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ATTRA
The National Sustainable Agriculture Information Service
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Rotational Grazing

Livestock Systems Guide

Abstract: *Rotational grazing is periodically moving livestock to fresh paddocks, to allow pastures to regrow. Rotational grazing requires skillful decisions and close monitoring of their consequences. Modern electric fencing and innovative water-delivery devices are important tools. Feed costs decline and animal health improves when animals harvest their own feed in a well-managed rotational grazing system. Included are lists of resources for further research and other ATTRA publications related to rotational grazing.*

By Alice E. Beetz
NCAT Agriculture Specialist
November 2004

Introduction

Ruminants such as cattle, sheep, and goats can convert plant fiber—indigestible to humans—into meat, milk, wool, and other valuable products. Pasture-based livestock systems appeal to farmers seeking lower feed and labor costs and to consumers who want alternatives to grain-fed meat and dairy products. The choice of a grazing system is key to an economically viable pasture-based operation.

Adding livestock broadens a farm's economic base, providing additional marketable products and offering alternative ways to market grains and forage produced on the farm. In addition, soil losses associated with highly erodible land used for row crops decline when such land is converted to pasture. Besides these benefits, rotating row crops into a year or two of pasture increases organic matter, improves soil structure, and interrupts the life cycles of plant and livestock pests. Livestock wastes also replace some purchased fertilizers.

Because ruminants co-evolved with grassland ecosystems, they can meet their nutritional needs on pasture. A profitable livestock operation can be built around animals harvesting their own feed. Such a system avoids harvesting feed mechanically, storing it, and transporting it to the animals. Instead, the livestock are moved to

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NCAT

the forage during its peak production periods. Producers manage the pasture as an important crop in itself, and the animals provide a way to market it.

Reduced feed and equipment costs and improved animal health result from choosing species well-suited to existing pasture and environmental conditions. In most operations, a good fit between animals and available pasture provides more net income. ATTRA's publication *Matching Livestock and Forage Resources in Controlled Grazing* goes into more depth on this subject.

Some animals will produce acceptable meat with little or no grain finishing. Marketing these lean meats directly to consumers is an opportunity to increase profits. Skilled managers who can consistently offer high-quality forage to their animals, producing lean and tender meat, should consider pursuing this market.

Choosing a Grazing System

Continuous grazing, the most common grazing system in the United States, usually results over time in a plant community of less-desirable species. When livestock graze without restriction, they eat the most palatable forage first. If these plants are repeatedly grazed without allowing time for their roots to recover and leaves to regrow, they will die. Plants not eaten by livestock mature and go to seed. Thus, populations of undesirable plants increase, while preferred plants are eliminated, reducing the quality of the forage in a given pasture. Trampling and animals' avoidance of their own wastes further reduce the amount of usable forage.

Continuous grazing does, however, have the benefit of low capital investment, since few fencing and watering facilities are required. Because livestock are seldom moved from pasture to pasture, management decisions are simple. This type of grazing frequently results in higher *per-animal* gains than other grazing systems, as long as adequate forage is available to maintain high growth rates. But if pastures are overstocked, growth rates dwindle.

Rotational (or controlled) grazing, on the other hand, increases *pounds of animal production per acre*. How the system is managed influences the level of production, of course. In fact, management-intensive grazing (MIG) is another term for rotational grazing. This term emphasizes the intensity of the management rather than the intensity of the grazing.

Management-intensive grazing (MIG) is grazing and then resting several pastures in sequence. The rest periods allow plants to recover before they are grazed again. Doubling the forage use on a given acreage is often possible with the change from continuous to controlled grazing. There is considerable profit potential for the producer willing to commit to an initial capital investment and increased management time.(1) The producer can meet individual animal gain or gain-per-acre goals with sound management decisions.

