The Economic, Environmental, and Social Aspects of Management Intensive Grazing

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There has been growing concern in recent years over the environmental impacts of conventional agricultural systems that rely heavily on chemical inputs and mechanization. As the public becomes more aware and begins to question our food production systems, alternative methods of production with increased regulation are likely needed to minimize further environmental degradation. This should be seen as an opportunity for farmers, agencies, and the public to embrace alternative systems of agriculture with reduced environmental impact. Examples of this discussion and shift already taking place include the popularity of literature dealing with these issues, such as books by author Michael Pollan, the growing demand for community supported agriculture, and the adoption of farming techniques such as management intensive grazing. These farming techniques can reduce the environmental impact of agriculture while maintaining high levels of production.

Agriculture is immensely important to Wisconsin. Wisconsin is a national leader in milk and cheese production, and agriculture is one of the biggest industries in the State. This industry generates over 51 billion dollars in economic activity annually, employing hundreds of thousands of Wisconsin residents. However, agriculture has had an undeniable impact on Wisconsin’s environment. This impact includes soil loss and erosion, degradation of water resources, loss of wildlife habitat, and increased emission of hazardous air pollutants, among others. These impacts have raised concern for agriculture in general, and specifically Confined Livestock Feeding Operations (CAFOs), and thus the call for increased regulation of these farms.

One way to mitigate some of the environmental impacts of conventional agricultural is to utilize alternative methods of production, such management intensive grazing (MIG). MIG represents a shift from these conventional agricultural systems that rely extensively on chemical inputs and expansion by utilizing sound management techniques to maintain the same high level of production. MIG has demonstrable benefits for Wisconsin’s agriculture economy and environment, on both local and statewide scales. In fact, the future of agriculture in Wisconsin will likely depend on the use of such production methods that are both profitable and ecologically sound.
Management Intensive Grazing

MIG is a practical method of production for farmers seeking to lower input costs, improve environmental stewardship, and maintain profitability. Additionally, graziers (farmers with established MIG operations) often speak of the personal satisfaction MIG has provided. The origin of this satisfaction differs for each producer, but often stems from proven economic and environmental attributes of grazing. Producers can realize such attributes through the establishment of perennial pastures on their farms and proper management of their grazing herd.

The basic concept of MIG is that cattle are moved through a series of pastures, allowing each pasture to recover from grazing before it is grazed again. The duration of each rotation depends on the pasture system, weather conditions, and feed requirements of the herd. This requires careful management on the part of the producer to ensure pastures are grazed at their peak productivity and nutritional level. The dairy herd will receive a majority of their forage from the pastures during the growing season. The high quality feed source provided by managed pastures and harvested by grazing livestock reduces the need for purchased feed, decreases labor to harvest, store, and feed cultivated forage, and decreases the amount of manure to be handled and stored by the producer. The use of MIG provides benefits to producers through decreased expenses, labor, and environmental risk.

Use of Management Intensive Grazing in Wisconsin

Many Wisconsin farmers have incorporated MIG into their livestock systems over the past few decades. Seven percent of Wisconsin dairy farms practiced MIG in 1993, growing to 14 percent in 1999. Current estimates indicate that nearly a quarter of the Wisconsin dairy producers practice MIG. The average milking herd size of MIG operations in the state is less than 100 cows, owning to the fact that MIG requires more land per cow than non-MIG systems. However, these farms contribute nearly six billion dollars to the state’s 26 billion dollar dairy industry, based on conservative estimates of the amount of milk produced on MIG farms. In addition to contributing billions of dollars to the Wisconsin economy, MIG farms provide jobs for farmers, county and state agencies, non-governmental organizations, and others involved in livestock agriculture.

The efforts of many diverse groups have led to the increased use of MIG on Wisconsin farms. Groups advocating MIG include county and state agencies, non-governmental
organizations, and producers through a variety of outreach methods. For instance, there have been a number of projects funded through the Wisconsin Grazing Lands Conservation Initiative (GLCI). The Wisconsin Department of Trade and Consumer Protection administers the over two million dollars of funding provided by the GLCI. This program supports educational projects such as pasture walks, workshops, and grazing research ranging from the carbon sequestration potential of pastures to livestock management techniques. There are similar outreach efforts through the University of Wisconsin-Extension, as well as a growing body of grazing research within the University of Wisconsin system, all with the purpose of increasing awareness and use of MIG.

Many resources are available to farmers with established grazing operations or those who wish to begin grazing. State and county conservation agencies work with farmers to develop formal grazing plans. These plans help them to establish operations on their farm, become eligible for grant funding for grazing related projects and help graziers operate in an economically and environmentally sound way. Also, established graziers around the state have organized into grazing networks to provide guidance and assistance to beginning graziers. These educational and research projects have contributed to the growth of grazing in Wisconsin thus far.

