Managing Grazing for Sustainable Pastures

Lesson Description

This lesson focuses on grazing management. Effective grazing management increases forage production and grazing capacity, saves money, reduces erosion, and improves water quality. It will become increasingly important to demonstrate good grazing management practices for water quality protection in the future, as the government scrutinizes nonpoint sources of pollution.

Lesson Objectives

1. Understand the benefits of grazing management.
2. Review how grass grows and the steps to effective grazing management.
3. Estimate available forage using a pasture stick or the Animal Days per Acre or Animal Units per Month methods.
4. Learn to monitor behind, ahead, and where of livestock.
5. Understand the basics of several grazing systems and pasture configurations.
6. Apply grazing tips to your land.

Module 5, Lesson 2

Managing Grazing for Sustainable Pastures

Activity Sheets

1. Determining Carrying Capacity Activity Sheet
2. Stocking Rate Exercise Activity Sheet
3. Feed and Forage Balance Activity Sheet
4. Stubble Height and Regrowth Recommendations Information Sheet
5. Guidelines for Exercise Runs and Paddocks Information Sheet
6. Grazing Planning and Monitoring Activity Sheet
7. Grazing Dates Activity Sheet
8. ABC's of Rotational Grazing, King County Conservation District

Supplemental Resources

How Green is Your Grass? Five Steps to Better Pasture and Grazing Management, WSU Clark County Extension

Managing Pastures, Washington County Soil and Water Conservation District

Four Steps to Rotational Grazing, Penn State Cooperative Extension

Rotational Grazing, The National Sustainable Agriculture Information Service (ATTRA)

Footprints: Deciding When to Make Your Move, University of California Cooperative Extension

Paddock Design, Fencing, and Water Systems for Controlled Grazing, ATTRA

Determining Carrying Capacity Activity Sheet, page 1 of 3

Carrying capacity is the number of animals that a paddock or cell can accommodate without overgrazing. Simply put, the carrying capacity is how much grass you have. Determining carrying capacity helps you determine the number of months your pastures can provide forage for your livestock or how many animals your pasture(s) can support.

It's important to recognize that grazing animals only need to eat 2.5 to 3 percent of their body weight each day. A 1,100-pound horse will eat 27.5 pounds of air-dry forage (hay) a day, or 825 pounds per month.

Remember that horses damage or trample another 25 percent of the forage in a pasture, so we have to add 25 percent, making the total available forage requirement for an 1,100-pound horse a little over 1,000 pounds per month. Horses will eat more than needed if given continuous access to pasture grasses.

Remember from the forage yield calculations done in Lesson 1 of this module, useable forage in a pasture in reasonable good condition is 35 percent of the total forage. Useable forage in a "native" pasture or rangeland is 25 percent of the total forage.

Sample carrying capacity problems

Pasture 1 consists of introduced plant species. It is in reasonably good condition and produces a total of 4,893 pounds of useable forage per growing season. Pasture 1 is 3 acres in size.

Pasture 2 consists of native pasture or rangeland. It is also 3 acres in size. It produces 3,495 pounds of useable forage per growing season

Problem 1: Estimate the approximate number of months one horse can graze on Pasture 1.

Problem 2: Estimate the approximate number of months one horse can graze on Pasture 2.

Problem 3: Estimate the approximate number of months three horses can graze on Pasture 1.

Problem 4: Estimate the approximate number of months three horses can graze on Pasture 2.

Determining Carrying Capacity Activity Sheet, page 2 of 3

Pasture 3 consists of 10 acres of introduced grasses and is not subdivided with fences. Representative areas were clipped and an average forage yield of 850 pounds per acre was calculated. Two (2) horses graze on this property from May 1 to September 1.

Problem 5a: What is the total production for the 10 acres?

Problem 5b: What is the useable forage after harvest efficiency?

Problem 5c: How many months of grazing are available for one horse?

Problem 5d: How many months of grazing are available for two horses?

Problem 5e: Is this pasture overgrazed? In other words, are the key species grazed too short, or are plants regrazed before desired regrowth has occurred? When this happens repeatedly, plants die, bare ground results, and weeds invade.

