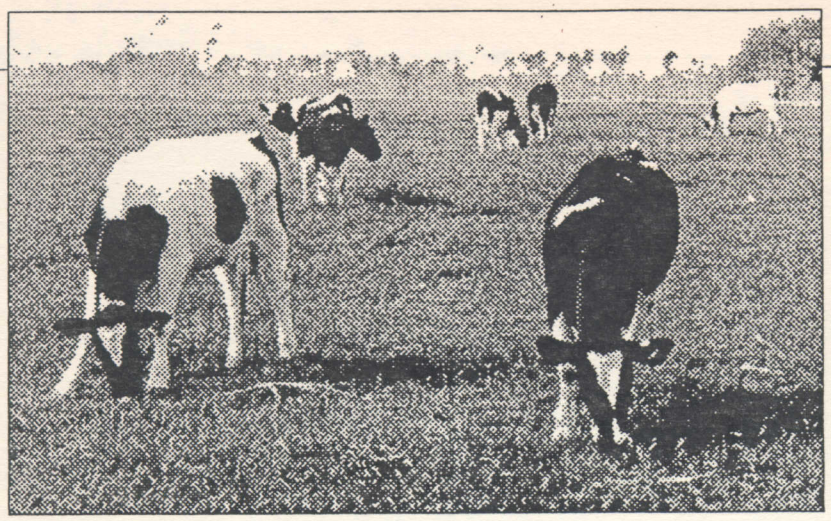
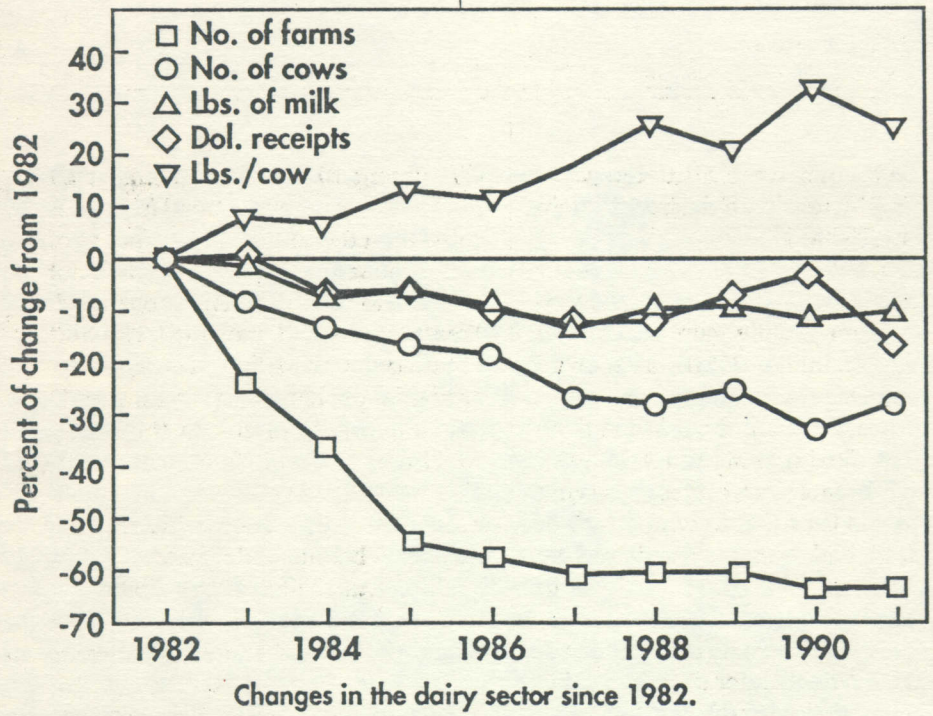


RESEARCH UPDATE
1993
DAIRY

Alabama Dairy Producers Surveyed About Milk Handling Services

The dairy industry of Alabama has experienced major changes during the last decade. The number of farms with milk cows has declined more than 60% since 1982. However, the number of milk cows in the state has declined only about 30%, suggesting that mostly small farms have been exiting the dairy business (see figure). Moreover, milk production and cash receipts from dairying have declined even less than cow numbers, indicating improved production and economic efficiencies among the remaining dairy operations. This trend in efficiency is reflected in the steady increase in average milk production per cow over the decade.

Changes also have occurred in marketing strategies for milk. Many commercial dairies now have more options in choosing who will handle their milk. A survey of dairy farmers in the Southeast was conducted by the AAES in conjunction with the U.S. Department of Agriculture-Agricultural Research Service. The survey was designed to evaluate dairy farmers' satisfaction with the services provided by their milk handlers.



Changes in the dairy sector since 1982.

