

Feeding Dairy Cows on Quality Pasture

By Larry Tranel and Dr. Dave Combs

Many studies suggest that quality pasture reduces input costs and increases net returns. Benefits cited include: 1) increased yield and quality of forage 2) decreased purchased feed 3) decreased equipment and fuel 4) decreased manure handling and bedding 5) better animal health and 6) reduced labor to feed or harvest the forage.

Successes at maintaining good milk yield are generally due to an ability to optimize pasture yield and quality; supplement rations to meet energy requirements; and balance diets for undegradable protein.

Yields of high quality pasture forage can be similar to yields obtained on most farms that mechanically harvest forage for hay or silage. Quality pastures can achieve 4-6 ton of dry matter per acre and can be grazed 6-9 times each season. Proper grazing management is the major factor determining yield and quality of forage.

Proper grazing management includes keeping the grass vegetative-this means leaving enough residue (6-8") after grazing to allow regrowth from photosynthesis in addition to root reserves. Grazing occurs before the reproductive stage (8-16" depending on species) so quality is high and growth fast. Proper management also includes rest after grazing. Pastures need adequate time to replenish root reserves as more continuous grazing weakens pasture plants. Thus, cows should be offered fresh forage after each milking and not be allowed to re-graze areas grazed less than 3 days prior.

Selection of forages also impacts both yield and quality. Grasses and legumes grown together typically increase 10%-15% compared to monocultures. Forage intake is also increased by adding legumes to pasture. Legume-grass pastures are better than pure alfalfa pastures because of greater yields, better persistence, reduced bloat and higher milk production per acre. Cows on pasture tend to have lower grain intake which decreases total dry matter intake but does not consistently affect milk yields, body weight or cow condition. When milk per acre is calculated, the legume-grass pasture system can produce similar milk yield per acre compared to confinement feeding.

Forage utilization in grazing dairy cows may differ from forage utilization in cows fed alfalfa silage. Ruminant disappearance of dry matter is faster and more extensive for cows on fresh forage diets than for cows on alfalfa silage diets. When fresh grass is compared to ensiled grass, significant water soluble carbohydrates are lost.

Lower dry matter intakes, lower rumen volumes and lower digesta weights of cows on pasture relative to cows fed silage indicate something other than physical fill (NDF) limits intake.

Ruminal environment (pH) of pastured cows, unlike cows fed alfalfa silage, is suggested to be more controlled by intake of forage than by intake of grain. Cows on pasture can have the same level of milk production and milk components as cows fed alfalfa silage but they consume less grain and forage which leads to lower rates of forage and liquid passage, lower total digesta weight and lower rumen volume. Cows on pasture also have higher rumen pH ammonia concentrations and lower total VFA concentrations.

Supplemental grain is critical if high milk output and maintenance of body condition are priorities. In general, each additional pound of grain increases milk yield @ between .5 and .67 pounds per day. Each pound of grain will increase total dry matter intake .4 to .6 pounds per day thus decreasing forage consumption .6 to .4 pounds per day. The break-even for grain supplementation, depicted in the following table, depends on 1) response in milk 2) cost of grain 3) value of milk and 4) value of forage not consumed because substituted for grain.

Milk price, \$/cwt	14.00	12.00	10.00	6.00
Response*	(Breakeven grain price cents/lb)			
.70	9.8	8.4	7.0	4.2
.40	5.6	4.8	4.0	2.4

*pounds milk produced per pound of grain supplement.

Typical recommendations are one pound of grain supplement to 3.5 to 4 lbs. of milk produced. Early lactation rations should contain .78 to .80 Mgal NEI/lb DMI. The benefits to grain supplementation on pasture include increased energy intake; stimulation of rumen bacterial protein synthesis and increased dry matter intake. Milk yield, body condition and reproduction respond to supplemental grain. Grain supplementation will also make up for reductions in forage quality.

Starch utilization, which assists rumen microbial protein synthesis is another benefit but is affected by amount, form and frequency of feeding. Finer grains can improve utilization due to rapid rumen passage.

Research with high producing dairy cattle indicates that cows under grazing conditions lose more body condition in early lactation and tend not to gain weight as rapidly in mid to late lactation compared to confinement cows. Lower rumen fills decrease apparent body weight so cattle appear thinner than actual body stores of fat indicate.

