednesday, and Friday. Colostrum samples were collected at calving to determine quality. Milk production and dry matter intake were recorded daily. Milk quality was measured at two-week intervals. The results are shown in Table 3.

	No sprinklers	Sprinklers and Fans	Prob
AM body temperature	101.5	101.6	NS
PM body temperature	102.4	101.9	P<0.01
Pre calving intake	19.8	19.1	NS
Post calving intake	38.8	39.5	NS
Milk production	79.1	78.0	NS
Butter fat	3.0	3.2	P<0.08
Colostrum quality	56.1	86.2	P<0.08

Sprinkling before calving was effective in cooling cows during the afternoon. It had no effect on a.m. body temperatures but they were well within the normal range for both groups. The lower body temperatures did not translate into increased dry matter intake in cooled cows. Also there were no post calving effects of pre-calving cooling on dry matter intake or milk production. Pre-calving cooling did lead to better colostrum quality and higher butter fat after calving. In the no-sprinklers group colostrums was below 60 mg/dl, the threshold for high quality colostrum. Cows in the sprinkled group were well above this threshold and produced very high quality colostrums. These data indicate that pre-partum cooling may be beneficial in Louisiana.

# **The Effects of Feeding Yeast Culture During the Transition Period of Holstein Cows During the Summer**

**Jerry Ward and Laura Zeringue**

**Introduction.** During the hot, humid Louisiana summers, DM intake and milk production decrease. Many producers time their breeding to avoid freshening cows during July, August, and early September. This helps alleviate individual cow performance losses but can lead to uneven production across months and can increase days open. From 1997 through 2002, September, October, and November had the highest average pay prices for milk. To be at peak production at these times of high milk prices, cows need to freshen in July, August, and September. In an analysis of milk production by cows freshening in different months, Adkinson and Hay found that cows calving during July, August, and September produced less total milk than cows calving later in the year. Therefore, nutritional and management strategies need to be developed that will allow producers to take advantage of seasonally high milk prices without giving up production.

Feeding yeast culture during the transition period appears to be one such strategy. Therefore, we conducted three experiments to determine the effect of feeding yeast culture during the transition period on production of Holstein cows calving during hot, humid weather.

## **Materials and Methods**

A series of experiments was conducted to determine the effects of feeding yeast culture during the transition period when the weather was hot and humid. In the first experiment, cows were fed 57 g of yeast culture per d beginning 21 d before expected calving date and 114 g of yeast culture through 21 d post parturition. Calving occurred between Sept. 10 and Oct. 21. Cows were fed a 20% CP (as is basis) concentrate consisting of ground corn, soybean meal, and minerals and a partially mixed ration (PMR). The PMR consisted of (DM basis) 14% whole cottonseed, 41.3% corn silage, 22.4% sorghum silage, 14% alfalfa hay, and 8.4% of 48% protein soybean meal. Daily milk production was measured for 100 d. Body condition scores were recorded on d 0, 30, and 60. Monthly DHIA records were used to determine milk composition. Cows used on this experiment were housed with cows in a production herd and were given ad libitum access to the above PMR until Nov. 21 and then were given access to annual ryegrass pastures for 6 h day and ad libitum access to a PMR consisting (DM basis) of 18.2% whole cottonseed, 38.0% corn silage, 19% sorghum silage, 15.9% alfalfa hay, and 8.9% of 48% protein soybean meal during the nighttime. When PMR was being offered, cows had access to free stalls and grass paddocks.

In the second experiment, cows were fed 57 g of yeast culture per d beginning 21 d before expected calving date and 114 g of yeast culture through 21 d post parturition. Cows were fed a commercially available 20% (as is basis) CP pellet and a PMR consisting of (DM basis) 32.7% alfalfa hay, 20.9% whole cottonseed, 28.5% corn silage,

and 17.9% ryegrass haylage. Daily milk production and DMI were measured for 60 d. Milk composition and BHBA were measured at 10-d intervals throughout the experiment. Body condition scores were measured on d 0 and 60. Cows were housed in a free-stall barn equipped with fans and electronic Calan doors.

In the third experiment, two different yeast supplementation regimens were used. Both began receiving 57 g of yeast culture per d 21 d before expected calving date. One group received 114 g of yeast culture per d through 21 d after parturition and the other received 114 g of yeast culture per d through 56 d after parturition. The PMR in this experiment consisted of (DM basis) 13% alfalfa hay, 15.9% whole cottonseed, 63.5% corn silage, 6.6% of 48% soybean meal, and .9% calcium carbonate. Daily milk production and DMI were recorded throughout the 56-d study. Milk composition was measured at 14-d intervals throughout the study. BHBA was measured on d 7, 14, 21, 28, and 56 after parturition. Body condition scores were measured on d 0 and 56. Cows were housed in a free-stall barn equipped with fans and electronic Calan doors.

For all three experiments, before parturition, cows were fed 4.5 kg of a 20% CP (as is basis) concentrate (this same concentrate was fed during lactation), ad libitum access to bermudagrass hay and pasture and 4 kg of DM from corn silage every other day. Daily management of milking cows was the same for all three experiments. They were component fed with one-half of their daily concentrate offered before each milking. Then the cows were placed in a wash pen for 4 min to clean the udders. Cows were allowed to air dry and then were milked. Cows were then returned to housing where they had ad libitum access to the PMR, which was weighed and offered twice daily. Incidences of disease and metabolic disorders were recorded daily.

Milk production, intake, repeated BHBA, and milk component data were analyzed using the mixed models of SAS. Changes in body condition score and the analysis of BHBA data from d 56 in experiment three were analyzed using the general linear models of SAS. Differences among treatments were determined using single degree of freedom contrasts. In experiments 1 and 2, the contrast was yeast vs no yeast. In experiment 3, the contrasts were yeast vs no yeast and short supplementation regimen vs long supplementation regimen.

To measure BHBA, blood was collected via coccygeal venipuncture into vacutainer tubes containing sodium heparin. Blood was centrifuged at 2200 x g for 30 min at 5° C for 30 min. Plasma was stored at -18° C until determination of BHBA by Sigma Kit number 310-A.

Milk samples were composite samples of two consecutive milkings and were analyzed by the Louisiana DHIA laboratory. Samples of concentrate and PMR were collected weekly and analyzed by the SERS Forage Quality Laboratory, a NFTA-certified laboratory. Values reported are means of all samples.