It is unclear whether or not MIG will continue to expand in Wisconsin at the rate witnessed in recent decades, but if the trend continues Wisconsin may reach a tipping point. A tipping point, as described by author Malcolm Gladwell, refers to a crucial stage in some phenomenon in which the momentum for change becomes unstoppable. This sociological phenomenon may apply to MIG if enough farms implement the practice. Once the tipping point is reached through education and outreach, others will adopt MIG without further efforts. However, there are certain barriers that must be addressed before there are enough MIG farms to even reach the tipping point.

The Profitability of Management Intensive Grazing

Historically, a major hurdle to the adoption of MIG by producers has been concern over profitability. The mindset of “get big or get out” runs counter to MIG, which emphasizes a high level of management over an expansive operation. However, a study by the University of Wisconsin Center for Dairy Profitability compared MIG farms to non-grazing operations, and
showed that grazing farms are economically competitive with the other farms.\(^5\) In fact, the study found that MIG farms were more profitable per cow than non-grazing operations, even though MIG farms produced less milk per cow. Reduced milk production is a common argument against MIG, and this shows that production alone does not determine financial success.

A comparison was done of the financial performance of three types of farms found in Wisconsin: MIG farms, traditional confinement (non-MIG) farms with less than 100 cows, and large confinement farms with greater than 250 cows. The study showed MIG farms have the highest net income per hundredweight equivalent of milk (a term used to standardize farms), and lowest cost of all three farm types.\(^5\) The key to profitability is high income and low costs. MIG operations clearly excel in this area.

The reduced costs of MIG stem from, among other things, decreased use of fossil fuels, chemical fertilizers and pesticides. Managed perennial pastures require fewer inputs to maintain productivity than cultivated systems, which can result in real savings for the farmer. For example, a recent study found that pasture-based agricultural systems use 67 percent less fossil fuel energy per ton of animal feed than feedlot systems.\(^7\) Fuel expenditures are reduced for the farmer, and reduced use of fuel results in fewer greenhouse gas and particulate emission from farm equipment. Another case study from a Wisconsin farm shows similar results. Switching to MIG reduced fossil fuel usage on this farm from 8,000 gallons per year to 3,200 gallons per year, a reduction of 29 gallons of fossil fuels per gallon of milk produced.\(^8\) This is a major benefit of MIG, especially with the often volatile pricing of fuel and milk.

Another economic advantage of MIG to producers is low transition costs. Because MIG doesn’t require a large investment in capital, MIG transition does not require producers to assume a high debt load. Lower capital investment is possible because there is less of a need to construct expansive animal housing, feed, and manure storage facilities. These can be expensive business decisions that keep a producer in debt for decades. Savings may also be realized through the reduced use of farm machinery because the livestock are harvesting a majority of their own feed on pasture. Using less machinery will result in lower maintenance costs and an overall reduction in the amount of equipment needed. Overall, the less capital investment and the lower debt load generally will allow producers to become more financially secure. Economic stability is important to any business, but is especially important to dairy agriculture given the volatility in milk markets and input costs.
It is important that farmers understand the short and long-term economic benefits provided by MIG as they consider options for their future. The profitability of the operation is what ultimately allows for stability and longevity. MIG provides adequate income to producers by avoiding intensive capital investment and reduced costs. Additionally, when Wisconsin farms are profitable they contribute more revenue to the state’s economy. Clearly, the economic advantages of MIG are important to both producers and the state.

**Environmental Considerations of Management Intensive Grazing**

Conventional agriculture tends to rely on high levels of inputs to maximize the yield potential of the system. However, this can be detrimental to the environment and result in soil erosion, reduced water and air quality, and the loss of wildlife habitat, to name a few. Ultimately, a shift will need to be made to systems that sustain both high levels of production and environmental quality. MIG is representative of one such method, and recent data suggests a shift in Wisconsin is both underway and likely growing.

Many of the environmental benefits of MIG result from the perennial ground cover of managed pastures, reduced chemical inputs, and the high level management by the farmer. Coincidentally, the economic advantages of MIG arise from the same attributes. This fact shows that MIG can be both profitable and environmentally sound.