Related ATTRA Publications

- *Sustainable Pasture Management*
- *A Brief Overview of Nutrient Cycling in Pastures*
- *Nutrient Cycling in Pastures*
- *Assessing the Pasture Soil Resource*
- *Converting Cropland to Perennial Grassland*
- *Matching Livestock and Forage Resources in Controlled Grazing*
- *Multispecies Grazing*
- *Meeting the Nutritional Needs of Ruminants on Pasture*
- *Grazing Networks for Livestock Producers*
- *Introduction to Paddock Design & Fencing-Water Systems for Controlled Grazing*
- *Protecting Riparian Areas: Farmland Management Strategies*
- *Managed Grazing in Riparian Areas*
- *Dung Beetle Benefits in the Pasture Ecosystem*

An easy way to begin MIG

An easy way to begin MIG is to subdivide existing pastures with one or two fences (or simply close existing gates). Managing these simple divisions is a chance to try out a more controlled system and begin learning this type of grazing management at a basic level.

If the new fences are electrified high-tensile wire, animals will learn to respect them, and managers can practice handling them. The manager's observation skills develop as the animals and forages adjust to the change.

Faced with low milk prices, the potential loss of price supports, and ever-rising costs, some dairy producers have changed to MIG to meet economic and quality-of-life goals. Some are providing cows fresh paddocks after each milking. Seasonal dairying—drying off the entire herd during times when pasture production is low— is often the next step, but it requires even more skillful management and may not be as profitable. For more information, see the ATTRA publications *Grass-Based and Seasonal Dairying* and *Ecomonics of Grass-Based Dairying*.

MIG can be used in many other operations as well. Cow-calf and stocker operations benefit from increased forage and higher-quality feed under MIG. Some graziers specialize in dairy beef or in raising replacement heifers for dairy operations. When MIG is used with sheep and goats, fencing must be excellent in order to keep the livestock in and the predators out. (Guard animals can enhance predator protection. More in-depth information about guard animals is available from ATTRA.)

MIG offers the manager a wide range of options in terms of grazing intensity. The enclosed chapter from *Forages, the Science of Grassland Agriculture* provides a thorough discussion of various grazing systems. The section "Building Forage-Livestock Systems" deserves special attention.

An Iowa farmer once said he hoped that scientists would soon discover that "animals like to move around and grass likes to stand still."

Making the Change

When making a change in grazing management, a logical first step is an inventory of the farm's resources. An outline to help in this inventory process is enclosed. Another useful tool is an aerial map of the farm on which to mark fences, water supplies, and existing forage resources. Writing down farm and family goals in this process makes it easier to stay on course with management decisions. When a salesperson is applying pressure, for instance, it helps to be able to evaluate the cost of the product against some chosen goal.

Implementating rotational grazing requires subdividing the land into paddocks, providing access to water, adjusting stocking rates, and monitoring grazing duration. These decisions may seem overwhelming at first. Some of the enclosed materials offer information about setting up paddocks to fit the landscape, calculating stocking rates, and estimating forage yield and availability. For more information, see ATTRA's *Introduction to Paddock Design*.

The change to controlled grazing will have impacts on the animals, the plant community, and the farmers. Livestock operators who have not monitored their livestock daily or weekly will feel the greater time demands. On the other hand, the need for harvested forages declines, resulting in less time spent making hay or silage. Purchased feed costs also shrink.

Economic benefits come from improved animal health and increased production. Research confirms lower feed costs and fewer vet bills on most operations making this transition.

Actual figures vary widely, depending on the profitability and forage condition under the old system. As the new system is fine-tuned, feed quality improves, quantity increases, and management skills also grow. As a result, more

animals can be raised on the same acreage, translating into more income for the farm.

It takes commitment to succeed in making the change to MIG, a system requiring more complex management skills. Old ways of thinking will need to shift, as analytical and problem-solving skills develop. The new grazier's commitment will be tested by mistakes, unpected weather patterns, and neighbors' attitudes.

Fencing and Water Systems

Rotational grazing requires additional fencing. High-tensile electric fencing is cheaper and easier to install than conventional fencing. Temporary as well as permanent electric fencing is available, and many producers use a combination of the two. This equipment offers flexibility in managing animal and plant resources.

Animals need to be trained to electric fences. Producers sometimes use a special paddock for introducing new stock into the system (fencing suppliers can furnish information). Once animals learn to respect the electrified wire, it becomes a psychological rather than a physical barrier.

