



Forage Management

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Principles of Management-Intensive Grazing¹

There are different scales at which we can discuss management-intensive grazing (MiG). One is the small scale of plant productivity and quality. At the other end of the spectrum is the large scale of the whole farm. The whole-farm scale is the viewpoint I will use in this discussion of MiG.

In today's economy, agriculture faces challenges. The manager of a MiG forage-livestock system needs to study them carefully and identify solutions for the challenges facing the operation.

I will address six major challenges facing managers of MiG systems and discuss some of the management strategies that can be used as solutions. The degree of implementation of a management strategy depends on the local farm, community, and market economics. These six challenges were chosen because of their impact on farm social, economic, and environmental sustainability. They are:

- Management direction
- Marketing
- Nutrient management
- Seasonal forage growth patterns
- Forage species
- Grazing management

Management direction

To direct the efforts of management and labor, managers need to identify what they want to accomplish through the farming operation. They may include personal aspirations of owners, managers, and workers; financial requirements and goals; and personal satisfaction and quality of life. Direction is based on a clear vision of what is to be achieved in the long term and how it will be achieved through short-term, intermediate, and long-term goals.

The importance of visioning has been taught for over 3,000 years as noted in the quote: "Where there is no vision the people perish..." (King Solomon, Proverbs 29:18, 1000 BC). A more recent phrase for the need of vision is "begin with the end in mind" (Covey, 1989). If a clearly defined vision and related goals are not articulated, then there is little likelihood that management or labor efforts will be directed in a cost-effective manner. A third adage goes: "If you don't know where you are going, any road will get you there."

Envision your destination and develop practical goals to draw the map to get there.

Marketing

If vision gives the destination and goals are the map, then marketing is the fuel for achieving the vision. If you put together a budget for an enterprise using average production, average costs, and average prices, most often the bottom line will be negative or break-even at best. To have a profitable MiG system, the manager has to be above average in some aspect of cost-effective production or marketing.

In West Virginia, pooled feeder calf marketing adds up to an additional \$120 per calf sold. In the Midwest, this value may not be as high since feedlots are nearby and there is a stronger market, but good marketing practices will still be important.

Livestock managers need to know what drives the market they are producing for and provide livestock with the attributes that add value to their product. In West Virginia, this is accomplished by pooling feeder calves in tractor-trailer load lots, with calves having known genetic quality and being health managed under a certified quality assurance program. In these pools, cooperating producers cull cows that do not produce calves meeting the pool requirements and use performance-tested bulls that are above average in performance EPDs.

A major part of marketing is to know your break-even price and the marginal value of your product. These two pieces of information allow you to determine if a management technology is likely to make additional money. An example of how to calculate the marginal value of feeder calf gain is given in Table 1, using average prices received by producers in the West Virginia Marketing Pools in 2000.

As Table 1 shows, a calf in the 500-pound weight class was worth \$1.17/lb, but the value of a pound of gain going into the 600-pound weight class was not \$1.17 but \$0.36. When one buys a product to promote gain, the economics are different if the gain is worth \$1.17 or \$0.36 per pound.

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Table 1. Calculate the marginal value of calf gain from reported feeder cattle prices by multiplying the midpoint weight of the reported weight breaks by their value. The difference in price per head for hundred 100 weight breaks gives the value of the marginal gain. For weight breaks of less than 100 pounds, adjust the value to a pound or hundredweight basis.

Weight break	Midpoint weight (lbs)	Average price/100 lbs	Average price/head	Value of next 100 pounds added to calf
400-499	450	\$124.00	\$558.00	\$85.50
500-599	550	\$117.00	\$643.50	\$36.14
600-699	650	\$104.56	\$679.64	

Table 2 shows the value of different attributes of a feeder calf in the West Virginia market over a six-year period. A basic calf was worth \$77.20 before adding weight, grade, or color. Adding 100 pounds to the calf added \$57.52 so a 600-pound calf added \$345.12. If the calf was a M1 Angus calf, you added another \$49.29 for the grade and \$19.27 for the breed, bringing the value of the calf up to \$413.68 or \$82.74/cwt. Then there were additional premiums for the date of sale or how many cattle were in the lot of cattle sold.

Table 2. Factors that affected the value of a steer feeder calf in the West Virginia market over a six-year period (1990-1995).

