MANAGING WINTER FORAGES FOR DAIRY CATTLE

Mike McCormick
Southeast Research Station
LSU Agricultural Center, LAES, Franklinton, LA

In contrast to much of the country where confinement feeding and total mixed rations are the norm, grazing pastures with dairy cattle has been, and continues to remain, an integral part of many successful Louisiana dairy farms. Long-term increases in production costs, coupled with low milk prices, have rekindled interest in pasture-based dairying programs throughout the U.S. Grazing systems tend to have lower purchased feed, bedding, seed/fertilizer, labor and waste management expenses compared to confinement operations. Long growing seasons, plentiful rainfall and the difficulties associated with making high quality stored forage make grazing systems particularly attractive for southern dairymen.

Although grazing offers several advantages compared to feeding stored forages, there are some liabilities which should be carefully studied by those interested in this forage system. First, year-round grazing/hay systems generally generate less milk than silage based systems (Posey, 1991; Adkinson, 1993). Recent studies in Louisiana indicate that grazing operations are generally competitive with silage-based systems when annual milk yields of grazed cattle are no more than 1000-1200 pounds per cow less than silage fed cattle. One reason for lower production on grass is that these systems are weather dependent and, consequently, are riskier than silage-based systems. Environmental factors such as heat, cold and rain hinder performance directly by stressing cattle and indirectly by limiting pasture availability and quality. Also, acreage requirements and proximity to milking facilities limit herd size of grazing operations relative to all-confinement dairies.

From late fall to mid-spring is one of the best times to graze lactating dairy cattle in the Gulf Coast region of the U.S. Temperatures are cool, fall-calving cows are in early lactation and high quality winter annuals are available. This combination leads to high dry matter intake and milk production. Annual ryegrass has proven to be the winter forage of choice for dairymen in South Louisiana. In fact, it has long been dubbed "the backbone" of the dairy industry in south Louisiana and Mississippi. Other winter crops such as oats find limited use among dairymen who want to begin grazing 2-4 weeks earlier in the fall. However, oats and other small grains such as wheat and rye are rarely interseeded in ryegrass pasture because they mature early in the spring, making it difficult to maintain late spring pasture quality.

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Ryegrass stand establishment

Ryegrass is an easily established winter annual crop; however, high seed prices and lost grazing time necessitated by replanting suggest that growers may want to place special emphasis on good planting practices. First, it's important to plant only proven, adapted varieties. Ryegrass varieties vary in yield, disease resistance and maturation rate. However, variety performance tests indicate protein and fiber contents are often similar (Alison, 1994).

Certified ryegrass seed should be planted on well drained soil with a pH of 5.5 or greater. As always, it is a good practice to lime and fertilize by soil test recommendations. Ryegrass should be planted at a rate of 30 pounds of seed per acre if drilled and 40-50 pounds per acre when broadcast planted with fertilizer. Best planting depths are from 1/2 to 3/4" on prepared seed beds. Nitrogen (100 units) can be applied either at planting or after stand emergence. Generally, heavily grazed pastures require top-dressing with an additional sixty pounds of N in late December and again in late February/early March depending on initial grazing date, weather conditions and pasture quality (Faw, 1992).

Sod-seeded ryegrass may be planted after a killing frost or earlier if an application of a "knock-down" herbicide such as Round-Up is used to control summer grasses. To avoid competition from summer grasses, no more than 25 pounds of N should be applied at planting for sod-seeded ryegrass. Once ryegrass is up to a stand, the remaining N fertilizer may be applied. In South Louisiana, recommended varieties planted and fertilized as described above normally yield between 8,000 and 10,000 pounds of DM per acre during a typical 160-day grazing season (Alison et al, 1994).

Grazing ryegrass pastures

Ryegrass pastures should not be grazed until seedlings are firmly anchored. This normally means holding off of pastures until grass is at least six inches in height. Under good rainfall conditions, winter grasses are often ready for grazing 6-8 weeks after planting, however, hot weather and drought conditions may delay the onset of grazing considerably.

Ryegrass pastures are excellent sources of nutrition for growing heifers and milk cows. However, winter pastures are rarely grazed by dry cows because of the expense. In addition, the plant's high protein concentration and the high level of potassium and other minerals which may create a highly positive dietary cation-anion balance and lead to an increased incidence of milk fever and udder edema.