## **Results and discussion**

In experiment 1, feeding yeast culture increased milk production and slowed BCS loss between d 0 and d 100 and tended to slow BCS loss from d 0 to d 50; however, milk composition was not affected; neither was BCS change from d 50 through d 100. Peak milk and days to peak milk were not altered by yeast culture.

In experiment 2 dry matter intake and milk production were increased by feeding yeast culture; however peak milk, days to peak milk, peak dm intake, and days to peak intake were not altered by yeast culture. Also BHBA and efficiency of DM use were not changed by yeast culture.

In experiment 3, feeding yeast culture tended to decrease DM intake but increased efficiency of feed use, so milk production was not affected. Feeding yeast culture for 56 d post parturition increased efficiency of DM use more than just feeding yeast culture for 21 d post parturition, causing cows receiving yeast for 56 d after calving to produce more milk than cows fed only yeast culture for 21 d after calving. During the first 28 d post parturition, BHBA was not affected by dietary treatment but, by d 56, cows on the long yeast culture supplementation regimen had lower BHBA than cows that stopped receiving yeast culture 21 d after calving. Feeding yeast culture also decreased the days to peak milk although peak milk, peak intake, and days to peak intake were not altered by yeast culture supplementation.

It appears that DM intake was limiting in experiment 2 and that improvements due to yeast culture increased DM intake and therefore milk production. This modulation could have been through increased DM digestibility or rate of passage or both. It appears that DM intake was not limiting milk production in experiment 3, however. Improvements caused by yeast culture in experiment 3 increased efficiency of DM use, but not milk production. The differences in results between the two experiments could be related to levels of heat stress. During experiment 2, the summer was hotter than during the summer of experiment 3. Hourly observations in the thermo-neutral zone were higher during experiment 3 and hours in the moderate and severe zones were also lower during experiment 3. In addition, average daily low temperature and THI and average daily high for temperature and THI were lower in experiment 3.

The differences in heat stress were also supported by differences in health problems between the two experiments. During experiment 3, the cooler year, there was one case of metritis, one case of foot rot, and an average of 0.37 mastitis treatments per cow. In contrast, during experiment 2, there were 19 cases of metritis, 28 other disease instances, and an average of 1.0 mastitis treatments per cow.

The results of these three experiments combined indicate that feeding yeast during the transition period of dairy cattle during hot weather is beneficial, but the level of heat stress can modulate the effects as well as the magnitude of effects.

Table 1. Results from experiment 1.

	Yeast	No yeast	Prob
Milk production, lbs	81.87	77.78	.0185
Milk fat, %	3.75	3.63	.77
Milk protein, %	3.13	3.14	.9322
Peak milk, lbs	92.56	94.08	.6576
Days to peak	69.56	62.78	.3749
BCS 0-50	-.35	-.54	.1417
BCS 0-100	-.38	-.63	.0418
BCS 50-100	.04	.07	.52

Table 2. Results from experiment 2.

	Yeast	No Yeast	Prob
Bhba	8.9	9.2	.8225
BCS 0-60	.96	1.02	.61
Milk production, lbs	87.00	84.50	.0855
DMI, lbs	47.486	46.371	.0219
Efficiency	1.84	1.85	.908
PMR intake, lbs	27.919	26.816	.0213
Milk fat, %	2.859	3.019	.45
Milk protein, %	2.68	2.77	.1961
Peak milk, lbs	106.31	105.72	.88
Peak milk, days	45.96	40.58	.32
Peak DMI, lbs	75.126	73.444	.3705
Peak DMI, days	50.107	51.49	.5648

Table 3. Results from experiment 3.

	No yeast	Short yeast	Long yeast	yeast	time
SCC	1.98	1.73	1.82	.23	.639
BCS 0-56	-.49	-.41	-.48	.69	.59
Milk protein, %	2.81	2.74	2.60	.09	.12
Milk fat, %	3.43	3.54	3.67	.50	.65
Bhba D 56	7.20	7.54	5.11	.44	.07
Peak Milk, lbs	88.55	88.86	96.27	.45	.24
Peak Milk, day	51.20	43.16	45.76	.08	.55
Peak DMI, lbs	69.32	68.97	70.89	.69	.29
Peak DMI, day	48.85	50.27	50.25	.37	.99
Bhba 0-28	5.91	5.84	6.22	.385	.61
DMI, lbs	44.02	43.07	43.02	.15	.95

PMR Intake	27.64	26.73	26.95	.21	.76
Grain intake, lbs	16.37	16.34	16.07	.19	.06
Milk production	74.40	74.18	79.90	.19	.0174
Efficiency	1.69	1.71	1.85	.004	.0002

Table 4. Average values of heat stress measurements during experiment 2 and 3.

	Experiment 2	Experiment 3
Hours in HSZ1	5.1	6.4
Hours in HSZ2	9.4	11.0
Hours in HSZ3	9.1	6.6
Hours in HSZ4	.4	0
Maximum THI	83.6	82.3
Minimum THI	69.8	68.6
Maximum Temperature	89.7	85.3
Minimum Temperature	69.8	68.6

HSZ1 = Thermo-neutral zone or THI less than 72.

HSZ2 = Mild heat stress or THI between 72 and 80.

HSZ3 = Moderate heat stress or THI between 80 and 90.

HSZ4 = Severe heat stress or THI greater than 90.

**Heifer Mastitis Project Protocol  
(2004- 2005 Calving Season)**

**Project Leader: Gary Hay, LSU Dairy Science Dept. (225-578-4411)**  
**Cooperators: Mike McCormick, Southeast Research Station (985-839-2322)**  
**Bill Owens, Hill Farm Research Station (318-927-2578)**

Numerous research trials on intramammary infusions of commercial dry cow antibiotics have shown positive results in prepartum dairy heifers for early lactation mammary infections, somatic cell counts and milk production. Several studies have shown dry treating heifers reduced the number clinical and subclinical mastitis cases and reduced somatic cell counts in early lactation. Results for increasing lactation milk production have been mixed with some studies showing substantial gains in early and total lactation milk production and some studies showing no change in milk production from untreated controls. A study was initiated in the summer of 2004 to further examine the effects of prepartum dry treatment of heifers in Louisiana. The cooperative study included heifers from the Hill Farm Research Station in Homer, La; the Southeast Research Station in Franklinton, La; and the LSU Campus Dairy in Baton Rouge, La. The objective of the study was to determine the effects of treating prepartum heifers with a commercially available dry cow treatment 30 and 60 days prior to calving on milk yield, postpartum intramammary infection rate and somatic cell count during first lactation.