Component	Model	Average	Range Covering 66% of Observations
Calf (\$/hd.)	Basic calf	77.20	± 27.16
Weight (\$/hd./cwt.)	Sale weight	57.52	± 5.93
Grade (\$/hd.)	M1	49.29	± 7.17
	L1	44.51	± 6.85
	S1	5.58	± 7.35
	LM2	0.00	± 0.00
Breed (\$/hd.)	Black white face	25.72	± 8.67
	Angus	19.27	± 5.94
	Charolais cross	17.35	± 6.36
	Continental cross	11.60	± 7.60
	Hereford cross	0.00	± 0.00
	Hereford	-5.80	± 6.52
Date (\$/hd./day)	Late (after Oct 1)	-0.52	± 0.26
	Early (before Oct 1)	0.52	± 0.26
Lot size (\$/hd./hd.)	No. head in sale lot	0.81	± 0.05

Understand your market and use enterprise budgets to determine and control the marginal costs and profitability of management strategies in your MiG system.

Nutrient management

Good management of plant nutrients is needed if a MiG system is to be economically or environmentally sustainable. Soil fertility and fertilizer (including manure) management can make the difference between a soil producing only 30% of the soil's yield potential or 100% of its potential.

The fertilizer value of manure and urine passed to the soil by a 1,000-pound cow is worth \$100 to \$130 per year. If the animal's manure and urine are not spread relatively uniformly where they can grow grass, their value is lost. The replacement value of these plant nutrients represents 20-25% of the value of a weaned calf. Nutrient flows in a MiG system can be managed by proper placement of fencing and a watering system and by shade management when shade is necessary.

Legume management is another tool that provides nitrogen at relatively low cost and risk compared to purchased nitrogen. Nitrogen fixation by clovers or alfalfa replaces the need for commercial nitrogen in cool-season pastures. Legumes also increase forage intake compared to nitrogen fertilized grass, increasing yearling cattle growth by 25% or more and increasing dairy cow milk production by 6-10 pounds per day. Table 3 shows data from Virginia where clover used in place of 200 pounds of nitrogen per acre per year gave improved steer growth and a small reduction in grazing days per acre due to the increased forage intake, but about the same gain per acre.

Table 3. Legumes used with a cool-season grass increase forage intake and animal gain per head at a lower stocking rate with little loss in gain per acre compared to the grass alone fertilized with 200 pounds of nitrogen/per acre per year (Blaser, et al., 1969).

Pasture	Days/acre	ADG	Gain/acre
OG-Clover	257	1.28	329
OG-200#N	311	1.07	333
TF-clover	303	1.02	303
TF-200#N	403	0.91	367
BLG-clover	258	1.21	312

A good MiG tool is to base a cool-season pasture on legume-fixed nitrogen and use strategic nitrogen applications when they are economically justifiable.

Seasonal forage growth pattern

Pasture systems based on cool-season grasses and legumes have a flush of growth in the spring when soil and air temperature and soil moisture are optimum for their growth. In the summer as temperatures increase and soil moisture decreases, these forages have a growth rate one-half to one-third of the spring growth rate.

A cool-season pasture system needs a “buffer” to balance forage production and quality to the animal nutritional requirement. If the manager does not develop a buffer, Mother Nature will provide one of her own.

If there is no buffer and a pasture is stocked for average midsummer forage growth, the animals will waste about 50% of the spring pasture, representing about 25% of the total forage growth for the year. The animals will also be short of feed at the end of summer, which can reduce milk production or growth.

A.W. Illius at the Edinburgh School of Agriculture coined the term “buffer grazing system.” For his buffer, a portion of pasture was fenced off and opened for grazing when needed later in the spring. If late-spring growth was adequate, then the area might be hayed. We can broaden the definition of buffer to include other management strategies that enable the manager to match forage availability to animals’ needs. Strategies that act as buffers in a MiG system include:

- Harvesting first-cut hay on some paddocks and adding these paddocks back into the grazing sequence in midsummer to provide more acres of pasture.
- Varying the stocking rate by shipping some livestock in early summer when pasture growth slows down.
- Using warm-season grasses that do not need to be grazed until late spring or early summer in selected paddocks.
- Wasting some forage in the spring.
- Allowing animals to lose body condition in late summer.
- Feeding supplemental forage, forage substitute, or grain when forage growth slows down.
- Strategically applying nitrogen fertilizer to increase fall growth.

Depending on local economics, some of these strategies are better alternatives than others. Using a buffer in a MiG system can increase the effective productivity of a soil by 25%. Use a grazing system buffer to increase the efficiency of forage utilization and use stockpiling or other fall forage production strategies as fall buffers to extend the grazing season by one to three months or more.

Forage species

In most cases, the best economic approach in forage production is to manage well what is in the pasture. It is often amazing the response an old, worn-out pasture gives once it is taken care of by rotational grazing, a buffer, improved soil fertility, and legume management.

Soil types can range in yield potential from 2 to 5 tons per acre or more. (This information is available in county soil surveys available at your local NRCS or Extension office.) These two extremes can be found in soils located next to each other on a farm. Fencing should be laid out so that soils having similar drainage and yield potential are within a paddock. This will assist in grazing management and the development of more uniform species and forage growth within the paddocks.