Providing water is another capital requirement of rotational grazing systems. Experienced producers soon see the value of adequate water, and some regret that they did not invest more in the water system initially. Designing a water system for *future* expansion may be the best option for beginners with limited funds.

Many producers use pipes and portable waterers to create movable water systems and design permanent systems based on this experience. Flexibility in locating water within paddocks should be part of any final design, so the manager can control animal distribution and avoiding trampling around the water source.

Some paddocks have alleyways that give animals access to one water source from several side-by-side paddocks. However, the area around a permanent water source will suffer from heavy traffic. This heavy-use area tends to accumulate nutrients and is a potential source of parasites, disease, and erosion. (Many producers see the same problems in any location where animals congregate; e.g., shade trees and mineral sources.)

Heavy livestock traffic around ponds, springs, or streams can destroy vegetation. Piping water away from these sources or limiting animals' access results in higher-quality water for them, and it benefits wildlife habitat.

Some producers report economic benefits from providing cool, high-quality water, though little research exists. Mineral blocks are typically placed near the water supply, but excessive use of the area can lead to the problems mentioned above. Placing the minerals away from water or other gathering areas helps redistribute the animals' impact and avoids overuse of any one area. Dispensing soluble minerals in the water is another alternative. For more information on fencing and water, see ATTRA's *Introduction to Paddock Design*.

Forage Growth

How much pasture area to offer animals and how long to keep them there are critical decisions for a successful grazier. These decisions influence the amount and quality of forage available throughout the grazing season.

Figure 1. Forage Growth Curve.

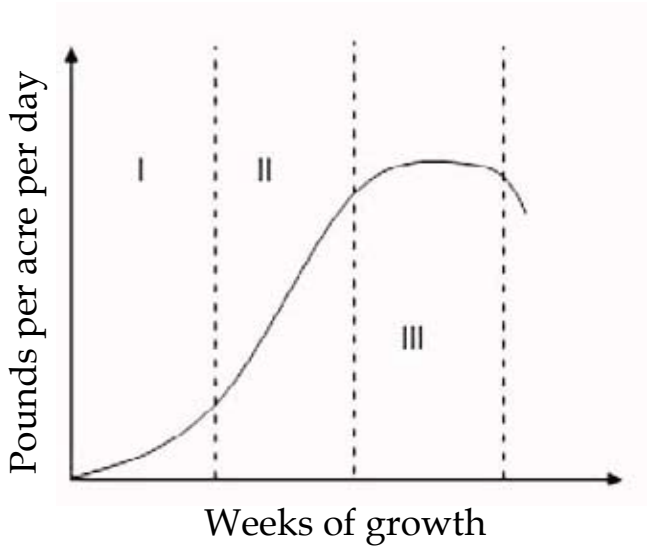

Figure 1 shows the natural progression of forage growth through three stages. Phase one is the first growth in the spring or the time required for regrowth after extreme defoliation. Photosynthesis is low because of the small leaf area available to capture solar energy.

During phase two, plants grow rapidly because leaf area is increasing. Toward the end of this growth phase, forage growth is near its peak, and it is of high quality. This lush and abundant forage is ideal for grazing.

The transition from phase two to phase three marks the beginning of reproduction and slower plant growth. Lower leaves begin to die as they are shaded out by those above. Plant resources are used for reproduction rather than more growth, and forage quality declines.

Managing Forage Growth

The grazier manages this forage growth-curve to keep pastures producing a maximum amount of high-quality forage. Decisions about moving animals from paddock to paddock are based on the amount of forage available, size of paddocks, and estimated seasonal growth rates. The number and nutritional needs of the livestock must also be figured into this balance. Additional information on these management decisions is included in the enclosures.

After each grazing period, if adequate leaf area is left for photosynthesis, plants quickly replace leaves lost without depleting root reserves. The animals are moved to fresh, succulent pasture before plants are overgrazed. Thus the plants and animals both benefit from good grazing management.

Many desirable plants, including legumes and native grasses, disappear from pastures that are not given adequate rest. Animals must be moved after three to five days, maximum, to prevent them from grazing these plants' regrowth.