In Alabama, about half of the survey respondents were members of a milk marketing cooperative, while the other half were affiliated with independent, proprietary milk handlers. More than one-third of the respondents had changed handlers in the last five years, with "better prices" being the most common reason cited for changing handlers. Most of these had changed from a cooperative to an independent plant (59%) or from one independent plant to another (23%). Only 5% had changed from an independent plant to a cooperative.

Those who had remained with a cooperative for the previous five years cited "assured market" and "stable and secure operation" as the strongest influences for their allegiance. Only 10% had to market their milk through a cooperative because no other handlers were available.

One way of estimating the value of belonging to a cooperative is to compare the price received from the

continued on page 2

ALABAMA AGRICULTURAL EXPERIMENT STATION AUBURN UNIVERSITY
LOWELL T. FROBISH, DIRECTOR AUBURN UNIVERSITY, ALABAMA

Effect of Feather Meal on Growth in Young Dairy Calves

Feather meal (FM) contains 70% protein and is plentiful in Alabama and much of the Southeast. It has been widely used in pet and poultry feeds and to a large extent in beef cattle diets. Recent AAES studies indicate that FM may have potential use in dairy cattle rations, including rations for baby dairy calves.

The protein requirement as a percentage of the diet is relatively high (18%) for young calves. FM, because of its limited amino acid composition, is not as high in protein quality as other protein sources, which may affect growth for young calves. An AAES study evaluated the effects of FM in dairy calf starter grain mixes on calf growth.

Seventy-five Holstein calves were fed one of five treatments for 12 weeks. All treatments contained ground corn, rolled oats, cane molasses, minerals, and aureomycin, but differed in protein source. Grain mixes were formulated with one of the following protein bases: (A) 18.3% soybean meal (SBM); (B) 2.9% FM and 13.4% SBM; (C) 5.3% FM and 9.4% SBM; (D) 8.0% FM and 5.1% SBM; (E) 6.0% FM, 3.0% blood meal (BM), and 4.9% SBM. Diets were formulated to contain 18% crude protein (CP) with undegradable protein values of 34.4, 39.5, 43.6, 48.5, and 51.2%, respectively, for the five treatments. The amounts of SBM and corn were adjusted with FM or BM to obtain desired protein content (Table 1).

Table 1. Formulation of Calf Starter Ration

	(A)SBM	(B)2.9%FM	(C)5.3%FM	(D)8.0%FM	(E)FM+BM
			(% of dry matter)		
Ingredients					
Corn, ground	54.32	56.19	57.81	59.47	58.90
Rolled oats	20.31	20.30	20.27	20.28	20.10
Molasses cane	4.30	4.30	4.29	4.29	4.24
SBM, 48%	18.26	13.39	9.40	5.06	4.85
Feather meal	—	2.92	5.33	8.01	6.03
Blood meal	—	—	—	—	3.01
Aureomycin	1.29	1.29	1.29	1.29	1.27
AU calf mineral	1.62	1.62	1.62	1.26	1.60
Nutrient analysis					
DM, %	87.4	87.7	87.8	87.6	87.6
CP, %	18.4	18.9	18.4	18.9	18.9
ADF, %	3.3	2.5	2.9	2.7	3.0
NDF, %	9.0	11.5	14.5	12.8	13.4
NEG, Mcal/kg	1.34	1.34	1.41	1.34	1.34
UDP, %	34.4	39.5	43.6	48.5	51.2

Table 2. Feed Intake and Growth of Young Calves

	Treatments				
	(A)SBM	(B)2.9%FM	(C)5.3%FM	(D)8.0%FM	(E)FM+BM
Initial wt., lb.	87.8	88.7	89.3	89.3	89.3
Final wt., lb.	195.8	195.4	205.3	189.2	206.6
Birth-12 wks.					
DMI, lb./day	2.46	2.38	2.62	2.35	2.68
ADG, kg/day	1.28	1.28	1.39	1.19	1.39
Feed efficiency	1.93	1.86	1.89	1.98	1.94
Wither height, cm	91.1	91.1	92.5	90.6	92.7
Hearth girth, cm	104.6	105.1	106.4	104.8	106.6
Plasma urea N, mg/dl	6.3	6.9	6.3	6.2	6.8
Gain, 8-12 wks					
4 wks.	51.9	49.5	57.6	47.1	57.4

In this study, the addition of FM or FM plus BM did not significantly increase average daily gain (ADG) and dry matter intake (DMI), as seen in Table 2, even though there was a trend toward higher values up to the 5.3% FM diet. Final weights and ADG were slightly greater for calves receiving treatments C and E, in which 50% of the SBM had been replaced by FM. Most of this difference was due to growth during the eight- to 12-week period as there were no differences between treatments prior to eight weeks.