High quality pastures are relatively high in crude protein but low in by-pass protein compared to NRC guidelines. Cows fed higher by-pass protein concentrates tended to produce more milk and milk protein than controls. However, if converted to fat corrected milk no difference showed in yields. Other work indicates that the marginal returns from supplying additional by-pass protein may not always cover the added expense. By-pass protein is only a limiting factor after adequate energy needs are met.

Another limiting factor can be forage consumption. Cows typically eat 22 to 28 lb of forage dry matter per day. At 25 lbs of dry matter, this would be the equivalent of 28.4 lbs of hay at 88% DM; 50 lbs. of alfalfa silage at 50% DM; or 167 lbs of fresh pasture at 15% dry matter.

Time needed to consume forage depends on: 1) Bite size which ranges from .25 - 2.5 grams dry matter/bite. 2) Eating rate which ranges from 50-65 bites/minute and 3) time spent eating which could range from 2-10 hours per day. If eating a TMR at 2 grams per bite x 55 bites/minute x 60 minutes/hour divided by 454 grams/lb equals 14.5 lb DM/hr. If 50 lbs. DM are consumed divided by 14.5 lbs/hour, equals 3.4 hours per day eating time using 11,220 bites per day.

A cow on pasture eating 25 lbs DM forage and 20 lbs of supplement can be challenged in DM intake even when optimizing sward density, height and area offered. A cow consuming .5 g DM/bite x 55 bites/min x 60 min/hr) divided by 454 grams/lb = 3.6 lb DM per hour. Thus, 25 lb DM on pasture/ 3.6 lb DM/hour needs 7 hours per day eating time on pasture alone. Then, add in the supplement at 2 g DM/bite x 55 bites/min x 60 min/hr)/454 g/lb which is 14.5 lb DM per hour. This 20 lb DM/14.5 lbs DM/hour equals another 1.4 hours /day eating. So, total bites/day = 55 x 60 x (7 + 1.4) equals 27,720 total bites eaten by the dairy cow on pasture.

This time function of grazing relative to dry matter intake on pasture can also be related to season and /or seasonal dry matter production as depicted below:

	Spring	Summer	Fall
Grazing time minutes/day	490	540	570
Rate of biting, bites/min	59	65	65
Intake per bite, g DM	0.50	0.32	0.28
Pasture intake, lb DMI day	32	24.6	22.9

Many cows are limited on intake due to quantity of quality pasture offered which contributes to overgrazing. Overgrazing is defined as allowing or forcing cows to leave less than 35-40 percent DM residue in the pasture. This overgrazing contributes not only to lower DM yield from the pasture but also can lower milk yield per cow

and acre. Leaving ample DM residue (6-8') is an integral part of balancing high milk and pasture production-an aspect often overlooked in grazing.

Another often overlooked aspect is the negative impact of grain feeding when pasture intake is less than expected. If balancing a ration for 70 lbs of milk and pasture intake is 10 lbs of dry matter lower than formulated ration, the loss in dry matter intake could result in shortage of 5 Mcal of energy and 4.7 pounds of NDF. This scenario can and does severely affect rumen pH and cause sub-acute rumen acidosis.

Heat stress is another often overlooked area of management in high producing dairy cows on pasture. Heat stress needs to be managed so cows maintain adequate dry matter intakes. Early morning pasturing (between 6-10 am) should be encouraged on hot days and evening pasturing coupled with a mid afternoon supplemental TMR or com silage feeding. A shaded feedbunk equipped with a misting system or a misted holding area equipped with a wind tunnel ventilation system can effectively cool cows on most hot days.

So, feeding high producing dairy cows on quality pasture has its challenges in optimizing pasture yield and quality; meeting cow energy requirements; and balancing diets for undegradable protein. Producers also need to concern the time function of dry matter intake relative to pasture sward density, height and area offered. In addition, an awareness of the negative dry matter intake impacts of overgrazing is as important as the yield of dry matter lost in subsequent grazings.

It is the author's perspective, that many of the difficulties in pasturing dairy cows is due to inadequate sward densities of high quality forage and feeding schedules which inhibit higher dry matter intakes due to environmental factors, especially heat.

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