If improved management does not increase pasture productivity to a level appropriate to the soil’s potential, it may be worth a new seeding. The species mixed for a new seeding should be ones adapted to the site’s climate, soil drainage, and grazing management. For soils having potential hay yields of 2.5 tons or less under good management, there is little likelihood of economic improvement beyond a good grass-clover system.

If the grass is endophyte-infected tall fescue and clover and grazing management is not proving adequate to meet the farm’s production and economic goals, then eradication of the infected fescue and establishment of an endophyte-free or endophyte-enhanced tall fescue may be advisable. When used with ladino and red clover, these new fescues have the potential to be the foundation of good MiG systems for meat and milk production.

Grazing management alone may not bring in the plant species most adapted to the extremes in soil drainage. On deep, well-drained soils, seeding alfalfa may be a good practice. An alfalfa-grass mix makes good first-cut hay and provides a good buffer for summer grazing. Since alfalfa can exploit moisture in deep, well-drained soils, total yield may be increased. The hay buffer adds to grazing flexibility and system efficiency. The grazing management of alfalfa paddocks should be different than grass-clover paddocks to meet the needs of the alfalfa. Wet sites may not have a natural seed bank of alkaloid-free reeds canarygrass so seeding this species may greatly increase forage production and improve paddock trafficability in wet weather.

Two cool-season grass species grown on a site, under management that both are adapted to, will seldom differ in yield by more than 20%. Varieties within a species seldom differ in yield by more than 10%. However, adding a nitrogen-fixing legume such as clover or alfalfa to a grass mix, where no commercial nitrogen is used, can increase total forage production by 100%.

If the plant species in a new seeding are not adapted to the soil and grazing management used, they will not survive and yield of the planted forage species may be zero. Plants arising from the soil seed bank will then invade the site. In the best case, the site may revert to the original plant community with only a loss of money. If there are major weeds that were controlled by the original plant community and grazing management, the site may be worse off and money may be lost.

The plant species found in a pasture are the ones adapted to the soil drainage, fertility, and current grazing management. Changing the grazing management and soil fertility may change the plant community to a more productive, higher quality one. When reseeding, use a mixture of species adapted to the site's soil drainage and grazing management.

Grazing management

Fences and water are the tools for controlling grazing management. Movement of livestock in relation to pasture growth or defoliation controls the timing and intensity of grazing, which is functional grazing management.

Stocking rate is used to balance annual forage requirement to annual forage production and utilization. Buffers are used to balance monthly forage requirement to monthly forage production and utilization.

The foundation of proper rotational grazing is timing and intensity of plant defoliation to meet the nutritional needs of the animal and maintain plant health. At times, preference may be given to the needs of the animal. At other times, we may make the animal work for us to accomplish a plant management goal. The effects of grazing, rotation rest interval, and grazing intensity (grazing pressure) in MiG can mean the difference between 50 and 100 percent production relative to the soil's potential.

The term "intense management" is sometimes used to mean the number of paddocks in a grazing system. "Intense grazing" should be used to refer to how close or short the animals are allowed or forced to graze a paddock before they are moved to a new paddock. Some species respond well to close grazing (Kentucky bluegrass and white clover) while other species do not (native warm-season grasses). It is possible to mismanage 20 rotationally stocked paddocks as much as one continuously stocked pasture.

The management-intense part of MiG is based on:

- Knowing the defoliation timing and intensity preferred for a given plant community in a pasture.
- Controlling the defoliation timing and intensity of the pasture by moving animals between paddocks in a rotationally stocked system or by controlling the height of pasture by changing the stocking rate in a continuously stocked pasture.

Summary

A MiG system is a grazing system that looks at the whole-farm forage-livestock system from visioning to marketing. Challenges to profitability and sustainability of the production system need to be identified by the management team. Management then needs to develop strategies that will overcome these challenges, within the local economic and environmental context.

Six challenges that need to be addressed for a MiG system are:

- Management direction – vision and goals give direction to the management and work accomplished;
- Nutrient management – manage nutrients to reduce costs and provide the basis for a sustainable production system;
- Marketing – using good marketing practices will help provide the optimum economic margin for your product;
- Seasonal growth patterns – use buffers to reduce or eliminate their negative effects;
- Forage species – manage what you have, then look for ways to fine-tune the use of alternative forage species in your system;
- Grazing management - manage the timing and intensity of defoliation to maintain a healthy grass-legume combination and meet the nutritional needs of the livestock over the year.

References:

- Blaser, R. E., et al., 1969, "Managing forages for animal production." Virginia Poly. Inst., Blacksburg VA. Res. Bull. 45.
- Covey, S.R., 1989, "The 7 Habits of Highly Effective People"

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