Between eight and 12 weeks, calves receiving diets with the 50% FM replacement (treatments C and E) had greater ADG than those with 25% (Treatment B) or 75% (Treatment D) FM replacement and a trend for higher gains than the control. The amount of undegradable protein alone would not account for the differences observed. Treatment E had more (51.2%) and Treatment C had less (43.6%) undegradable protein than Treatment D (48.3%). Interestingly, in this study ADG and DMI for Treatment D (8% FM) were the lowest values among all treatments. The reduction in ADG and DMI may be due to decreased protein quality, availability, or digestibility.

Cumulative skeletal measurements did not differ for the 12-week period. The plasma urea nitrogen concentration indicated that protein was sufficient for all diets during the 12-week testing period.

continued on page 3

Dairy Producer Survey, continued

cooperative to the price offered by alternative independent handlers. A coop-erative's prices may be higher or lower than those offered by independent handlers in any particular area, but across the Southeast cooperatives averaged $0.29 per hundredweight less than independents. This figure was calculated by adjusting the mailbox price for capital retains and differences in hauling deductions and marketing services. The net difference is a rough estimate of the benefits of having an assured market, a decided asset to producers who have been in the dairy business for many years.

R.G. Nelson

Effects of Different Cooling and Management Regimes on Milk Production

A major concern of dairy producers throughout the South is the effect of prolonged heat stress on milk production. Cows often eat less during hot weather, which results in lower milk production. Modifying diet and employing management practices, such as providing shade or sprinkling animals with water, are generally recommended to reduce the effects of heat stress.

Many dairy operations throughout the state utilize fans and a water mist to assist in cooling both air and cows. However, this constant mist of water may effectively layer a "blanket of humidity" on the cows, which would reduce the cooling effect. How such systems affect feed intake and milk production is not apparent so an AAES study was conducted at the E.V. Smith Research Center Dairy Unit to compare feed intake, milk production, milk composition, and other factors of cows maintained under different cooling regimes during hot weather.

Thirty-nine lactating Holsteins averaging 156 days in milk were assigned to three different environments from June 15 to September 7, 1992. Treatments were: (A) regular management as a control; (B) housed indoor with limited forced-air cooling from fans; and (C) housed indoor with Turbo-Aire fans and water sprinklers to reduce heat. Cows in the control group were outside five to six hours a day and at night. Cows in all three treatments were fed (see Table 1) and milked at the same time. Fans and water sprinklers operated when air temperature was greater than 77°F. For Treatment C, fans were on continuously when temperatures exceeded 77°F and intermittent water was sprinkled at 10 psi for four three-minute cycles per hour.

The average maximum indoor temperature for treatments A and B were essentially the same (87.1°F), see Table 2. However, Treatment C had a significantly lower temperature (77.2°F) and reduced temperature over the use of fans alone. The minimum indoor temperature of all treatments did not differ. As expected, the relative humidity was higher for Treatment C than for the other two treatments (90% versus 70%), due to high moisture content in Treatment C caused by water sprinkling in the system.

The respiration rate of cows under the two indoor treatments was lower than for cows under the control treatment; however, the indoor "cooled" treatment resulted in the lowest respiration rate of the three different treatments.

Dry matter intake (DMI) was slightly higher for cows under Treatment B (37.8 pounds per day) and considerably higher for cows under Treatment C (40.9 pounds per day) than for cows under the control (36.1 pounds per day).

In this study, average milk production (pounds per day) were 54.3, 49.3, and 45.3, for treatments C, A, and B, respectively. Treatment C stimulated feed intake, resulting in higher milk production by five and nine pounds per day over the other systems (treatments A and B, respectively) in dairy cows during hot weather. The milk fat content for cows under Treatment B tended to be higher (3.60%) than those under Treatment A (3.36%), but was not different from those under Treatment C (3.47%). Milk protein content (3.23%) was not affected by treatments.

In this study, DMI and milk production increased with decreasing maximum temperature. Reducing the environmental temperature by use of a proper cooling system during hot weather may increase DMI and milk production. Use of a combination of fans and water sprinklers increases DMI and milk production over the use of fans alone. Additional information on operation costs and comparison of other systems is needed.