If not removed from the area, livestock will preferentially graze certain forages and deplete root reserves, thus killing the most palatable forage species. Continuous grazing thus eliminates desirable species and maintains those that can tolerate repeated defoliation, such as tall fescue.

Management-intensive grazing encourages a wide variety of plants in the pasture. Plant diversity increases in adequately rested pastures. Plants adapted to the varied soil and moisture conditions of the landscape thrive in their microclimates. Animals can graze plants during their seasons of maximum palatability.

Livestock will, in fact, eat many weeds in their vegetative stage, some of which are good feed. By eating weeds such as dandelions, quackgrass, redroot pigweed, and lambsquarters when they are young and tender, grazing animals keep both annuals and perennials from going to seed. These plants have been shown to have feed values that compare favorably with oats.(2)

Profits improve because:

1. ***The stocking rate is higher.***
2. ***The grazing season is longer.***
3. ***There is less need for land dedicated to "hay production only."***
4. ***There is less dependence on mechanical equipment.***
5. ***Animal health improves.***

Keith Johnson, Forage Crops Specialist,
Purdue University Cooperative Extension Service

Dairy or fast-growing meat animals will need energy or fiber supplementation at certain times of the season, depending on what they can graze for themselves. Since what livestock eat is different from a random profile of the plants in the pasture, forage samples or harvested forage tests will not exactly reflect true animal intake. It is, therefore, difficult for the manager to know whether protein or energy supplementation is economically justified.

Other than salt, the need for mineral supplements is likewise difficult to determine. If soil tests show micronutrients are missing, they can be added to the mineral mix. However, some may be present in the soil but unavailable to the plants. Adjusting pH often remedies this. While some consultants argue that missing micronutrients should be applied to the soil so they can be eaten as plant material, mineral suplements are often the most economical solution. Minerals not removed by grazing will cycle with other nutrients in the pasture as the years go by.

Seasonal Adjustments

Rotational grazing gives the livestock manager flexibility in responding to the changing forage supply. During periods of rapid plant growth, cattle are moved quickly through paddocks. Alternatively, if equipment is available or the work can be hired, excess forage can be harvested for feeding later. During periods of slow plant growth, delayed rotation allows plants in each paddock a longer time to recover after each grazing period.

Various strategies or specialized forages can delay having to feed harvested forages. In late fall, stockpiled fescue or other winter grasses can be strip grazed. Grain and stalks left in corn or milo fields after harvest, offered as strips, provide another source of good-quality feed into the winter months. Small grains, grown alone or with brassicas, are a third option in some parts of the country for extending the grazing season.

In some regions, providing excellent grazing through the hottest summer months is the biggest challenge. Native grasses, summer annuals, and interseeded legumes can offset this slump. However, the costs of establishment—in time and money—are justified only if the resulting increase in livestock production translates into sufficient profit. *Sustainable Pasture Management*, a companion ATTRA publication, provides further information on this subject.

Effects on the Animals

Multiple paddocks make access and handling easier. Cattle become easier to work when they see people as the source of fresh pasture. Managers who observe their animals frequently can identify and treat health problems in their early stages.

If just beginning an animal operation, the producer should choose a breed adapted to the climate and grazing system or pick individual

animals with good performance records on pasture. Some types of animals, even within a breed, can better use high-quality forage, and others are better adapted to low-quality rangelands. Some tolerate legumes without bloating.

There is as much variation among individuals within the breeds as between breeds. To some extent, animals learn grazing skills.(3) Therefore, animals that have been raised on pasture—especially those from a controlled grazing system—are desirable. In an established herd, culling animals that don't adapt is essential to achieving a profitable grass-based livestock system.

Information Resources

A host of published and electronic information about rotational grazing is available to producers.

Many land-grant universities have materials about rotational grazing that are specific to their states. Workshops and videos on management-intensive grazing may be available as well. Check with local Extension offices regarding such resources.

The Natural Resources Conservation Service (NRCS) has grazing specialists in each state to help farmers improve their grazing management. Your county NRCS office can refer you to the grazing specialist in your area.