**Soil Erosion**

The loss of productive topsoil from farmland has been an issue in Wisconsin for decades. Wind and water erosion reduce soil quantity and quality, which ultimately decreases productivity. The loss of productivity often leads to the cultivation of marginal land that is easily eroded, further exacerbating the problem. MIG can help conserve soil resources and mitigate significantly the undesirable consequences of soil loss. The deep root systems of perennial forages along with a diversity of microorganisms found in managed pasture soils increase water infiltration and soil stability, reducing runoff and erosion. Moreover, the perennial forage cover reduces the velocity of raindrops impacting the soil. On bare soil, the energy from a raindrop causes the detachment of soil particles from the soil surface. These particles are then easily moved by wind and water. Reducing the energy of the droplet will consequently reduce the erosion potential of the soil.
Conventional tillage practices and crop rotations that leave soil exposed during parts of the year increase the chance of erosion. Conventional Wisconsin cropland loses nearly 3.5 tons of soil per acre per year due to wind and water erosion. Much of this soil ends up in the state’s streams and rivers, and the lost fertility must be replaced with chemical inputs and the cultivation of more land. This increases the environmental and economic costs of production not only to the producer, but to society as well. In comparison, pasturelands in Wisconsin do not require annual tillage, and lose only 0.5 tons of soil per acre per year to erosion. Soil conservation through MIG ensures the long-term health and fertility of the soil, and ultimately, the farm.

**Water quality**

Non-point pollution from agricultural runoff can have significant impacts on riparian ecosystems, water quality, and human health. The extent to which agriculture impacts water resources is often dependant on the method of production. Typically, better water quality is associated with reduced nutrient and chemical inputs as well as healthy riparian areas, hence the potential for MIG to protect water resources.

Reduced fertilizer and pesticide inputs associated with MIG minimize the potential for surface and groundwater contamination. Health risks associated with exposure to these chemicals include birth defects, cancer, and immune system suppression in both humans and animals. Any possible reduction in the use of these substances is beneficial to human health, flora and fauna, and the environment as a whole.

Similarly, excess nutrients such as nitrogen and phosphorous often leach out of agricultural soils into water bodies where they contribute to the growth of algal blooms within Wisconsin’s water bodies, as well as the “dead zone” in the Gulf of Mexico. These blooms can create anoxic conditions in which aquatic species cannot survive. However, the deep root systems of MIG pastures help hold nutrients within the soil and prevent them from leaching into water bodies. The mix of grasses and legumes in the forage stand maximize the use of these nutrients, and legumes produce their own nitrogen, reducing the need for additional inputs. This is an example of where MIG can have environmental benefits locally in Wisconsin rivers and lakes, as well as on broader scales by reducing runoff contributing to anoxic conditions in the Gulf of Mexico.

Another concern regarding water quality is contamination by livestock manure. Farms that store manure onsite face the risk of storage facility failure, resulting in large releases of
manure to surface water. Manure runoff from barnyards and feedlots can also enter streams. Such releases have occurred, and often result in the unnecessary and harmful mortality of aquatic species. MIG reduces this risk in two ways. First, livestock are not confined in buildings or feedlots year round because they are on pasture grazing during the growing season. This reduces the amount of manure that needs to be handled by the producer. The cattle are dispersing their waste throughout the pasture system in small concentrations and the potential for a large release is reduced. Secondly, the potential for runoff from pastures into water bodies increases during precipitation events. The forage stand in managed pastures reduces the potential for runoff, preventing the harmful manure from ever reaching the stream.12

A properly managed MIG system can protect water resources from chemical, nutrient, and manure contamination. Producers can further protect these resources by specifically managing riparian areas. These areas are favored by livestock in the summer months as a place to drink, cool-off, and graze on lush riparian forage. However, these areas are important habitat for aquatic species and are very sensitive to degradation. Livestock can damage stream banks, increase sediment deposition into the stream altering fish habitat, and contaminate water with harmful bacteria. In order to maximize the benefit of MIG, farmers clearly must manage livestock access to riparian areas.

Producers can manage riparian areas by restricting cattle access and reducing degradation when cattle must be around the stream. Fencing parallel to the stream to exclude cattle will create a riparian corridor that will protect the stream banks when they are especially sensitive to degradation in the wet spring months. This will also allow the grasses along the stream to mature and become less desirable to the cattle, reducing the duration of time they will spend around the riparian area. Stream crossings are often the site of much degradation due to high traffic. Producers can reduce this degradation by observing where the cattle naturally want to cross, and then reinforcing this area with gravel. Cattle will likely continue to use this crossing because it is where they prefer to cross and provides better footing than other portions of the stream bank.

Restricting access cattle have to surface water will also reduce harmful levels of bacteria, such as the cause of fecal streptococci and E. Coli. These bacteria can be harmful to both human and livestock health, potentially with fatal consequences. Managed pastures may have as much as a 77 percent reduction in levels of these bacteria compared to unmanaged pastures.10 Degraded water resources affect the farm, wildlife, and the community. It is imperative farmers
realize the impact they have on water quality and mitigate this impact through the use of such practices as MIG.