J.C. Lin, B.R. Moss, K.A. Cummins, D.A. Coleman, and R.C. Smith, III

Table 1. Formulation of Diet Used in Cooling Study

	Dry matter (DM)
	Pct.
Ingredients	
Corn silage, avg.	36.72
Alfalfa haylage, 48%	13.42
Corn ground, high moist	18.11
Cotton SD hulls	2.31
Protein-mineral pellets	20.25
Soybean hulls	5.24
Selenium and vitamin E	.19
Brewers yeast	.18
Niacin	.04
Dicalphos	.19
Dynamite	.08
Megalac	1.53
Blood meal	1.76
Nutrient analyses, calculated	
DM,%	52.14
CP, % DM	16.88
ADF,% DM	20.98
NDF,%DM	34.95
NEL, Mcal/kg	1.48

Table 2. Environment and Response of Dairy Cows Under Various Cooling Regimes

	Cooling treatments		
	A:Control	B:Indoor/fan	C:Indoor/cool
Maximum °F temperature	83.7	83.7	77.2
Minimum°F temperature	71.4	71.2	71.1
Humidity	70.2	70.8	90.7
Respiration rate per min.	76.6	66.9	36.2
Body score			
Initial	2.62	2.62	2.54
Final	2.42	2.30	2.29
Body weight changes, lb./day	.62	- .51	.53

Effect of Feather Meal, continued

These results suggest feather meal could be a valuable protein source, especially for the young dairy calves, if not fed at more than 6% (dry matter basis) of FM in the diet. Additional studies on FM diets for calves 14-24 weeks or older should be further evaluated because of the potential economic benefit for dairy and beef producers.

B.R. Moss, J.C. Lin, and R.C. Smith, III

Nutritional Value of White Lupin Ensiled Under Different Regimes

The grain of sweet white lupine, a large tall-growing winter legume, has been used successfully as a protein supplement for dairy cows and calves. The high protein (18%) and dry matter yields of lupin plants indicate that lupin may be a good forage source. However, information on using the whole lupin plant as a forage is limited.

Composition of Tifwhite-78 and Lunoble White Lupin

	Tifwhite-78		Lunoble
Quality variable	April 29	May 14	May 19
Dry matter, %	25	28	30
Crude protein, %	18.4	14.7	14.7
ADF, %	33.6	36.8	38.5
NDF, %	38.7	46.5	45.1
ASH, %	—	4.7	4.7
NEL, Mcal/lb.	.6	.6	.5
RFV	153	120	122

An AAES study was conducted to evaluate lupin's potential as a forage.

Due to large stems and the potential for loss of leaf, making silage with the whole lupin plant appears to be the most practical approach for forage use. Lupin harvested for silage could fit well into a double cropping system with tropical corn or sorghum silage. Lupin, as a legume, might not have adequate energy for good fermentation, and the large diameter stalks and time of ensiling of lupin could create moisture problems for ensiling.

The study sought to determine whether addition of ground corn or a live microbial inoculant at ensiling would improve fermentation characteristics and digestibility of lupin silage. Different cultivars of lupin also were evaluated to see if these cultivars would have similar responses to ensiling treatments.

Fall-planted Tifwhite-78 and Lunoble sweet white lupin were the forage sources. Each cultivar was ensiled as: (A) no treatment control; (B) 90% silage-10% ground corn;(C) 80% silage-20% ground corn; or (D) microbial inoculation added at 227 mg per pound of wet weight. Eight five-pound samples of each treatment were packed into small laboratory silos made of PVC pipes. Silos were stored under controlled conditions at 77°F for 130 days.

The dry matter (DM) content was 28 and 30%, respectively, for Tifwhite-78 and Lunoble at ensiling (see table). Although DM remained essentially unchanged due to moisture in the stalk, the nutrient content of Tifwhite-78 decreased drastically from initial pod development (April 29) to that at ensiling time. The crude protein (CP), acid detergent fiber (ADF), neutral detergent fiber (NDF), calculated values of net energy for lactation (NEL), and relative feed value (RFV) were very similar for both cultivars at ensiling and at 130 days. Energy content was similar but protein content was higher than that of sorghum silage. The calculated RFVs are better than many grass forages, but not greatly different from mid-bloom alfalfa forage or sorghum silage.

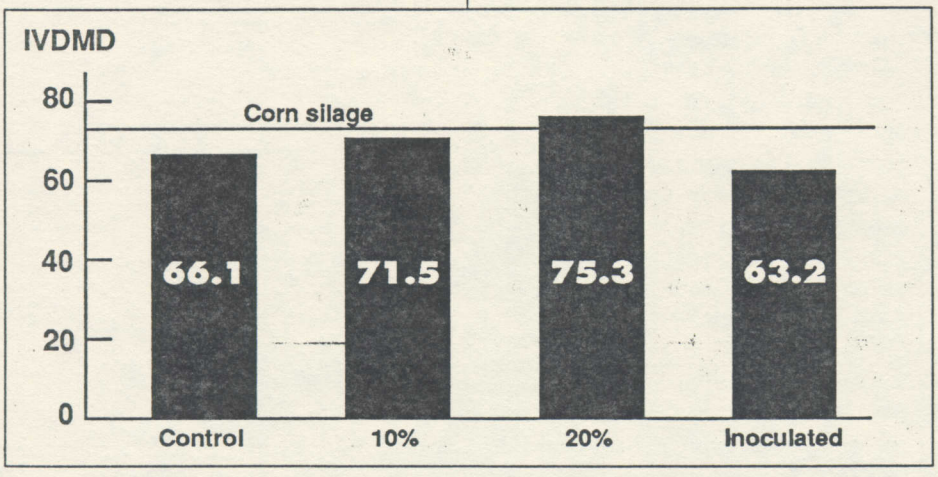
Although initial pH values were similar for all treatments, the pH values of inoculated silage was lower than any other treatment or the control. However, the pH of all silages were considered satisfactory (less than 4.5) for good silage making.