Determining Carrying Capacity Activity Sheet Answer Key, page 3 of 3

Note: Calculations are based on calculations from the "Determining Forage Yield" activity.

Problem 1:

4,893 pounds of forage divided by 1,000 pounds per month forage requirement = 5 months

Pasture 1 can provide five months of forage for one horse to graze.

Problem 2:

3,495 pounds of forage divided by 1,000 pounds per month forage requirement = 3.5 months

Pasture 2 can provide three and a half months of forage for one horse to graze.

Problem 3:

Three horses, each requiring 1,000 pounds per month, brings the monthly forage requirement to 3000 pounds.

4,893 pounds of forage divided by 3,000 pounds per month forage requirement = 1.6 months

Problem 4:

3,495 lb of forage divided by 3,000 pounds per month (forage requirement for 3 horses) = 1 month

Problem 5a:

850 pounds per acre multiplied by 10 acres = 8,500 pounds of total forage

Problem 5b:

8,500 pounds of total forage multiplied by 35 percent (0.35) useable forage = 2,975 pounds of useable forage

Problem 5c:

2,975 pounds of usable forage divided by 1,000 pounds per month needed for one horse = 3 months of grazing

Problem 5d:

2,975 pounds of usable forage divided by 2,000 pounds per month needed for two horses = 1.5 months

Problem 5e:

No simple answer. If the owners are regulating the number of hours a day the horses are grazing, the pastures will not be overgrazed. If the horses have access to the pastures 24 hours a day, seven days a week, then it is probably overgrazed.

Stocking Rate Exercise Activity Sheet, page 1 of 2

First, pace off or measure an area that you think has enough forage to feed one animal for one day. Try to keep your paces one yard in length. If using a tape measure, also measure in yards. If you're not sure how large to make the area, use temporary fencing and do some experimentation. Four people, one standing at each corner, can make the task of estimating the area easier. Have the helpers take a step in or out until the area appears to be the right size. If you make your time period equal to one day, the calculations are simpler.

Multiply length (yards) _____ x width (yards) _____ =

_____ Area (square yards)/Animal Day

Calculate stock days per acre:

4,840 square yards per acre divided by _____Area/Animal Day =

_____Stock Days/Acre (SDA)

Next multiply the SDA_____ x the total number of acres_____ =

_____Stock Days

The number of Stock Days_____ divided by the total number of animals_____ =

_____the number of days you can graze prior to resting the forage to allow regrowth.

Try an example:

You have a total of 5 acres of pasture and four horses. You've picked a time period of one day, and your area is 25 yards on each size. The total area then is 25 x 25 = 625 square yards for one animal for one day.

Next, divide 4,840 square yards per acre by 625 square yards per animal day to get 7.7 SDA.

As you have a total of 5 acres, 7.7 SDA x 5 acres = 38 stock days.

38 stock days divided by a total of four horses means you can graze for 9.6 days on the five acres.

Remember, you need to continually monitor for the condition of the grass to verify your estimate is correct. It will take some practice to become accurate.

Stocking Rate Exercise Activity Sheet, page 2 of 2

Management Tip: Divide your 5 acres into 1-acre pastures and only graze four to six hours a day to increase your number of grazing days.

What should you do with your horses after 10 days? If you only have 5 acres, then you should never let your horse or horses out 24 hours a day, seven days a week if you want to graze through the growing season. Instead, measure off an area and use the time frame of four to six hours rather than a full 24 hours. This would then represent the full amount the horse would consume on a daily basis when restricted to six hours of grazing per day. If you want to graze several horses on five acres and maintain your pastures in good condition, you will need to manage more intensively than those who have fewer animals or more acres of pasture.

Module 5, Lesson 2

Feed and Forage Balance Activity Sheet, page 1 of 3

Using the tables and worksheet below, compare your land's production with your animal feed and forage requirements.

Please note that FEED is defined here as the hay you provide for your animals, either through growing it yourself or purchasing it. This is the feed you provide during the winter, between pasture regrowth period, etc.