The Stockman Grass Farmer (SGF) (4) is an excellent monthly publication for news about alternative forages and innovative management strategies, as well as for discussions among practitioners of management-intensive grazing. In addition, the commercial and classified ads offer many services, including grazing workshops and supplies, that may be difficult to obtain locally. Suppliers and their salespeople often serve as consultants, having practical experience of many grazing operations. A free sample issue of SGF is available to those who call or write to request it.

A list of books on grazing is provided at the end of this publication. If local libraries and bookstores are unable to get them, any issue of *The Stockman Grass Farmer* has an ordering form for many of them.

Holistic Management™ is a decision-making process initially used for livestock management on range. Now the model is being used by many farmers and ranchers to evaluate options as they plan for changes to their operations. The Center for Holistic Management (5) can refer producers to state organizations and regional representatives, who can in turn provide information and contacts with practitioners. After initial training courses, Holistic Management practitioners often form management clubs to further their understanding and learning as they apply holistic management principles. See the ATTRA publication *Holistic Management.*

There are many agricultural discussion groups on the Internet covering a wide range of topics. Internet discussion groups operate via e-mail. Listservers receive and distribute postings. When you subscribe, your name gets added to the mailing list. If you wish to post to the discussion group, you only need to send one e-mail, and the listserver will send it to all members. Subscribing to newsgroups is a simple and painless process, and it is free. There are lists associated with most ruminant breeds (see Table 1). A search engine such as Yahoo! can help locate other lists on the Web.

Conclusion

Management-intensive grazing is not for every producer. It will not instantly provide wealth and leisure or solve all the problems livestock producers face. Some experienced graziers say it takes three years of observation and manipulation of soil, plant, and animal resources to really

begin to manage them well. During these years there will be countless challenges and necessary adjustments. Every attempt to prepare for potential problems will make the transition smoother. An assumption that the system can continually be improved will help the manager to identify weak areas early. Being alert for difficulties ensures that they can be addressed before they become serious.

Nevertheless, those producers who have made the change to MIG report many benefits, including increased net income and improved quality of life. In groups of these innovative graziers, one is struck

Table 1. Internet Listservers

Listservers are electronic discussion groups that often include experienced producers, researchers, and educators. They are a rich resource, but since they are rarely moderated, evaluate the information carefully.

Grazing Lists

Graze-l discusses intensive rotational grazing and seasonal grazing. This newsgroup is based in New Zealand and has a definite international feel to it.

To subscribe send an e-mail to *listserv@taranaki.ac.nz*.
In the body of the e-mail type "subscribe graze-l."
Graze-l also has a Web page with an archive of past discussions:
http://grazel.taranaki.ac.nz/.

The Grazer's Edge is another on-line forum.
To subscribe to the grazersedge listserve, send e-mail to *grazersedge-subscribe@egroups.com*.

Sheep

There is a list for sheep called **SHEEP-L.**

To subscribe to SHEEP-L, send the message "subscribe SHEEP-L Your Name" to *listserv@listserv.uu.se*. Post e-mail messages at *sheepl@listserv.uu.se*.

Goats

Subscription address: *Listproc@listproc.wsu.edu*.
In subject line and message area type "subscribe goats-Your Name."

Dairy

Dairy-L@umdd discusses a wide range of dairy issues. Topics tend to revolve mainly around the feeding and health of dairy cows. Discussions are based around the American / Canadian confinement system.

To subscribe send an e-mail to *listserve@umdd.umd.edu*.
In the body of the message type "SUB Dairy-L Your Name".

by the enthusiasm and creativity they bring to the management of their particular pasture systems. They observe the results of their decisions and are constantly fine-tuning their systems to meet their production and family goals.

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2) Marten, Gordon C. 1978. The animal-plant complex in forage palatability phenomena. Journal of Animal Science. Vol. 46, No. 5. p. 1476.

3) Forbes, J.M. 1995. Voluntary Food Intake and Diet Selection in Farm Animals. CAB International, Wallingford, England. p. 353.

4) The Stockman Grass Farmer
P.O. Box 9607
Jackson, MS 39286-9607
800-748-9808 (toll-free)
http://stockmangrassfarmer.com/sgf/

5) Center for Holistic Management
The Savory Center
1010 Tijeras, NW
Albuquerque, NM 87102
505-842-5252
800-654-3619 (toll-free)
www.holisticmanagement.org/

Enclosures

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Mundy, Victoria. 1995. Successful grazing systems start with solid goals. NSAS Newsletter. No. 52. p. 4-5.