**Wildlife Habitat**

The expansion of monoculture row crop systems to support growing human and livestock populations has resulted in the loss of wildlife habitat for many native species. Many species are habitat specialists, which require a specific habitat type to survive. Species of particular concern are grassland birds. Grassland birds require some open grassy area during the mid-May to July breeding season to successfully reproduce. Conventional cropping systems are often not suitable breeding habitat for these birds. The loss of grassland habitat has historically resulted in low nesting success and declining populations. In fact, there has been a 90% decrease in the abundance of grassland bird species in the past 4 decades. And while the precipitous decline in abundance is not exclusively attributable to livestock agriculture, this massive decline has effects throughout grassland ecosystems, altering trophic interactions between insects, birds, and predators.

However, MIG can be amenable to grassland species because managed pastures are similar natural grasslands. The forage stand provides ground cover for nesting and protection from predators, and birds are much more likely to nest in pastures than cropped corn or soybean fields. Additionally, producers can protect ground nesting bird nests from mortality by cattle and haying operations by setting aside a portion of the pasture during the breeding and nesting months. This can actually be beneficial to the grazing operation by allowing the grasses in the paddock to go to seed, which improves the forage stand at no additional cost to the farmer. This is only one example of how MIG can improve wildlife habitat, but the close resemblance of MIG to natural ecosystems suggests similar benefits for other species.

**Air Quality**

Air emissions from animal agriculture include pollutants such as ammonia, hydrogen sulfide, volatile organic compounds, and greenhouse gases. In low concentrations, these pollutants are generally not a risk to human or animal health. However, many farms store large quantities of manure on-site, increasing the concentration of pollutants emitted into the air from these wastes. MIG systems may have lower emission levels of hazardous air pollutants because livestock are not confined year-round to buildings or feedlots where manure can accumulate as
often as in other operations. It is reasonable to believe that because of the reduced opportunity for wastes to accumulate, air emissions would be lower on MIG farms than comparable, non-grazing operations. Therefore, MIG may be a way to reduce these hazardous air pollutants and decrease the risk to human health. However, more research is needed before this can be definitively concluded.

**Climate Change**

There is growing concern over the role of agriculture in global climate change as both a source and sink of atmospheric carbon dioxide and other greenhouse gases. In particular, there is increasing interest in sequestering carbon in the soils of grassland ecosystems. Management intensive grazing could increase carbon sequestration while maintaining agricultural productivity. Perennial grasses have been shown to increase soil carbon levels and limited tillage reduces carbon release from soil disruption. Also, perennial forages such as those found in managed pastures indirectly reduce greenhouse gas emissions through reduced use of farm machinery. This is a new and exciting area of research and it will be interesting to see the role MIG can play in future carbon sequestration projects.

**Social Considerations of Management Intensive Grazing**

Equally important as the economic and environmental aspects of MIG are social considerations. It is important that graziers enjoy what they do and get a sense of pride from their operation. Graziers who believe in and practice the MIG system are more likely to share their feelings and encourage other producers to transition to grazing.

An important social consideration is quality of life. Recent surveys of Wisconsin farmers have shown that those who use MIG on their farms report a higher level of life satisfaction than other methods of production. Reasons for this response are varied, but many reflect the decreased use of chemicals and farm equipment, reduced debt loads and associated stress, and the belief that MIG is better for the environment. Not surprisingly, the social aspects of grazing stem from some of the same factors that make MIG profitable and environmentally sound.

On a broader scale, MIG farms are often more appealing to much of the public than other operations. People like to see cows grazing, as they associate this with their natural state. Also, MIG farms tend to be family owned and operated, unlike some larger farms with corporate ties. Therefore MIG can play a crucial role in maintaining the important cultural role of the family
farm in Wisconsin, and hopefully exposing the next generation of farmers to this profitable, environmentally sound, and satisfying method of production. The upcoming generation of farmers is likely to face increased economic and environmental challenges that may best be addressed through the use of MIG. It will be much easier to meet these future challenges if the groundwork is established today.

Conclusion

Management intensive grazing represents a method of production that can reduce the environmental impact of modern agriculture in Wisconsin in a profitable way. MIG allows agriculture and wild species to coexist on the landscape while protecting soil resources, and water and air quality. These demonstrable environmental benefits, in conjunction with the proven profitability of MIG farms and quality of life benefits, argue for the continued growth of MIG in Wisconsin.

In fact, the economic, environmental, and social benefits available to farmers whom practice MIG, collectively, benefit the entire state. Continued expansion of MIG as a method of production will increase the realization of these benefits and ensure that agricultural profitability and environmental stewardship are compatible goals. The fact that profitability, stewardship, and social satisfaction each stem from fundamental concepts of MIG illustrate the wide-reaching benefits of MIG in the State of Wisconsin.
Resources Cited