FORAGE is defined as the growing plant material an animal grazes on. It is generally measured in Animal Unit Months (AUMs). One AUM is equivalent to the amount of forage consumed by one 1,000-pound animal in one month. This is equivalent to about 800 pounds of feed a month, or 27 pounds per day. Another way of looking at it is that animals consume 2.5 to 3 percent of their body weight per day.

If you do not have clipping data, the pasture production sheets for high, moderate and low production, based on management practices, may assist in categorizing your field condition; they are located in Lesson 1 of this Module.

LAND PRODUCTION: What is your present annual hay and pasture production?						
Is your land irrigated?	**Feed** = hay (tons per acre) Feed is hay you provide for an animal.			**Forage** (AUMs per acre) Forage is what an animal consumes by grazing.		
	FIELD CONDITION			**FIELD CONDITION**		
	Poor	**Fair**	**Good**	**Poor**	**Fair**	**Good**
YES	<2	2 to 3	3 to 6	<4	4 to 7	7 to 9
NO	<0.75	0.75 to 1.5	1.5 to 2	<1	1 to 2	2 to 3

LAND PRODUCTION CALCULATION					
Acres of Hay	**Tons of feed per acre**	**Total feed production**	**Acres of pasture**	**AUMs of forage per acre**	**Total forage production**
_____ Acres X _____ Tons/Acre = _____ Tons			_____ Acres X _____ Tons/Acre = _____ Tons		

The above numbers are the amount of feed or forage your land is now producing. Balance this against the feed and forage requirements of the animals you now possess.

Living on the Land

Feed and Forage Balance Activity Sheet, page 2 of 3

ANIMAL REQUIREMENTS: How much feed/forage do your animals need each year?								
Animal	FEED: (hay) tons				**FORAGE: (pasture) AUMs of grazing**			
	Tons per animal per month	**Number of animals**	**Number of months**	**Total tons required**	**AUMs per animal per month**	**Number of animals**	**Number of months**	**Total AUMs required**
Cow	0.40	X _____	X _____	= _____	1.00*	X _____	X _____	= _____
Horse	0.50	X _____	X _____	= _____	1.20	X _____	X _____	= _____
Sheep	0.10	X _____	X _____	= _____	0.20	X _____	X _____	= _____
Llama	0.15	X _____	X _____	= _____	0.30	X _____	X _____	= _____
Goat	0.10	X _____	X _____	= _____	0.20	X _____	X _____	= _____

SO, does your production exceed your requirements? Congratulations!

Do your requirements exceed your production? Well, don't despair – you're in good company!

If your requirements exceed your production, you have these options:

1. Reduce the number of animals.
2. Buy additional feed.
3. Increase your production.

Options 1 and 2 are simple management decisions. Extra effort and cost are needed for option 3, but the money you eventually will save may be worth the initial labor and cost.

Methods for increasing production include monitoring grass growth and grazing periods; this allows for regrowth. Controlling weeds is another method for increasing pasture production. Partial or complete renovation may be required to achieve better pasture production. More information on weed control and pasture renovation is included in Lessons 3 and 4, respectively, of this module.

* Remember, this is the AUM value for a 1,000-pound cow plus calf. Adjust the AUM value to reflect the weight of your stock.

Feed and Forage Balance Activity Sheet, page 3 of 3

A feed and forage balance worksheet example:

A landowner has 10 nonirrigated acres. He cuts hay on 5 acres and grazes two horses on the remaining 5 acres. He considers his pasture and hay ground to be in good condition. Using the tables provided, estimate the feed and forage produced and check for balance.

Land production:

Feed: Assume that a pasture is in good condition and not irrigated, so two tons of hay per acre are produced (see table.) The landowner has five acres, so **5 acres x 2 tons = 10 tons of hay.**

Forage: That other 5 acres is in good condition but is not irrigated, so the pasture produces 2 AUM's. **5 acres x 2 AUMs = 10 AUMs**. If the 5 acres is one big pasture without any cross fencing, eight horses could graze for one month, since 1.25 is the Animal Unit for a horse (10 divided by 1.25 equals eight.) Alternatively, four horses could graze for two months, or two horses for four months. This is just a general rule of thumb based on giving the horses access to the grass 24 hour a day, seven days a week. Horses do not need continual access to forage unless they are work horses. The deciding factor is always the grass plant. Use your key species to help you make the decision on when to graze and when to rest. No matter what these calculations tell you, when the grass is grazed to a certain height, it needs time to regrow.