Ryegrass pastures should be rotationally grazed to optimize consumption and milk yields. This is especially important for producers who have limited acreage or poorly drained fields. Also, those dairymen who feed total mixed rations and practice once-a-day ryegrass grazing may fail to realize the full advantage of winter annuals when continuous grazing is not employed. Rotational grazing minimizes trampling and fouling of pastures and assures uniform pasture harvesting and plant regrowth. This maximizes forage quality and stimulates high levels of pasture consumption. Rotational grazing is particularly beneficial in peak spring growing periods when rapidly maturing winter annuals tend to become stemmy and unpalatable.

Intensive, strip or cell grazing are terms used to describe a rotational grazing system commonly practiced in New Zealand and many European countries. Under the forage system, large pastures are subdivided with electric fencing into small paddocks. Cattle graze one small area for 12 to 72 hours or until all available forage is utilized. They then are rotated to the next paddock of fresh grass. Paddock numbers and stocking rates vary with forage species, rainfall, type of livestock and desired production level.

<u>Strip grazing ryegrass</u> (Mississippi Agricultural and Forestry Experiment Station, Holly Springs, MS)

Mississippi State University researchers located at the Holly Springs Research Station in northwest Mississippi (Marshall County) compared the effectiveness of strip grazing to continuous grazing for early-lactation Holstein cows (Pogue, 1988). Cold, wet weather and high stocking rates resulted in a comparatively short fall grazing period (35 days) and only 60-75 days of spring grazing. Intensive pastures were rested 21 days in the fall and 14 days in the spring. Average 4.0% fat-corrected milk (FCM) yield was 68.1 lbs/hd/day for the continuous grazing system compared to 66.1 lbs/hd/day for the intensive grazing system (Table 1). Although cattle consumed an average of 5 pounds of bermudagrass hay while on pasture, milk fat levels averaged only 3.05%, an indication of the low fiber concentration in immature ryegrass. Strip grazers did utilize pasture more efficiently resulting in 52.6% greater carrying capacity and 50.6% more milk per acre than the conventional system.

In spite of the extra costs associated with fencing, the intensive grazing system generated $.30/cow/day more income over feed costs than the conventional system because of increased cow days grazing, slightly higher milk fat and lower concentrate consumption. Also, the strip grazing system generated labor savings by reducing the time required for observing and moving cattle from pasture.

<u>Southeast Research Station (SERS) ryegrass grazing study</u> (Franklinton, LA)

A three year grazing project was initiated in the fall of 1991 to compare performance of Holstein cows 1) grazing ryegrass A.M. and P.M. 2) grazing ryegrass A.M. and fed corn silage P.M. and 3) grazing ryegrass A.M., corn silage P.M. plus by-pass protein (blood meal/corn gluten meal).

Diet 1 is typical for many Louisiana dairy farms, while diet 2 is the conventional feeding system for late fall through spring at the SERS and diet 3 was designed to improve milk yield while suppressing blood urea nitrogen levels in lactating cattle. All diets were designed to be equal in energy, but diet 1 was estimated to exceed NRC protein requirements by 20-25%. Rumen undegradable protein (RUP) values were 28, 34 and 38% of total protein for diets 1-3, respectively. A.M. and P.M. grazers were allocated approximately 1.3 acres/cow while A.M. grazers received about .7 acres/cow averaged over the grazing season.

A 14-day dry-lot study was conducted in late March of each year to provide an estimate of forage consumption. All cattle had access to bermudagrass hay while on pasture. Estimates of forage and grain consumption were obtained by placing treatment groups in separate pens and providing green chopped ryegrass in place of grazing. Availability of forages and grains followed time frames similar to actual grazing sequences. Early lactation Holsteins (avg. wt. 1320 lbs.) on the 2X grazing diet consumed an average of 172 lbs. of ryegrass per day or 23.0 lbs. DM (Table 2). Hay DM consumption averaged 4.8 lbs., while grain DM intake was 22.3 lbs. Total intake was 49.9 or about 3.8% of body weight. Based on herd records at the SERS, cattle grazing ryegrass normally consume only 2-3 lbs. of hay. If so, ryegrass consumption may have been slightly depressed in this intake trial. Forage DM accounted for 55.5% of total DM consumed. Cattle on A.M. grazing and P.M. corn silage consumed between 8-10 lbs. of ryegrass DM (66 lbs. fresh) and 13-16 lbs. corn silage DM. Total forage DM consumption was similar across groups ranging from 27.7 to 29.5 lbs/hd/day. Although these intake values may seem high, milk production and butterfat levels changed little during the intake study indicating that, at least total nutrient consumption was fairly similar between grazing and drylot feeding.