Approximately 100 heifers were included in the study. The dry cow medication used was Quartermaster®. Individual mammary quarter samples were taken on all heifers on the study at 30 and 60 days prepartum and immediately prior to the 12<sup>th</sup> milking postpartum. Microbiological cultures and somatic cell counts were taken on all samples. Changes in microbiological profiles pre and post calving were examined along with early lactation somatic cell counts in all heifers. Peak and summit milk from DHIA tests were also collected on all heifers. Differences between treatment groups were tested to determine differences in microbiological infections, somatic cell counts, early lactation milk production and total lactation milk production. Antibiotic screening (Delvo P®) tests were also run on all heifers beginning prior to the 6<sup>th</sup> milking and continuing at each milking until two consecutive tests had negative results. Antibiotic screening was performed to insure dry treating heifers at 30 days prepartum did not increase the amount of time milk had to be dumped postpartum.

Complete results and analysis of the study data should be complete by early summer 2005.

## **Alfalfa Baleage Production: Yield, Persistence, Quality, and Economics (2-yr. Summary)**

**Mike McCormick, Tara Doughty, Catherine Coxe, Randy Walz, and Brad Venuto**

**Introduction.** Alfalfa is a key dairy forage in much of the United States; however, insects, low soil pH, and disease limit productivity in Louisiana. In addition, high rainfall conditions often limit successful alfalfa hay production. Following is a two-year summary of an alfalfa verification project designed to determine the productivity and longevity of a relatively new alfalfa variety, 'Amerigraze 702.' We were also interested in the feasibility of storing alfalfa as baleage.

**Procedures.** A 12-acre field was sprayed with a quart of Round-up and disked in the late fall of 2002. Approximately two tons per acre of dolomite lime were applied two months before planting to raise soil pH to 7.0. On November 30, the field was planted with 25 pounds of live seed. At planting, sulfur, boron, phosphorus and potash were applied according to soil recommendations. Fertilizer was applied twice during each of the 2003 and 2004 growing season to compensate for P and K removed as baleage. Herbicides and insecticides were applied as needed. Boron and sulfur were applied in the spring of each year. Forage was allowed to accumulate for a minimum of six weeks between harvests because research conducted by Brad Venuto indicated alfalfa stands in Louisiana persisted longer when harvested at late maturity. All harvests were at full bloom stage of maturity except for those taken in early spring and late fall (early bloom). Alfalfa forage was cut with a mower conditioner, allowed to wilt in windrows for 24 hours, baled (4'x 4.5'), and individually wrapped with six layers of white stretch film. High quality baleage was fed to the milking herd and low to moderate quality alfalfa baleage was fed to growing Holstein heifers.

**Results.** Stand density declined from approximately seven alfalfa plants/ft<sup>2</sup> in the spring of 2003 to four plants/ft<sup>2</sup> in late fall of 2004. Weed contamination averaged 1.7 plants/ft<sup>2</sup> in 2003, but increased to 4.3 plants/ft<sup>2</sup> in 2004. In 2003, five cuttings of alfalfa yielded 4.9 tons of hay equivalents per acre (11.5 bales per acre). In 2004 four cuttings yielded 5.2 tons of hay equivalents per acre (12.4 bales per acre). Harvest intervals ranged from 45-60 days. Alfalfa baleage dry matter concentrations varied from 42% to 72%. All bales appeared to store well as baleage, though mold was more prevalent in the drier bales. Baleage protein concentration ranged from a high of 23.6% to a low of 14.0% with relative feed value (RFV) ranging from 88 to 164. In 2003 protein and RFV averaged 17.2% and 130, respectively, and in 2004 protein averaged 17.5% and RFV averaged 111. Lower RFV in 2004 was likely related to high weed contamination. An economic analysis revealed total establishment costs of \$319.70 per acre (direct and fixed costs) and annual fertilizer, pesticide, and harvest costs of \$365.21 per acre. The two-year total hay value was \$1269.00/acre; total production costs, including establishment, were \$1050.11/acre for a total net return of \$218.89/acre or \$109.45/acre annually. These data indicate that alfalfa grown in Louisiana will produce yields comparable to other parts off the country, but stand persistence and quality may limit profitability.

**Alfalfa Yield, Quality, Stand Persistence and Market Value , 2003.**

Cutting Date	Bales Per Acre*	Tons Hay Equiv./Acre	Protein	TDN,%	Alfalfa Per Square Foot	Weeds Per Square Foot	Market Value Per Acre
4/16/2003	2.25	1.06	18.64	63.94	6.80	0.76	\$169.60
5/30/2003	2.42	1.10	19.19	60.63	6.06	2.02	\$110.00
7/22/2003	3.67	1.37	16.58	59.39	4.84	0.86	\$123.30
9/9/2003	2.25	0.94	13.67	66.00	4.93	3.21	\$122.20
10/15/2003	0.87	0.43	17.83	67.64	4.41	1.90	\$51.60
<b>Average</b>	<b>2.29</b>	<b>0.96</b>	<b>17.18</b>	<b>63.52</b>	<b>5.41</b>	<b>1.75</b>	<b>\$115.34</b>
<b>Season Total</b>	<b>11.46</b>	<b>4.90</b>					<b>\$576.70</b>

**Alfalfa Yield, Quality, Stand Persistence and Market Value , 2004**

Cutting Date	Bales Per Acre*	Tons Hay Equiv./Acre^	Protein^	TDN,%^	Alfalfa Per Square Foot^	Weeds Per Square Foot^	Market Value Per Acre^
3/23/2004	3.00	1.18	23.63	66.34	7.17	1.91	\$182.90
5/25/2004	4.50	1.96	18.09	58.09	6.17	2.50	\$264.60
7/6/2004	3.17	1.55	13.95	54.11	5.29	8.08	\$186.00
8/24/2004	1.17	0.49	14.33	59.98	4.23	4.72	\$58.80
10/26/2004	0.58	N/A	N/A	N/A	N/A	N/A	N/A
<b>Average</b>	<b>2.48</b>	<b>1.29</b>	<b>17.50</b>	<b>59.63</b>	<b>5.71</b>	<b>4.30</b>	<b>\$173.07</b>
<b>Season Total</b>	<b>12.42</b>	<b>5.18</b>					<b>\$692.30</b>

\* Based on 4' x 4 1/2' bales of hay containing an average of 53.6% dry matter.