In vitro dry matter digestibilites (IVDMD) were the same for cultivars and were similar for the innoculated and control groups (see figure). The control IVDMD values were less (73.1%) than values for three varieties of corn silage, but compare favorably with nongrain forages. Addition of ground corn increased the IVDMD, but this was due primarily to the addition of corn rather than enhanced fermentation of the ensiled product. A second IVDMD was conducted in which 10 or 20% corn was added to the control silage just prior to analyses. Additions at this time increased IVDMD to values similar to those of the ensiled corn/lupin.

Tifwhite-78 silages had higher acetic and lactic acid concentrations than Lunoble silages during the first three days. Treatments B and C did not affect acetic acid content of Lunoble silage, but acetic acid content was lower for the inoculated treatment at 130 days. Lactic acid concentration was greater in the inoculated treatment than for other treatments. The concentrations of acetic and lactic acid were similar to reported values for grass silage but less than reported values for alfalfa. The lactic:acetic acid ratio for Tifwhite-78 was less than that for Lunoble. A low concentration of butyric acid is desirable for good silage, and butyric acid concentrations of all silages in this study were less than 0.1%.

Results indicate lupins could be stored as silage, but more research is needed on this promising feed alternative.

J.C. Lin, E. van Santen, and B.R. Moss



In vitro dry matter digestibility (IVDMD) of various treatments compared to whole-corn plant silage IVDMD value (73.1). The corn silage value is an average of three varieties cut at about two-thirds milk time.

Feather Meal as a Protein Source for Dairy Cows

Feeding feathers to dairy cows? Not exactly, but a recent AAES study that assessed the effect of feather meal (FM) on milk production, milk composition, and feed intake of dairy cows suggests that there is potential for feeding this by-product of the poultry industry to dairy cows.

Milk Yield and Composition, Feed Intake, and Body Weight Changes of Lactating Dairy Cows Fed Various Protein Supplements

	Diets				
	SBM	4%FM	8%FM	FM+BM	LP-4%FM
Yields, lb./day					
Milk	74.1	76.2	76.1	76.7	71.9
FCM[1]	73.7	77.8	77.7	78.1	72.7
Milk composition, %					
Fat	3.43	3.63	3.62	3.63	3.61
Protein	3.28	3.20	3.10	3.12	3.04
Body weight changes, lb./day	.95	1.45	1.21	.99	.79
Intake, lb./day dry matter	57.4	54.2	49.2	52.3	49.1
Feed efficiency DMI/milk	77	.77	.64	.68	.68
Plasma urea N mg/dl	17.8	17.8	17.9	18.4	11.2
Cost/cwt of feed dry matter, $	6.83	6.68	6.58	7.04	6.29

[1]FCM = fat-corrected milk.

Alabama's poultry industry processes tons of feathers annually, providing a meal that is high in protein (70%). Dairy cows require large amounts of protein and in Alabama, due to the low protein content of most forages, producers must purchase large amounts of protein supplements. Feather meal (FM) is usually priced about the same as soybean meal (SBM), even though FM is higher in protein than SBM. Therefore, FM may be an economical alternative to SBM for Alabama producers.

Feeding FM to beef cattle has produced favorable results, especially when fed in combination with other products, such as blood meal (BM), urea, or liquid supplements. However, very few FM studies have been conducted with dairy cattle, which require close attention to the amount of by-pass protein and the amino acid composition of protein supplements. Feather meal is considered to have high "by-pass," but the amino acid composition may be limiting for milk production. Several trials were conducted at the E.V. Smith Research Center Dairy Unit, Shorter, and the Black Belt Substation, Marion Junction, to evaluate FM for dairy cows.

On one trial, 20 lactating Holsteins were fed one of five rations (treatments) for 12 weeks. All rations had similar amounts of corn silage, alfalfa hay, ground corn, oats, dried fat, minerals, and buffers, but differed in protein source. Treatments were total mixed rations with one of the following protein bases: (1) 18.8% SBM; (2) 4% FM and 12% SBM; (3) 8% FM and 5.9% SBM; (4) 4% FM, 4% BM, and 5% SBM; (5) and a low protein (14%) ration with 4% FM and 4.8% SBM.