Stockman Grassfarmer Bookshelf. 4 p.

Grazing Books

Ball, Donald M., Carl S. Hoveland, and Garry D. Lacefield. 1996. Southern Forages, 2nd Ed. Potash & Phosphate Institute and the Foundation for Agronomic Research, Norcross, GA. 264 p.
Available for $25 + $4 s&h from:
Potash & Phosphate Institute
Norcross, GA 30092
770-447-0335

Barnes, Robert F., Darrell A. Miller, and C. Jerry Nelson (eds.). Forages: An Introduction to Grassland Agriculture. 5th ed. Vol. 1. Iowa State University Press, Ames, IA. 516 p.

Barnes, Robert F., Darrell A. Miller, and C. Jerry Nelson (eds.). Forages: The Science of Grassland Agriculture. 5th ed. Vol. 2. Iowa State University Press, Ames, IA. 357 p.

Grandin, Temple. 1993. Livestock Handling and Transport. CAB International, Wallingford, U.K. 320 p.

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Hodgson, J., and A.W. Illius (eds.). 1996. The Ecology and Management of Grazing Systems. CAB International. Wallingford, U.K. 466 p.

Murphy, Bill. 1998. Greener Pastures on Your Side of the Fence: Better Farming With Voisin Grazing Management (4th ed.). Arriba Publishing, Colchester, VT. 379 p.
Available for $30 from:
Arriba Publishing
213 Middle Rd.
Colchester, VT 05446

Nicol, A.M. (ed.). 1987. Livestock Feeding on Pasture. Occasional Publication No. 10. New Zealand Society of Animal Production. Private Bag, Hamilton, New Zealand. 145 p.
Available for $20 ppd. from:
New Zealand Society of Animal Production
AgResearch, Ruakura
PB3123
Hamilton, NZ
NZSAP.ANIMAL@xtra.co.nz
http://nzsap.rsnz.govt.nz

Savory, Allan, with Jody Butterfield. 1999. Holistic Management: A New Framework for Decision Making. Island Press, Covelo, CA. 616 p.

Smith, Burt, Ping Sun Leung, and George Love. 1986. Intensive Grazing Management: Forage, Animals, Men, Profits. The Graziers Hui, Kamuela, HI. 350 p.
Available for $29.95 from:
The Graziers Hui
P.O. Box 1944
Kamuela, HI 96743
808-885-7553

Turner, Newman. 1974. Fertility Pastures and Cover Crops. Bargyla and Gylver Rateaver, Pauma Valley, CA. 202 p.
Available for $25 from:
Bargyla Rateaver
9049 Covina St.
San Diego, CA 92126
619-566-8994
(Also available are Turner's Fertility Farming *and* Herdsmanship *for $35 each.)*

Wilkinson, J.M. 1984. Milk and Meat from Grass. Granada, New York, NY. 149 p.
A few copies still available for $26.50 + $4 s&h from:
Sheridan House Inc.
Dobbs Ferry, NY 10522
914-693-2410

The following grazing books are available from the Stockman Grass Farmer's Bookshelf. A copy of the order form and brief descriptions of the books are included in the enclosures, or you can visit the electronic version at *http://stockmangrassfarmer.com/sgf/bookshelf.html.*

Ekarius, Carol. 1999. Small-scale Livestock Farming: A Grass-based Approach for Health, Sustainability and Profit. Storey Books, Pownal, VT. 218 p.

Gerrish, Jim 2004. Management-intensive Grazing. Green Park Press, Ridgeland, MS. 320 p.

Hazard, Gordon. 2002. Thoughts and Advice from an Old Cattleman. Hazard Cattle Co., West Point, MS. 146 p.

Judy, Greg. 2002 No Risk Ranching. Green Park Press, Ridgeland, MS. 240 p.

Nation, Allan. 2000. Knowledge Rich Ranching. Green Park Press, Ridgeland, MS. 336 p.

