FORAGE-BASED SEASONAL DAIRYING IN SOUTH LOUISIANA

H. A. DeRamus[1], L. Labbe[1], K. Ingawa[2], W. A. Atkinson[2], M. J. Simon[1], and J. D. Roussel[2]
[1]Department of Renewable Resources, University of Southwestern Louisiana, Lafayette, 70504
[2]Department of Dairy Science, Louisiana State University, Baton Rouge, LA 70500

ABSTRACT

The effects on the net profit and total milk production were compared using two levels of grain supplementation and forage-only feeding in a program of seasonal dairying in South Louisiana using management intensive grazing. Treatments were 8 kg grain, 4 kg grain, and 0 grain supplementation. Annual ryegrass (*Lolium multiflorium*) and clovers (*Trifolium incarnatum*, and *T. Alexandrinum*) were grazed intensively with 51 multiparous Jersey and Holstein cows in mid-lactation in 1993-1995. Milk production, milk fat, milk protein, and blood urea nitrogen were measured. Milk and protein models were all highly significant for all classes. Daily milk production with 8 kg grain was significantly different ($p < .01$) than other treatments. Cows fed no concentrate had lower milk yield, but cows fed 4 kg grain daily did not have significantly ($p > 0.1$) increased yield compared to the zero grain group. Income-over-feed costs (IOFC) were highest for the group fed no grain in all months except May 1995. Increased IOFC in the no grain group should be sufficient to absorb any additional pasture costs of that treatment. An all-forage seasonal dairying may be profitable and may need to be considered for more management situations.

KEYWORDS

Dairy, intensive grazing, seasonal, management, forage, IOFC

INTRODUCTION

Forages have traditionally occupied approximately two-thirds of the total diet of dairy cows. The importance of high quality forage as a major component of the diet of the dairy cow is a well-established nutritional fact. Forages grow abundantly in the South, but pasture represents a significant underutilized resource. Forage quality of warm-season species has been a limiting factor to increasing their use in high-producing animal diets. The potential application of "Management Intensive Grazing" in seasonal milk production using adapted cool-season annuals and early growth of warm-season perennials while the dry period coincides with the "summer slump" warrants investigation.

With a long growing season of approximately 350 days, the forage sward is usually dominated by introduced tropical forages. These tropical grasses have the C_4-pathway of photosynthesis and most have a leaf structure in which each vascular bundle is surrounded by a sheath comprised of collenchyma cells that lowers digestibility. Chemical and anatomical differences among C_4- and C_3-species are now considered to account for differences in their digestibility (Pearson and Ison, 1987). Management intensive grazing is a management system that enables producers to maximize the productivity of pastures and animals through increased benefits of existing capital and labor.

MATERIALS AND METHODS

Cool-season annual ryegrass (*Trifolium multiflorium*), Crimson clover (*Trifolium incarnatum)*, and Berseem clover (*T. Alexandrinum*) were planted in early September each year (1993-1995) for grazing in late October through April with warm-season perennials being used in May and June. Forages were drilled into Memphis silt loam soil (fine-silty, mixed, thermic, Typic Hapludalfs). Preplant fertilizer 0-30-60 was applied at the final seedbed preparation. Pastures were topdressed with 55 kg N/ha when grass was approximately ten cm. tall and after rotational grazing in January and again in March. Ryegrass-clover pastures were first grazed when the forage was approximately 20 cm in height. Paddock size was approximately 0.2 ha. Sufficient paddocks were available for grazing to allow movement to a fresh paddock twice during the day and another paddock for evening grazing. Drinking water was available in each paddock with small portable tanks.

Fifty-one multiparous Holstein (36) and Jersey(15) cows that calved during September and October of 1993 were blocked by breed, stage of lactation, and parity number. Treatments consisted of: 1) traditional grain supplementation (8 Kg per day), 2) one-half of the traditional grain supplementation (4 Kg per day), 3) no grain supplementation. Milk production was measured with milk flow meters daily with two consecutive a.m.-p.m. samples taken for protein and fat analyses on a biweekly basis. Blood samples, body weights, and body condition scores were taken on a monthly basis. In 1994, 6 cows were removed for various health reasons and in 1995 another 9 cows were removed leaving 36 of the original cows in the study. After calving, all cows were fed wet-bale bagged ryegrass haylage and 8 Kg of grain until the study was initiated. Days in milk (DIM) were: in 1994— 141± 9, in 1995— 97± 7, and in 1996— 113± 12 when the study was begun. All results were analyzed by the GLM models procedure of SAS System (1995). The model was $Y_{ijklm} = m + R_i + M_j + T_k + B_l + RT_{ik} + RB_{il} + MT_{jk} + MB_{jl} + TB_{kl} + {}_{ijklm}$ where:

Y_{ijklm} = dependent variable
µ = mean
R_i = effect due to i^{th} year of study
M_j = effect due to j^{th} month of study
T_k = effect due to the k^{th} treatment
B_l = effect due to the l^{th} breed
RT_{ik} = interaction effect between i^{th} year of study and k^{th} treatment
RB_{il} = interaction effect between i^{th} year of study and l^{th} breed
MT_{jk} = interaction effect between j^{th} month of study and k^{th} treatment
MB_{jl} = interaction effect between j^{th} month of study and i^{th} breed
TB_{kl} = interaction effect between k^{th} treatment and i^{th} breed

${}_{ijklm}$ = error term

RESULTS AND DISCUSSION

Milk and protein yield models were highly significant for year, month, treatment, and breed. The fat yield model was significant for breed and month. Least square means for daily milk production and are reported in Table 1. Typical descending ranking of milk yield by treatment was 8 kg grain, 4 kg grain, and 0 grain. As expected, cows fed no concentrate had lower milk yield except the first year. Somewhat surprising was that 4 kg grain daily only increased production in 1995 compared to the zero grain group. Treatment 1 (8 kg grain) yielded significantly more milk in over half the biweekly test periods.

Income-over-feed-costs (IOFC) per cow per day by treatment, year, and month are reported in Table 2. IOFC values were derived from actual milk and fat prices received and concentrate prices paid for the respective periods by subtracting daily concentrate cost from daily milk and fat revenue. IOFC was highest in all months except May 1995 for Treatment 3, the group fed no concentrate. While this was the treatment with lowest milk yield, higher IOFC can be explained by a higher fat percentage, causing a higher pay price per kg, and the fact that there was no concentrate cost. Higher feed prices also helped account for some of the higher IOFC differences. IOFC highest differences between treatments occurred in March, when forage quality was best and cows were earlier in lactation.

Since cows in all treatment groups were grazed together, no estimate of pasture utilization was available. With ryegrass pasture cost estimated at $0.50 to $0.75 per cow per day, we believe the additional IOFC from the zero grain group would more than cover any additional grazing the group needed.

While we do not currently recommend zero grain feeding for all situations, this study demonstrated that all-forage dairying may be more profitable on a seasonal basis than conventional dairying, especially as concentrate feeds are increasing in cost.

REFERENCES

Chase Jr., C. C., and C. A. Hibberd. 1985. Utilization of low quality native grass hay by beef cows fed incremental quantities of corn grain. J. Anim. Sci. (Supp. 1) **61**: 477.

Pearson, C. J. and R. L. Ison. 1987. Agronomy of Grassland Systems. Cambridge University Press.

Pond, K. R., W. C. Ellis, and D. E. Akin. 1984. Ingestive mastication and fragmentation of forages. J. Anim. Sci. **58**: 1567.

Zartman, D. L. (Ed) 1994. Intensive grazing/Seasonal dairying: The Mahoning County Dairy Program. 1987-1991. The Ohio State University Research Bulletin 1190.

Table 1
Least squares means and standard error for average daily milk yield by year of study and treatment.

	Treatment					
	1 8 Kg Grain		2 4 Kg Grain		3 0 Grain	
Year of Study	LS Mean[1]	Standard Error	LSMean[1]	Standard Error	LSMean[1]	Standard Error
1994	21.04[1]	± .65	16.04[a]	± .62	16.57[a]	± ,64
1995	18.96[a]	± .45	16.91[b]	± .43	14,67[a]	± .39
1996	18.18[b]	± .48	16.18[ab]	± ,49	15,86[a]	± .50

[1]Least squares mean
[ab]Least squares means with different letters within treatment are different (P < .05).

Table 2
Daily Income-over-feed-cost (IOFC) per cow in dollars by year, month and treatment.

	Year of Study								
	1994[a]			1995[b]			1996[c]		
Month of Study	Treatment			Treatment			Treatment		
	1	2	3	1	2	3	1	2	3
Feb	---	---	---	4.24	4.64	4.90	4.49	4.68	5.69
Mar	5.89	4.92	6.01	3.99	4.33	4.58	4.30	4.84	6.10
Apr	5.25	4.46	5.30	4.89	4.73	5.01	3.94	4.89	5.50
May	---	---	---	3,50	3.32	3.26	2.92	3.43	3.99

[a]Each treatment group included 12 Holstein and 5 Jersey cows
[b]Each treatment group included 11 Holstein and 4 Jersey cows
[c]Each treatment group included 8 Holstein and 4 Jersey cows