Average values of milk yields, composition, and body weight changes are shown in the table. Cows in early lactation, with a negative energy balance, often respond to protein supplements that have a high by-pass component by increasing milk yield. In this study, the addition of FM or FM plus BM did not significantly increase milk production in early lactation even though there was a trend toward higher production. The lower milk yield for cows fed Treatment 5 compared to those fed treatments 2-4 is due to the reduced amount of protein (14%) rather than the use of FM. Interestingly, milk production for the control and low protein rations was not different, whereas the normal protein rations containing FM resulted in greater milk production than the low protein ration.

The milk fat content from cows fed rations containing FM or BM also tended to be greater (3.63%) than those fed SBM alone (3.43%), but was not enough to cause major differences in the 3.5% fat-corrected milk.

Increasing amino acid supply to the intestine normally increases milk protein yield and content. Also, inclusion of low degradable protein supplements, such as fish meal or meat and bone meal, has increased milk protein yields in other studies. However, in this study, FM depressed milk protein, with more depression at the 8% concentration than the 4% concentration of FM. Addition of BM did not improve milk protein. Low protein in Treatment 5 depressed milk protein more than 4% compared to FM alone in Treatment 2. This reduced milk protein may be due to decreased protein quality, availability, or digestibility. Reduced milk protein from feeding FM was observed in earlier AAES studies and in studies at Florida.

Results of this study suggest that FM could have a strong promise for the future as an economical feedstuff for lactating cows, if not fed at too great a concentration. No more than 4% (dry matter basis) of FM should be included in the ration. Additional studies on FM in combination with other feeds are needed to further explore its potential.

B.R. Moss, J.C. Lin, and R.C. Smith, III

Comparison of Three Tall Fescue Cultivars and Corn Silage for Dairy Cows

Tall fescue is one of the most widely grown forage crops in the United States; however an endophytic fungus, *Acremonium coenophialum*, has been associated with tall fescue toxicity that severely depresses milk production. Recent AAES tests indicate that fungus-free fescue can be used effectively for grazing dairy cattle.

Plant breeders have developed several new, fungus-free fescue varieties that are commercially available, however studies concerning the nutritive value of these fescues for dairy cows are limited. In tests at the Black Belt Substation, Marion Junction, performance of lactating cows was evaluated when grazing AU Triumph (AU-T) and Johnstone, two popular fungus-free varieties, and Kentucky 31 (Ky-31) tall fescue pastures (non-infected) or when fed corn silage.

For each of the cultivars studied, two pastures two acres each were established in the fall of 1988. The study was conducted for four weeks during the fall and for six weeks during the spring of 1989-90 and 1990-91. Available forages in the pastures were measured and sampled weekly. Cows on the pasture treatments were rotated from one pasture to its replicate on a weekly basis and received a 16% crude protein (CP) grain mix supplement one pound per 2.75 pounds of 3.5% fat-corrected milk) after milking. Cows on the corn silage treatment received corn silage, hay, and a 20% CP grain mix based on milk production. Cows on silage were kept in a dry lot, but cows on other treatments were kept on pasture except during milking and grain-feeding times.

Results indicated that AU-T tended to be the tallest and have the largest amount of available dry matter per acre (Table 1). Chemical analyses indicated that forage protein content was less and fiber values (ADF and NDF) were greater for AU-T than for Johnstone. However, Johnstone could not be grazed as long in the spring because available forage was limited.

Cows on pasture consumed less of the grain offered than those fed silage (Table 2). Despite some seasonal differences, actual milk yield was generally similar for all treatments. Cows grazing Johnstone produced more milk overall than those grazing AU-T, but their production was similar to those grazing Ky-31 and those fed silage for both years.

Cows grazing the AU-T pasture produced less milk than others during the spring of each year. However, this decreased production was compensated by an equal or greater yield during the fall, making the yearly averages of AU-T similar to those of other treatments. The greater milk production on Johnstone as compared to other pastures was probably due to greater values for CP and energy. The fat and protein in milk were not affected by treatment.

More desirable body weight change patterns were observed for cows fed corn silage than for those grazing on the various fescues. Data also show that cows in early lactation (fall) lose weight, whereas those in mid-lactation (spring) gain or maintain their weights. This indicates that cows in early lactation on pasture may have been using more body fat to produce milk and, if kept on pasture longer, would have lost more body weight or possibly milk production than those on silage.