Milk production and reproduction data for the experiment are presented in Table 3. Fat-corrected milk production was only 1.8 lbs. greater for the A.M. grass and corn silage forage system compared to the A.M. and P.M. grazers. Several cows each year peaked at over 100 lbs. of milk per day on essentially ryegrass grazing and grain. This demonstrates the high energy and protein available in well managed ryegrass. Butterfat was .27 percentage units higher for silage fed cows receiving the corn/SBM grain than those on A.M. and P.M. ryegrass. Low butterfats from ryegrass grazing cows were to be expected in view of the low fiber content (Fig. 1) in lush ryegrass pastures. Improvements in milk production were obtained with diet 3 (by-pass protein diet). Most of this increase was generated by cows less than hundred days in milk.

Pregnancy rates were lower among A.M. and P.M. grazers. The fact that the findings were consistent in all three years emphasizes the need for careful ration balancing when ryegrass grazing is the primary forage for lactating cows. Failure to do so, may result in a costly overfeeding of protein coupled with reductions in reproductive performance.

Economic analysis of diets and animal production are provided in Table 4. At $1.10 per cow per day A.M. and P.M. ryegrass grazing was $.24 cheaper to supply than A.M. grazing and P.M. corn silage. More efficient grazing such as strip grazing may have supported more cows per acre, thereby, reducing pasture cost/cow (Pogue et al, 1987). Since A.M. and P.M. ryegrass grazers produced less 3.5% FCM, value of product was lower; however, IOFC were similar between the two forage systems. Keep in mind that ryegrass grazers received a 20% protein (as-is) grain ration throughout the grazing season. Forage protein levels (Fig. 1) suggest that this could have been lowered to 14% protein for much of the grazing period without reducing milk production. Reductions in protein supplementation costs would have cut costs/cow by $.15 to $.20/cow/day.

<u>Summary</u>

Winter annual pastures, particularly ryegrass, offer Gulf Coast dairymen an economical means of generating high levels of milk production from late November through mid-May. Factors which contribute to successful winter grazing with dairy cows are:

1) proper soil fertility
2) good ryegrass stand establishment
3) employing rotational or strip grazing to optimize pasture utilization and quality
4) balancing diets for NRC requirements to maximize milk yield while maintaining body condition.
5) availability of high quality stored forage to supplement pastures during weather extremes.

Selected References

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Table 1. Continuous vs Intensive Grazing of Ryegrass by Holstein Cows--Forage Production, Milk Yield and Income-Over-Feed Cost (MSU, 1988)[1]

	Continuous	Intensive
Ryegrass Production, lbs DM/acre	6416	6671
Ryegrass Composition, % DM		
Crude Protein	19.5	20.4
Acid Detergent Fiber	29.1	28.3
Cows on Test	29	40
Days in Milk	91	88
Milk Yield, lbs/hd/d		
Actual	68.9	66.1
4% FCM	57.9	57.3
Lbs. 4% FCM/Acre	17,142	24,971
Milk Composition		
% Fat	2.97	3.12
% Protein	3.01	3.05
Ryegrass Costs/Acre, $	118.30	135.26
Hay Costs/Cow/Day, $	.15	.15
Total Forage Cost/Cow/Day, $	.70	.55
Grain Costs/Cow/Day, $	2.24	2.15
Milk Sales, $	7.43	7.49
Feed Costs, $	2.94	2.70
IOFC	4.49	4.79

[1]Grazing season was for approximately 35 days in the fall and 60-70 days in the spring.

Table 2. Forage and Grain Consumption by Holstein Cows[a] (LSU Agricultural Center Grazing Study, Franklinton, LA).

Consumption	Dietary Treatments[b] 1	2	3	SE
	------- lbs/hd/day -------			
Fresh Weight:				
Ryegrass Greenchop	172.6	66.8	66.6	6.5
Bermuda Hay	4.8	4.5	4.7	0.6
Corn Silage	--	52.6	51.3	3.9
Grain, lbs.[c]	24.8	24.7	22.5	0.6
Total[d]	202.2	148.6	145.1	5.2
Dry Weight:				
Ryegrass Greenchop	23.0	9.1	9.1	0.9
Bermuda Hay	4.2	4.0	4.2	0.5
Corn Silage	--	16.4	15.8	1.3
Grain[c]	22.6	22.2	20.3	0.4
Total	49.8	51.7	49.4	1.5