^ Based on 4 cuttings

**Costs and Returns for Alfalfa Bale Silage Production.**

Year	Value of Alfalfa Hay Equiv. Per Acre	Costs of Production Per Acre	Net Return Per Acre
2002	\$0.00	\$320.84	(\$320.84)
2003	\$576.70	\$318.99	\$257.71
2004	\$692.30	\$416.14	\$276.16
<b>Total</b>	<b>\$1,269.00</b>	<b>\$1,055.97</b>	<b>\$213.03</b>

\* Establishment costs.

Quality classification determined using Agricultural Marketing Service @USDA, Web site: www.ams.usda  
Market prices calculated at nearest dated Oklahoma quotes from "Hay and Forage Grower" plus \$50.00/ton shipping.

## **Performance of Warm-season Annual Forage Crops at the Southeast Research Station, 2004**

**Tara Doughty, Jerry Simmons, Ruben Anders, Mike McCormick**

Pearl millet, sorghum x sudangrass and forage sorghum are annual warm-season varieties recommended by the LSU AgCenter for summer grazing and greenchop and for the production of hay and silage/baleage. Each year varieties of each species are evaluated for agronomic performance. Researchers at Southeast Research Station conducted the 2004 trials.

The summer annual performance trials are open to all public and private breeding programs. Both commercially available and advanced experimental lines may be entered for consideration. Multiple varieties of each species from several sources are entered into each year's trials at the Southeast Research Station.

The trials are conducted each year using production practices recommended by the LSU AgCenter for each species. The application rates of phosphorus (P), potassium (K), lime and trace elements are determined by regular soil testing. Applications of pesticides are on an as-needed basis to control insects, weeds and diseases.

The trials are conducted in randomized complete block designs with three replications of each plot. Researchers harvest the plots periodically throughout the growing season and collect data from each trial. The plots are cut approximately 45 days after planting, and subsequent harvests made at approximately 30-day intervals.

Data gathered from the harvests is then analyzed and the total forage yield per variety per season, as well as per cutting, is determined. Cumulative forage yield data are combined for one to three years and analyzed by analysis of variance procedures to evaluate variety yields. The least significant difference (LSD) value represents the minimum amount by which variety yields must differ to be considered statistically different from one another. If differences are not detected among varieties, the LSD value is not indicated.

### **Pearl Millet**

Pearl millet is a summer annual grass suitable for use on well-drained upland soil. It tolerates drought stress more easily than sorghum x sudangrass hybrids, and it is capable of tolerating more acidic soils. It has a tendency to tiller out from the base of the plant, improving the ability to recover from harvesting. Unlike sorghum x sudangrass, pearl millet does not contain prussic acid.

Pearl millet can be recommended for grazing, hay and baleage. The slow drying time of this forage may limit the use of pearl millet as a hay crop, and relatively low yields, when compared to corn and forage sorghum, limit its use as a silage crop. Grazing should be delayed until the plants are 18 to 20 inches tall and hay should be harvested when the plants are 30 to 40 inches tall or in the boot stage, whichever comes first.

Pearl millet varieties were planted at the rate of 25 lbs./acre with a drill on June 10, 2004, at the Southeast Research Station. Phosphorus (P) and potassium (K) were applied at planting at the rate of 48 lbs./acre for each. Nitrogen (N) was applied at planting, at establishment and after the first cutting for a total of 118 lbs./acre/season.

<b>3-year Results, Pearl Millet, 2002-2004</b>		
<b>Entry #</b>	<b>Variety</b>	<b>Avg. Lbs/Acre Dry Matter</b>
31	Tifleaf 3	5946
22	Tift Exp. #4	5549
28	MilHy 400	5414
<b>Mean</b>		<b>5637</b>
<b>C.V.,%</b>		<b>21.12</b>
<b>LSD(0.05)</b>		<b>1223</b>

<b>2004 Results, Pearl Millet</b>			
<b>Variety</b>	<b>Cut 1</b>	<b>Cut 2</b>	<b>Total</b>
	<b>7/22/04</b>	<b>9/2/04</b>	<b>Avg. Lbs./Acre Dry Matter</b>
Tifleaf 3	2332	2763	5095
Tift Exp #4	2373	2202	4575
MilHy 300	2118	2761	4879
MilHy 400	2504	2939	5443
MilHy 500	2143	2579	4722
<b>Mean</b>	<b>2294</b>	<b>2649</b>	<b>4943</b>
<b>LSD (0.05)</b>	<b>582</b>	<b>1522</b>	<b>1999</b>
<b>CV%</b>	<b>13</b>	<b>31</b>	<b>21</b>

### **Sorghum x Sudangrass**

Sorghum x sudangrass hybrids are recommended for use in areas with limited drainage and heavy soils. They are intolerant of low soil pH and should be planted only on those soils with a pH of 5.5 or above.

Sorghum x sudangrass contains prussic acid, a chemical dangerous to livestock. To minimize the risk of prussic acid poisoning, grazing should not be done until the plants reach 24 inches tall or higher and should not be done if plants are drought stressed.

This forage is useful for summer grazing, hay and baleage. The thick, slow-drying stems make it more difficult to harvest as hay, but the shorter drying period necessary for baleage improves its usefulness. Lower dry matter yields and lower quality in relation to corn and forage sorghum limit the potential for this crop as silage.

Sorghum x sudangrass plots were planted on June 10, 2004, at the Southeast Research Station. Seeding rates were 30 lbs./acre, drilled. Phosphorus (P) and potassium (K) were each applied at the rate of 48 lbs./acre at planting, and nitrogen (N) was applied at planting, establishment and after harvesting for 118 lbs./acre/season of nitrogen.