The results of the study suggest that cows grazing Johnstone did not maintain body weight as well as those grazing Ky-31 and AU-T tall fescue when the three cultivars are established under the same conditions. During spring, milk production per day may be better on Johnstone than the other fescues, but carrying capacity may be more limited. Even though corn silage may support more milk production during extended periods, similar milk production can be obtained for short periods of time when cows graze high quality, endophyte free fescue pasture.

J.F. Kabiligi, B.R. Moss, J.L. Holliman, and D.I. Bransby

Table 1. Height, Dry Matter Available, Chemical Analysis, and Estimated Energy Values of the Treatment Pastures

	Johnstone	Ky-31	AU-T
Height, in.	5.7	7.9	8.6
Forage DM[1], lb./ac.	842	1,282	1,407
Nutrient content			
DM, %	26.2	28.2	28.5
CP, % of DM	16	14.7	14.3
ADF[1], % of DM	32.1	35.6	36.4
NDF[1], % of DM	64	63	66.7
NEL[1], Mcal/lb.	66	.56	.55

[1] DM = dry matter; ADF and NDF = fiber; NEL = energy, lactating cows.

Table 2. Milk, Milk Components, and Body Weight Changes by Cows Alloted to Treatments

	Johnstone	Ky-31	AU-T	Silage
Milk, lb./day				
89-90 Fall	59.5	58.4	59.6	57.6
Spring	53.5	55	52	55.7
90-91 Fall	53.1	53.7	55.1	56.4
Spring	57.7	54.6	50.3	58.03
Body weight change, lb./day				
Fall avg.	-2.38	-1.64	-1.78	-1.22
Spring avg.	1.12	.82	1.06	1.42
Combined data				
Grain intake, lb./day	20.7	20.5	20.7	23.2
Milk, lb./day	55.9	55.4	54.3	57
Milk fat, %	3.65	3.7	3.66	3.79
Milk protein, %	3.14	3.15	3.14	3.22
BWT change, lb./day	-.62	-.40	-.35	-.09

AU Triumph Fescue Promising As Dairy Cow Pasture

Winter perennial pastures that support high milk production would be welcomed by Alabama dairy farmers. Such pasture has generally been considered an impossibility, with only cool season annuals providing forage quality needed by high producing cows. Now there is research evidence that AU Triumph tall fescue can support milk production similar to winter annuals if a higher level of concentrate feed is provided.

An AAES study was conducted to compare milk production from a mixture of wheat and annual ryegrass with that from AU Triumph, a fungus-free variety of tall fescue released several years ago by the AAES.

For the study, 18 Holstein cows were assigned to one of three treatment groups for a six-week study. The treatments were (1) AU Triumph stocked at one cow per acre, (2) AU Triumph stocked at two cows per acre, and (3) wheat and ryegrass pasture stocked at two cows per acre. The cows remained on pasture day and night, except for milking and for about an hour following milking, during which time they were fed a 20% protein/grain mix. The grain mix was given to individual cows at the rate of one pound for each 2.5 pounds of 4% fat-corrected milk that they produced during the two weeks before the study began.

Pastures were subdivided into three equal sections, and each section was grazed for one week at a time. The amount of forages available was measured before and after grazing to estimate forage consumption and forages were sampled for quality analysis.

Results in the table show that the wheat/ryegrass pasture was a little taller than AU Triumph, but all pastures were grazed down to about the same level by the time the cows were rotated to another section. Moisture, protein, and total digestible nutrients contents were higher and acid detergent fiber was lower for winter annuals. Pasture consumption per cow on AU Triumph was higher on the low stocking rate compared to the high stocking rate, presumably due to available forage per cow. Consumption of wheat/ryegrass pasture was higher than for AU Triumph at equivalent stocking rates. Cows on AU Triumph consumed all the grain mix offered to them, but those on winter annuals refused some. This may be related to the higher moisture content and greater intake of wet pasture material on winter annuals compared to the fescue.

Total milk production, butterfat, protein content, and fat-corrected milk differed among treatments. Butterfat was lower on winter annuals, but was partially compensated for by slightly higher milk production as indicated by the fat-corrected milk level.

Results from this study show that both AU Triumph fescue and wheat/ryegrass pastures can support high milk production when stocked at two cows per acre. Although higher consumption of grain mix is required for AU Triumph, some producers may prefer this option in return for the convenience of a perennial pasture.