[a] Average of 14-day drylot intake trials conducted in March 1992, 1993 and 1994. Cows averaged 1320 lbs. in weight and produced 71.6 lbs/hd/d 3.5% FCM.
[b] Diet 1=Ryegrass grazing and corn/soybean meal grain mix. Diet 2=Ryegrass grazing A.M./corn silage P.M. and corn/SBM grain mix. Diet 3=Ryegrass grazing A.M./corn silage P.M. and corn/corn gluten meal/blood meal grain mix.
[c] Significant protein source affect (Diet 2 vs 3).
[d] Significant forage source affect (Diet 1 vs 2).

Table 3. Performance of Holstein Cows as Affected by Forage and Protein Source[a] (LSU Agricultural Center Grazing Project, Franklinton, LA)

Item	Dietary Treatments[b] 1	2	3	SE
Cows/Treatment	58	61	62	
Days in Milk, Initial	21.5	23.2	19.4	1.1
Grain Intake, lbs/hd/d[c]	22.6	22.2	20.3	2.0
Grain Intake, % of Offered[c]	97.6	99.9	87.7	--
Milk Yield, lbs/hd/d[c]	75.6	73.8	80.1	4.3
3.5% FCM Yield, lbs/hd/d[c]	72.4	74.3	77.9	3.8
Milk:Grain	2.9	2.9	3.6	--
Milk Fat, %[cd]	3.30	3.57	3.37	.15
Milk Protein, %[c]	3.77	3.72	3.62	.07
Milk Solids, %	12.31	12.56	12.32	.23
Condition Score[e]				
Initial	2.41	2.40	2.50	.06
Final	2.45	2.41	2.52	.05
Pregnancy Rate, %[d]	53.4	75.4	79.0	--

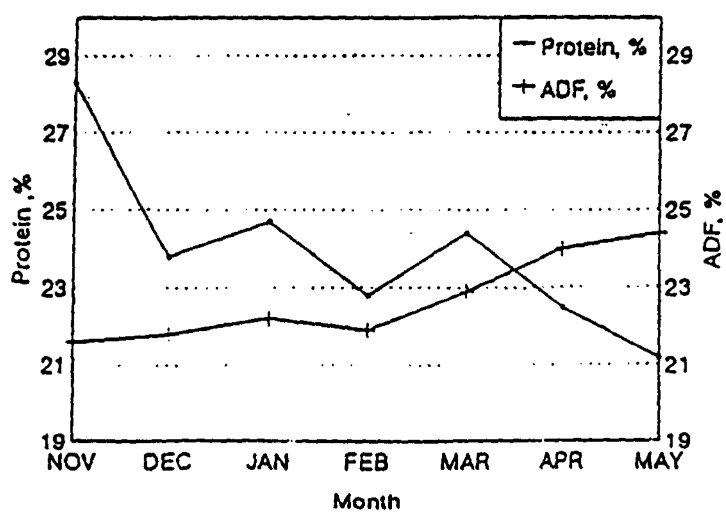
[a] Data are averages of 1992, 1993 and 1994 ryegrass grazing seasons. (Average grazing season duration was 159 days).
[b] Diet descriptions same as Table 2.
[c] Significant protein source affect (Diet 2 vs. 3).
[d] Significant forage affect (Diet 1 vs. 2).
[e] Condition scores range from 1 (very thin) to 5 (very obese).

Table 4. Economic Analysis of All-Grazing vs. Grazing/Silage Forage Systems With and Without By-Pass Protein (LSU Agricultural Center, Franklinton, LA)

Item	Dietary Treatments[2]		
	1	2	3
	- - - - Dollars - - - -		
Forage Cost/Cow/Day	1.10	1.34	1.32
Grain Cost/Cow/Day	2.01	1.97	2.15
Total Feed Cost	3.11	3.31	3.47
Milk Sales	9.44	9.70	10.16
IOFC[3]	6.33	6.39	6.69

[1] 2X grazers (Diet 1) were alloted 1.3 acres/cow and A.M. grazers averaged 0.7 acres/cow during the 159-day grazing period.
[2] Diets same as described in Table 2.
[3] Includes pasture, silage and hay production costs of $125/acre, $27/ton and $30/ton, respectively, and milk price of $13.05/cwt.

Fig. 1 Seasonal Changes in Ryegrass Protein and ADF Content



SERS Grazing Study-Average of 1991 and 1992