<b>3-year Results, Sorghum x Sudangrass, 2002-2004</b>		
<b>Entry #</b>	<b>Variety</b>	<b>Avg. Lbs./Acre Dry Matter</b>
55	Super Su 22	3776
54	Sugar Beef	3598
58	PS 210 BMR	3097
<b>Mean</b>		<b>3490</b>
<b>C.V.,%</b>		<b>10.39</b>
<b>LSD(0.05)</b>		<b>373</b>

<b>2004 Results, Sorghum x Sudangrass</b>			
<b>Variety</b>	<b>Cut 1</b>	<b>Cut 2</b>	<b>Total</b>
	<b>7/22/04</b>	<b>9/2/04</b>	<b>Avg.Lbs./Acre Dry Matter</b>
Nutri + Plus BMR	2937	2498	5435
Sugar Beef	3122	2453	5575
Super Su 22	3748	2779	6527
SS 200 BMR	4138	2498	6636
PS 210 BMR	4264	2258	6522
Drystalk BMR	2618	2222	4840
Nutrimax Drystalk BMR	3614	2495	6109
<b>Mean</b>	<b>3492</b>	<b>2458</b>	<b>5941</b>
<b>CV%</b>	<b>11</b>	<b>15</b>	<b>11</b>
<b>LSD (0.05)</b>	<b>705</b>	<b>666</b>	<b>1200</b>

**Forage Sorghum.** Forage sorghum is recommended for silage production in limited moisture areas or if it is too late to plant temperate corn. It can also be harvested for hay or used as summer grazing. As with the other large-stemmed summer annuals, drying for hay is difficult. It can, however, be harvested more easily as baleage because of the lower drying time to reach the appropriate dry matter rate. Silage quality is typically not as high as with temperate corn silage; however this annual can be useful in improving the quantity of silage capable of being stored in a season when corn production is limited.

Forage sorghum plots were planted on June 10, 2004, at the Southeast Research Station. Seeding rates were 25 lbs./acre, drilled. Forty-eight pounds of phosphorus (P) and of potassium (K) were applied at planting, and nitrogen (N) was applied at planting, establishment and after harvesting for a total application of 118 lbs./acre of nitrogen.

### **3-year Results, Forage Sorghum, 2002-2004**

Entry #	Variety	Avg. Lbs./Acre Dry Matter
37	FS 555	5272
40	BMR 100	3831
<b>Mean</b>		<b>4552</b>
<b>C.V.,%</b>		<b>14.75</b>
<b>LSD(0.05)</b>		<b>774</b>

### 2004 Results, Forage Sorghum

Variety	Cut 1	Cut 2	Total
	7/22/04	9/2/04	Avg. Lbs. / Acre Dry Matter
NK 300	1597	2622	4219
FS 555	2378	2458	4836
BMR 100	2677	2607	5284
Red Top + BMR	2994	2186	5180
BMR 106	2700	2198	4898
FS 515HQ	3765	2203	5968
BMR 110S	2687	2219	4906
<b>Mean</b>	<b>2685</b>	<b>2356</b>	<b>5042</b>
<b>CV%</b>	<b>16</b>	<b>21</b>	<b>14</b>
<b>LSD (0.05)</b>	<b>771</b>	<b>860</b>	<b>1249</b>

## **Performance of Cool-season Annual Forage Crops at the Southeast Research Station, 2003-2004**

**Wink Alison, Tara Doughty, Jerry Simmons, Mike McCormick, Ruben Anders**

Each year, LSU AgCenter researchers conduct variety trials of cool-season annual grasses at research stations and cooperating agencies across the state. These trials provide information on the performance of annual ryegrass, oat, wheat and cereal rye varieties under varying soil and climactic conditions. With this information, the researchers can recommend varieties for use by Louisiana forage producers for the production of green chop, hay and silage and for grazing of livestock.

A list of recommended varieties is developed and made available for distribution through the LSU AgCenter Cooperative Extension Service and on the LSU AgCenter Web site at [www.lsuagcenter.com](http://www.lsuagcenter.com). To be included on the list, a commercially available variety must be tested for three consecutive years and have an average yield of not less than 90% of the three-year average (mean) yield of the top three producing varieties. A variety is listed as “promising” if, following two consecutive years of production, it has shown acceptable agronomic characteristics and has yielded at least 90% of the average of the top three performing varieties. A variety is removed from the list if it becomes no longer available to producers or if it consistently performs unsatisfactorily.

All commercially available and advanced experimental lines developed by either public or private breeding programs are eligible for inclusion in the performance trials. Multiple varieties of each species are submitted for evaluation each year, but no wheat variety has been entered during the last three trials.

The trials are conducted each year using production practices recommended by the LSU AgCenter Cooperative Extension Service for each species. Soil tests are conducted regularly, and phosphorus, potassium, lime and trace elements are applied as necessary. Applications of pesticides are as needed to manage weeds, insects and diseases.

The trials are conducted in randomized complete block designs with three to four replications. Data are collected from each trial indicating the total forage yield per variety during the growing season, as well as the forage yield per variety per cutting within the season. This information allows the researchers to determine those varieties most useful for early or late season production and those suitable for overall production of forage.

Harvesting of the trial plots occurs periodically throughout the growing season by cutting to a stubble height of 2 to 4 inches when 8 to 12 inches tall. Cutting the plots eight to 10 weeks after planting and approximately every 30 days thereafter is a normal part of the protocol.

Cumulative forage yield data are combined over one to three years and analyzed by analysis of variance procedures to evaluate variety yields. The least significant difference (LSD) value represents the minimum amount by which variety yields must differ to be considered statistically different from one another. If differences are not detected among varieties, the LSD value is not presented.