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PASTURE DESCRIPTIONS, FEED AND PASTURE CONSUMPTION, AND MILK PRODUCTION ON AU TRIUMPH AND WINTER ANNUAL PASTURE

Performance measure	Result, by pasture and stocking rate		
	Fescue		Wheat/ryegrass, 2 cows/acre
	1 cow/ acre	2 cows/ acre	
Pasture description			
Av. height before grazing, in.	11.0	10.4	13.3
Av. height after grazing, in.	4.3	3.8	4.1
Moisture content, %	71.4	73.5	81.5
Protein content, %	19.0	17.8	22.3
Acid detergent ciber, %	27.1	26.6	23.5
Total digestible nutrients,%	70.9	71.3	73.8
Daily consumption per cow			
Pasture, wet weight, lb.	114	91	142
Pasture, dry weight, lb.	32.5	24.1	26.2
Grain milk, lb.	20.0	20.0	13.9
Daily production per cow			
Milk, lb.	55.6	58.0	59.0
Butterfat, %	3.47	3.47	3.15
Protein,%	3.18	3.25	3.18
Fat-corrected milk, lb.	55.3	57.8	55.5
Average daily gain, lb.	10	.47	.03
Feed and pasture cost/cwt. of milk[1]	$3.66	$3.11	$2.54

[1] Estimated by assuming pasture production costs of $120 and $70 per acre for winter annuals and AU Triumph, respectively, a 150-day grazing period for both pastures, and a price of $170 per ton of grain mix.

Whole Cottonseed Increases Milk Production During Hot Weather

Heat stress is a major concern of Alabama milk producers. When temperatures exceed 86°F during the day or do not fall below 66°F at night so animals can dissipate heat, milk production can drop 15 to 30%. Production losses result because cattle consume less feed during hot, humid weather. Increasing nutrients, especially energy sources, in the feed can help sustain production levels. However, this must be done carefully to avoid digestive upsets and lower milk fat content.

Whole cottonseed (WCS) is a good option because it is high in energy

continued on page 8

Whole Cottonseed, continued

(about 20% fat) and protein (23%), but not as apt to cause digestive upsets because it is also high in digestible fiber (34% ADF). Feeding WCS is one alternative, though it does not always increase milk and fat production. The recent development of commercial fats that by-pass rumen digestion but are digested and absorbed in the lower gastrointestinal tract provides another option.

An AAES study conducted at the E.V. Smith Research Center, Shorter, evaluated the effectiveness and economics of WCS, a commercial fat (Megalac®), and a combination of the two. Megalac is a commercial inert fat that has been reported to increase milk and milk fat production.

During June through August of 1987, 32 Holstein cows averaging 72 days of lactation were assigned to one of four treatment groups: (1) a control treatment of corn silage, corn, and a protein/mineral/vitamin supplement; (2) the control treatment plus 10.3% WCS; (3) the control treatment plus 2.6% Megalac; and (4) the control treatment plus 5.2% WCS and 1.3% Megalac. These products, which were introduced gradually over a two-week adjustment period, added about 3.4% fat to treatments 2, 3, and 4. These treatments had equal amounts of energy and protein, but all were higher than the control treatment.

Results in the table show that cows receiving WCS, Megalac, or a combination of the two consumed more dry matter than cows on the control treatment. This higher intake resulted in increased milk production. Milk fat percentage was slightly lower among cows on the rations containing WCS. Fat-corrected milk (FCM) was lower on the control treatment than on other rations, but cows on the control treatment were more efficient at converting feed to milk, as indicated by the higher amount of FCM per pound of feed consumed. Cows receiving fat-containing treatments produced milk with a lower protein content. Overall, income was higher for cows receiving the WCS or control treatments.

Results from this study indicate that milk production can be maintained at a higher amount during periods of heat stress using fat products, however, economics should be considered. Feeding dietary fat products is a strategy that producers may consider at any time, but it seems especially appropriate during periods of heat stress, although results are usually more favorable in early rather than in mid lactation. Feeding these products, especially WCS, is more easily accomplished by using a total mixed ration, but feeding in grain mixes also has been done successfully.

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Effect of Whole Cottonseed (WCS) and Megalac in Dairy Rations on Feed Consumption, Milk Production, and Economics

Item	Result, by treatment			
	Control	WCS	Megalac	WSC + Megalac
Daily dry matter consumption/cow, lb.				
Total	35.4	38.9	40.0	38.9
Per 100 lb. body wt.	2.86	3.13	3.19	3.16
Daily production/cow				
Milk, lb.	54.3	59.8	57.0	57.9
Milk fat,%	3.37	3.12	3.31	3.18
Protein, %	3.09	2.99	3.01	2.84
3.5% fat-corrected milk	53.0	55.2	55.9	54.3
Economic evaluation[1]				
Feed cost/cow/day, dollars	2.54	2.79	3.61	3.13
Income over feed cost/cow/day	4.75	4.80	4.07	4.34

[1]Based on 1987 feed prices of $130 per ton of WCS and $0.38 per lb. Megalac and $13.75 per hundredweight milk prices.

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