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Salatin, Joel. 1995. Salad Bar Beef. Polyface, Swoope, VA. 365 p.

Schroedter, Peter. 1997. More Sheep, More Grass, More Money. Ramshead Publishing, Moosehorn, Man. 112 p.

Smith, Burt. 1998. Moving 'Em: A Guide to Low Stress Animal Handling. The Graziers Hui, Kamuela, HI. 352 p.

Walters, Charles, and Gearld Fry. 2003. Reproduction & Animal Health. Acres, USA, Austin, TX. 222 p.

Periodicals with a Grazing Focus

The Forage Leader
American Forage and Grassland Council
P.O. Box 94
Georgetown, TX 78627
800-944-2342
www.afgc.org
A membership benefit; membership cost $30/yr.

Graze
P.O. Box 48
Belleville, WI 53508
www.grazeonline.com
$30 for 1 year subscription

Hay & Forage Grower
2104 Harvell Circle
Bellevue, NE 68005
866-505-7173 (toll-free)
http://hy.pbsub.com/
$12/yr.

The Stockman Grass Farmer
P.O. Box 9607
Jackson, MS 39286-9607
800-748-9808 (toll-free)
http://stockmangrassfarmer.com/sgf/
$32/yr.

Holistic Management In Practice
The Savory Center
1010 Tijeras NW
Albuquerque, NM 87102
505-842-5252
www.holisticmanagement.org
$30/yr.

Web Resources

Many resources are now available on the Internet. Besides listservers, mentioned in the box above, there are many useful Web sites. Several are listed below. Also, be sure to check the Web sites of nearby land-grant universities. They often contain information useful to both the beginner and the experienced grazier. Note that these addresses change often.

The Great Lakes Grazing Network
www.glgn.org/
Best all-around site for grazing information; provides access to grazing and forage information for the states surrounding the Great Lakes; quality links.

Cornell Forage-Livestock System
www.css.cornell.edu/forage/forage.html
Excellent forage information for northeast states, including a forage selection tool for NY; grazing manual.

Rangelands West
http://rangelandswest.org/
Provides access to many sources of information on rangeland management, including the Extension sites of the western land-grant universities.

American Farmland Trust's Grassfarmer Site
http://grassfarmer.com/
Information doorway for grass-based farming, with special emphasis on dairy.

University of Wisconsin Forage and Extension Links
www.uwex.edu/ces/forage/links.htm
Extensive research-based information on grazing, including access to other states' variety trial results; extensive dairy information is included.

Forage Systems Research Center
http://aes.missouri.edu/fsrc/

Grazing schools and workshops; publications and research.

Sustainable Farming Connection's Grazing Page
www.ibiblio.org/farming-connection/grazing/home.htm

Grazing discussion group; practical information on fencing and grazing management; forage resources.

North Dakota State University Grassland Report Index
www.ag.ndsu.nodak.edu/dickinso/grassland/rangrpt.htm

Extensive collection of articles on grazing management in the rangeland environment; soil concerns and forages; livestock nutrition.

University of Minnesota
[Copies of the following two publications can be bought by calling 800-876-8636.]

Grazing Systems Planning Guide
www.extension.umn.edu/distribution/livestocksystems/DI7606.html

A step-by-step guide to planning a grazing system, including inventory of resources, goal-setting, designing fencing and water systems, forage requirements, and grazing system monitoring.

Knee Deep in Grass—A Survey of Twenty-nine Grazing Operations in Minnesota
www.extension.umn.edu/distribution/livestocksystems/DI6693.html

A survey of grazing dairies that includes information that would be useful to other grazing operations.

State Grazing Lands Conservation Initiative Coordinators and Grazing Lands Personnel
www.glci.org/StateGLCI.htm

Map and list of designated GLCI grazing specialists for each state.

Ohio State Extension
[Copies of this publication can be ordered by calling (614)292-1607.]

Maximizing Fall and Winter Grazing of Beef Cows and Stocker Cattle
http://ohioline.osu.edu/b872/index.html

Besides excellent material on season extension grazing strategies, various harvest methods and supplementation plans are described.

Rotational Grazing
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