### Annual Ryegrass Test Southeast Research Station, 2004

Variety	Cut 1	Cut 2	Cut 3	Cut 4	Cut 5	Total
	12/16/03	1/23/04	3/11/04	4/9/04	5/24/04	
Beefbuilder III	524	448	1774	3577	2112	8435
Stampede	932	753	2057	3215	1432	8389
Dyna Gain	554	770	2265	3452	1280	8322
4X	439	588	1949	4256	1073	8306
Prine	475	533	1804	4292	1185	8288
WD-40	631	804	2495	3516	834	8279
Marshall	335	435	2135	4330	950	8184
Bar 9 Tam	518	476	1892	3903	1300	8089
Passeral Plus	599	594	1708	3542	1615	8058
Gulf	594	470	1775	4300	890	8029
Diamond T	421	572	1931	3528	1494	7945
Rio	659	601	1950	3289	1370	7869
Tam 90	758	809	2276	3078	940	7862
Wax ME94	487	434	1791	4070	1036	7818
King	535	513	2676	2726	1319	7769
Jackson	526	427	1658	3742	1323	7675
WMN97	496	439	1695	4014	1017	7661
FLX2002(new2)LRCT	402	410	2085	3331	1410	7639
FL/NE X2003	259	402	2263	3297	1395	7616
Abundant	421	485	1732	3849	1128	7615
Graze-n-Gro	580	453	1650	3493	1358	7534
Ed	495	444	2034	3137	1363	7474
FL/OK 2001(New1)	275	431	2032	3285	1285	7307
Brigadier	390	429	2065	3058	1293	7236
FL X2003 (New2) ER	285	486	3010	1644	688	6114
Ducado	406	539	2111	2280	749	6085
Shiwasuaoba	686	1264	2594	1292	160	5996
<b>Mean</b>	<b>507</b>	<b>556</b>	<b>2052</b>	<b>3389</b>	<b>1185</b>	<b>7689</b>
<b>LSD (0.05)</b>	<b>NS</b>	<b>256</b>	<b>428</b>	<b>360</b>	<b>259</b>	<b>849</b>

Annual ryegrass is an excellent cool-season forage crop for use as grazing, hay and silage (haylage/baleage). It can be successfully grown on most soils and can be planted into a prepared seedbed or overseeded into permanent summer pastures. It can also be drilled into the sod with excellent results using a no-till planting system.

Annual ryegrass plots were planted at the rate of 30 lbs./acre into a prepared seedbed of Tangi silt loam soil October 13, 2004. Phosphorus (P) and potassium (K) fertilizer was applied to the plots at planting according to soil test recommendations made by the Louisiana Cooperative Extension Service. Nitrogen (N) was applied at planting, at establishment and after the second and fourth harvest. The total amount of nitrogen was 190 lbs./acre per season.

The recommended varieties of ryegrass based on statewide trials are as follows: Gulf, Jackson, Marshall, Passerel Plus, TAM 90, Beefbuilder III, Prine, Brigadier and Ed. Diamond T and WD-40 are promising varieties.

**Southeast Research Station Ryegrass Varieties, 3-year Average  
2003-2004**

Entry #	Variety	Avg. Lbs/A Dry Matter
113	Beefbuilder	8821
108	Brigadier	7791
110	Ed	7633
12	Gulf	7742
23	Jackson	6780
8	Marshall	7957
63	ME 94	7826
96	Passerel Plus	7902
93	Prine	7925
27	Tam 90	7337
112	WMN97	6586
Mean		7664
C.V.,%		9.72
LSD(0.05)		1638

## Cereal Rye

Cereal rye is generally more cold tolerant than most varieties of annual ryegrass and is more tolerant of lower soil pH than ryegrass or other small-grain species including oats and wheat. It has the capacity to produce more forage during late fall and early spring than does annual ryegrass. Cereal rye is recommended either alone or in a mixture with annual ryegrass for winter grazing and as a spring hay crop on most types of soils.

Plots were planted into a Tangi silt loam soil October 14, 2003, as pure stands at the rate of 90 lbs. of seed per acre into a prepared seedbed. Phosphorus (P) and Potassium (K) were applied according to soil test recommendations made by the LSU AgCenter Cooperative Extension Service. Nitrogen (N) was applied at planting, at establishment and after every other harvest, beginning with the second, for a total N application of 140 lbs./acre.

The recommended cereal rye varieties for 2004 based on statewide studies are as follows: Bates, Elbon, Oklon, Maton and Wintergrazer 70.

<b>3-year Results, Cereal Rye 2003-2004</b>		
Entry #	Variety	Avg. Lbs/A Dry Matter
2	Maton	4588
3	Elbon	5036
5	Wintergrazer90	4862
24	Oklon	4526
29	Bates	4898
48	NF65exp.	4987
Mean		4816
C.V.,%		13.91
LSD(0.05)		773

<b>2003-2004 Cereal Rye Production, Dry Matter /Acre</b>					
Variety	Cut 1	Cut 2	Cut 3	Cut 4	Total
	12/19/03	1/23/04	3/11/04	4/9/04	
Elbon	285	221	1963	2618	5086
WR 2001	448	401	2782	1370	5001
Oklon	506	446	2733	1251	4935
Wintermore	485	397	2501	1525	4907
Maton	278	190	2382	2052	4903
NF 109	229	203	2091	2165	4687
Wintergrazer 70	483	352	2349	1382	4565
Noble Foundation NF65	523	425	2885	621	4453
Mean	405	329	2461	1623	4817
CV%	20	20	9	12	8
LSD (0.05)	144	113	381	344	NS

## Oats

Oats can be planted somewhat earlier than and have the capacity to produce earlier growth than ryegrass, generating high quality forage in the early winter. Varieties can be planted either alone or in mixtures with annual ryegrass to take advantage of these characteristics. Cold tolerance is generally somewhat less than annual ryegrass or cereal rye.

Trial plots of oats were planted into a Tangi silt loam soil October 14, 2003, as pure stands. Seeding rate was 100 lbs./acre, planted into a prepared seedbed. Phosphorus (P) and potassium (K) were applied according to soil test recommendations made by the LSU AgCenter Cooperative Extension Service. Nitrogen was applied at planting, at establishment and after every other harvest, beginning with the second, for a total nitrogen application of 140 lbs./acre.

The recommended oat varieties for 2004 based on statewide studies are as follows: LA 9339 and Horizon 314. Horizon 474 is a promising variety.

### 3-year Results, Oats 2003-2004

Entry #	Variety	Avg. Lbs/A Dry Matter
48	Horizon 314	3690
56	LA9339	4205
<b>Mean</b>		<b>3948</b>
C.V.,%		14.68
LSD(0.05)		1135

### 2003-2004 Production, Oats (Dry Matter/Acre)

Variety	Cut 1	Cut 2	Cut 3	Cut 4	Total
	12/16/03	1/23/04	3/11/04	4/9/04	
LA 9339	592	513	1836	3688	6628
FL9708-P37 exp	513	354	2215	3376	6458
Plantation Seed Horizon 474	709	529	2719	2045	6001
LSUAGCTR LA976GBS-22-B-S2	383	357	2076	2876	5692
LSUAGCTR LA966BSB119-1	514	539	1613	2647	5314
LSUAGCTR LA9810SBS-58	626	647	1885	1988	5146
LSUAGCTR LA989SBS-49-B-S1	189	406	1928	2470	4993
Horizon 314	424	383	1626	2546	4980
LSUAGCTR LA9533D63-1-C-S3	528	478	1557	2238	4802
Magnum 2000	1105	778	861	1222	3967
<b>Mean</b>	<b>558</b>	<b>498</b>	<b>1832</b>	<b>2510</b>	<b>5398</b>
<b>LSD (0.05)</b>	<b>210</b>	<b>173</b>	<b>553</b>	<b>277</b>	<b>700</b>

## **Southeast Research Station Forage Quality Laboratory Producer Sample Results, 2004**

**Randy Walz, Mike McCormick, Laura Zeringue, and Jerry Simmons**

The Southeast Research Station Forage Quality Lab was constructed to serve the forage analyses needs of Louisiana livestock and hay producers and to provide a resource for rapid analysis of samples generated by beef, dairy, wildlife, and forage scientists throughout the state. In 1991, a memorandum of understanding between MAFES and the LSU AgCenter extended the forage lab's services to producers in southern Mississippi. At the present time, the laboratory does not charge producers or other scientists for the analyses conducted. Producer samples are received primarily via mail from parish and county agents in Louisiana and Mississippi, though a significant number are brought in by local producers, consultants, and others. All feedstuffs including by-products, grains, commercial mixes, forages, total mixed rations, and organic fertilizers are accepted. Soil samples, commercial fertilizers, and mineral supplements are not analyzed.

Routine producer samples are assayed for dry matter, crude protein, acid detergent fiber, neutral detergent fiber, and an estimate of energy. In addition, a producer may request a mineral analysis on the sample that will include calcium, phosphorus, magnesium, potassium, copper, manganese, and zinc. Fiber and protein concentrations are determined by near infrared spectroscopy or wet chemistry. With the exception of phosphorus, which is determined colorimetrically, all mineral concentrations are determined by atomic absorption spectroscopy.

Generally, analyses are returned via Internet to county or parish agents within a week or less of sample reception. Sample results are also mailed to producers. Between 2,000 and 3,000 producer samples are analyzed annually, with about one-fourth coming from Mississippi producers.

Average quality analyses from producers samples received in 2004 are provided in the table below. In addition to the average we have also provided the maximum (highest) and minimum (lowest) values for each forage type. Protein concentrations were highest for ryegrass pasture (26.09%), clover pasture (19.00%) and alfalfa hay (21.91%). Of the stored forages, ryegrass haylage and baleage and clover hay contained the highest protein concentrations. Bahiagrass hay, on average, contained the least protein (7.86%). Annual pastures also contained the most energy. Alfalfa hay and corn silage samples were similar in digestibility, averaging about 66% total digestible nutrients (TDN).

Data indicate that some of the highest quality forage crops grown by local producers are ryegrass pasture, corn silage, ryegrass haylage, ryegrass baleage, and miscellaneous legumes. Summer perennial hays such as bermudagrass and bahiagrass can be harvested at a nutritious state, but intensive pasture/hayfield management is required.

**Producer Sample Forage Quality Analyses for Major Forage Crops Submitted to the SERS Forage Quality Lab (% DM), 2004**

Samples	Product	Protein	Protein	Protein	ADF	ADF	ADF	NDF	NDF	NDF	TDN	TDN	
		Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	
8	Clover pasture	12.62	26.59	19.00	21.66	37.33	28.09	31.73	50.22	41.41	58.76	75.50	68.63
13	Clover hay	8.49	21.59	14.72	31.25	43.63	35.64	40.16	61.11	50.89	52.02	65.25	60.56
46	Alfalfa hay	17.30	28.76	21.91	24.08	38.23	30.17	27.34	49.48	38.08	57.80	72.92	66.41
14	Misc legume pasture	13.46	30.61	21.56	11.33	28.87	19.26	19.82	42.22	30.52	67.80	86.54	78.06
12	Misc legume hay	9.66	20.85	13.45	30.77	50.54	40.56	39.19	83.21	54.92	44.64	65.77	55.31
5	Bahiagrass pasture	6.32	12.89	10.03	35.37	47.53	40.74	68.80	77.90	73.59	44.67	56.90	51.53
184	Bahiagrass hay	4.47	13.79	7.86	34.12	53.71	42.82	67.13	84.80	75.89	39.51	57.52	49.19
10	Bahiagrass baleage	6.47	15.65	9.21	38.61	54.58	43.79	60.19	80.91	72.39	38.50	54.40	48.64
21	Bermuda pasture	7.21	15.50	11.60	31.54	43.06	36.52	64.69	79.72	73.08	49.00	60.77	55.64
658	Bermuda hay	4.01	18.28	9.83	28.31	53.45	38.60	61.67	86.22	75.05	22.40	63.01	53.27
8	Bermuda baleage	6.50	13.52	9.28	34.29	44.39	40.10	63.65	81.41	73.61	48.07	57.99	52.01
21	Mixed grass pasture	6.46	13.27	10.06	30.28	46.32	39.31	55.61	81.53	72.90	46.23	61.12	52.85
214	Mixed grass hay	3.02	20.41	8.57	31.03	59.52	42.02	55.99	93.71	75.32	33.28	60.64	50.02
4	Mixed grass baleage	7.19	13.90	10.15	38.22	50.50	43.51	58.81	77.11	67.83	42.20	54.47	49.05
4	Crabgrass hay	8.40	18.43	12.10	34.35	38.76	37.05	65.99	74.02	69.75	52.99	57.63	55.05
4	Crabgrass baleage	9.39	11.63	10.77	38.94	41.95	40.94	58.20	69.51	65.33	50.64	53.08	51.48
4	Millet baleage	6.72	13.45	9.78	42.53	48.09	45.90	67.68	78.83	73.08	44.55	49.38	46.81
16	Ryegrass pasture	15.27	32.42	26.09	14.55	24.43	19.37	29.24	47.27	35.52	75.18	84.42	79.51
95	Ryegrass hay	4.79	22.41	10.71	27.99	56.44	40.67	48.78	83.51	69.44	43.40	68.72	57.07
47	Ryegrass haylage	8.09	22.12	14.49	23.23	44.08	34.63	44.11	69.38	55.08	53.75	72.88	63.44
117	Ryegrass baleage	7.11	24.79	14.07	23.04	46.53	33.85	37.89	73.01	54.60	52.34	74.25	63.93
22	Ryegrass greenchop	8.77	27.02	15.14	21.78	38.63	32.66	38.56	60.33	56.23	59.12	76.25	65.24
39	Winter mix hay	4.88	20.56	9.14	33.59	54.64	39.81	59.30	82.61	69.50	44.46	65.68	57.25
3	Winter mix baleage	8.80	13.37	10.63	28.60	30.69	29.78	53.30	54.77	54.05	64.70	67.89	66.04
2	Wheat haylage	11.54	12.87	12.20	34.34	35.38	34.86	56.36	56.82	56.59	62.30	62.69	62.50
2	Oat haylage	3.89	10.42	7.16	38.84	55.89	47.36	66.00	79.41	72.70	42.91	58.72	50.81
189	Corn silage	3.94	16.91	8.11	18.77	54.16	28.56	34.72	78.90	46.78	47.22	73.76	66.42
44	Corn greenchop	7.00	11.05	8.46	24.21	35.27	29.56	38.53	57.98	47.95	61.39	69.68	65.67

26	Misc summer hay	5.02	17.08	8.41	33.22	56.41	41.64	61.71	78.49	71.21	36.63	58.61	50.34
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**Mineral Analyses for Producer Samples Submitted to the SERS Forage Lab, 2004**

#	Product Description	Ca			P			Mg			K		
		Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
3	Clover pasture	0.93	1.38	1.23	0.28	0.38	0.33	0.33	0.40	0.36	2.01	3.81	2.72
2	Clover hay	0.92	1.43	1.18	0.28	0.29	0.29	0.32	0.52	0.42	1.76	2.89	2.32
18	Alfalfa hay	0.78	1.60	1.15	0.14	0.32	0.26	0.21	0.53	0.32	1.31	3.50	2.59
4	Bahiagrass pasture	0.31	0.46	0.36	0.12	0.16	0.14	0.14	0.86	0.36	0.19	1.37	0.96
70	Bahiagrass hay	0.13	0.47	0.29	0.11	0.45	0.22	0.12	0.64	0.28	0.35	3.27	1.25
4	Bahiagrass baleage	0.13	0.32	0.23	0.12	0.36	0.23	0.24	0.37	0.30	0.92	3.12	1.83
10	Bermudagrass pasture	0.18	0.51	0.33	0.19	0.39	0.27	0.07	0.31	0.18	1.23	2.19	1.63
268	Bermudagrass hay	0.12	1.28	0.35	0.10	0.65	0.26	0.06	0.93	0.18	0.01	3.97	1.70
21	Summer mixedgrass pasture	0.20	0.50	0.37	0.13	0.36	0.25	0.14	0.53	0.27	0.15	2.01	1.36
75	Summer mixedgrass hay	0.11	1.01	0.37	0.11	0.59	0.25	0.09	0.49	0.24	0.55	3.17	1.63
13	Ryegrass pasture	0.24	0.56	0.39	0.33	0.80	0.53	0.15	0.36	0.21	3.03	5.03	3.79
40	Ryegrass hay	0.18	1.71	0.49	0.09	0.57	0.26	0.06	0.44	0.20	0.24	3.48	1.70
5	Ryegrass haylage	0.39	0.59	0.47	0.13	0.46	0.28	0.18	0.28	0.23	1.25	3.53	2.22
36	Ryegrass baleage	0.34	0.92	0.48	0.13	0.66	0.33	0.14	0.47	0.22	1.11	4.89	2.33
25	Winter mixedgrass hay	0.16	0.61	0.31	0.15	0.28	0.22	0.10	0.25	0.14	1.20	2.56	1.92
51	Corn silage	0.05	0.44	0.14	0.13	0.35	0.25	0.06	0.22	0.15	0.40	2.00	1.16
13	Misc Summergrass hay	0.28	0.54	0.36	0.11	0.44	0.19	0.10	0.24	0.15	1.45	2.25	1.74

**Micro-mineral Analyses for SERS Producer Samples, 2004.**

#	Product Description	Cu			Zn			Mn		
		Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
3	Clover pasture	5.650	22	14.21	26	103.96	58.322	87	132.21	112.40
2	Clover hay	6.720	11.19	8.958	24.641	47.027	35.834	50.403	108.61	79.506
18	Alfalfa hay	4.570	15.90	8.390	12.569	26.519	19.989	21.711	95.967	56.047
4	Bahiagrass pasture	2	4	2.551	20	89	41.587	96.991	610	454.74

70	Bahiagrass hay	1.092	13.25	5.197	9.8328	82.671	22.825	55.835	820.21	289.64
4	Bahiagrass baleage	4	18	8.25	14	53	25.5	107	883	394
10	Bermudagrass pasture	3	10	6.3	18	61	31.8	70	506	239.5
268	Bermudagrass hay	1.089	68.29	6.996	9.9217	503.38	41.540	13.091	711.70	149.38
21	Summer Mixedgrass pasture	1	14	5.808	16	78	31.823	29	894	217.18
75	Summer mixedgrass hay	1.096	23.21	7.156	8.7700	133.13	30.258	41.942	798.90	207.98
13	Ryegrass pasture	1	15	9.384	21	55	33.615	48	248	128
40		1.081	52.21	6.694	9.7139	131.08	31.864	42.548	401.14	156.98
5	Ryegrass haylage	6	12	8	17	43	29.6	108	492	234.2
36	Ryegrass baleage	1	36	7.277	20	106	40.027	21	525	197.75
25	Winter mixedgrass hay	2.215	9.916	6.445	8.8603	38.729	16.803	18.730	94.057	47.390
51	Corn silage	1	10	4.450	12	62	23.588	8	196	58.941
13	Misc Summergrass hay	1.103	10.84	5.118	14	54.221	20.861	17.353	744	164.37