Animal requirements:

Feed: A horse will eat 0.5 tons per month. You have two horses and usually feed hay for five months, so **0.5 x 2 horses x 5 months = 5 tons needed to feed the horses.**

Forage: **1.25 AUMs x 2 horses x 7 months of grazing = 17.5 AUMs needed**

Balance – add it up:

The hay land is producing 10 tons of hay and is feeding two horses 5 tons of hay over five months. This is more than enough hay to cover the 5 month feeding period. This excess production will allow for emergency feed during unusually cold weather or during the growing season when you need to buy more grass-growing time. It also may provide extra income, if the excess production is sold.

The pasture is only producing 10 AUMs, while the horses are requiring 17.5 AUMs. The excess hay produced on the 5 hay land acres will cover a portion of this shortfall. The landowner will either have to purchase feed or lease other pasture land to cover the remainder of the shortfall.

By allowing the horses to graze only four to six hours a day at intervals, you could increase the AUMs in your pasture. Subdividing the pasture is one way that you can control where they eat. Keeping records and monitoring your grass height are the keys to a successful grazing system.

Body Condition Scoring for Livestock Website Links

Compiled by Erin Harwood and Eric Lambert, WSU Clark County Extension

Body Condition Scoring in Farm Animals, Purdue University Extension
https://www.extension.purdue.edu/extmedia/as/as-550-w.pdf

Cows

Body Condition Scoring I: Managing Your Cow Herd Through Body Condition Scoring
North Dakota State University Extension Service
https://www.ag.ndsu.edu/pubs/ansci/beef/as1026.pdf

Body Condition Scoring Beef Cows, Virginia Cooperative Extension https://pubs.ext.vt.edu/400/400-795/400-795.html

Horses

EQUINE FACTS: Body Condition Scoring for Your Horse University of Maine Cooperative Extension
http://www.umext.maine.edu/onlinepubs/htmpubs/1010.htm

Sheep

Body Condition Scoring of Sheep Department of Animal Sciences, Oregon State University
http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/14303/ec1433.pdf

Sheep Management Condition Scoring of Ewes
Cooperative Extension Service Iowa State University
http://www.case-agworld.com/cAw.IU.framescore.html

Goats

Evaluating Goat Feeding Management through Body Condition Scoring
By Gary Fredricks Washington State University Extension
http://smallfarms.wsu.edu/animals/goatfeeding.html

Body Condition Scoring for Pygmy Goats National Pygmy Goat Association
http://kinne.net/bcs.htm

Llamas and Alpacas

Body Condition Scoring of Llamas and Alpacas, Penn State University Extension
http://extension.psu.edu/animals/camelids/nutrition/body-condition-scoring-of-llamas-and-alpacas

Swine

Body Condition Scoring of Swine, Penn State University Extension
http://extension.psu.edu/courses/swine/reproduction/body-condition-scoring

Module 5, Lesson 2

Feeding Hay to Animals

By Gary Fredricks (garyf@wsu.edu)

Introduction

When feeding your animals, most rations contain forage, grain, a mineral mix and water. The key component that relates to production, animal health and cost is forage. Hay and/or pasture provide most of the forage in the ration. This article will focus on how to evaluate hay quality.

What is forage quality?

How can you tell if you're buying good hay? There are several things that you can visibly look for when inspecting the hay that relate to quality. They include:

-color
-number of stems vs. leaves
-moisture content
-maturity of grass or alfalfa
-number of weeds or foreign material
-palpability

The first thing you notice when inspecting the hay is color. You should expect a nice green color, which tends to be associated with higher vitamin, protein, and mineral levels. An overall brown color indicates more mature hay and deserves further investigation.

Before we examine the bale of grass or alfalfa for maturity, let us first understand what plant maturity means in terms of forage quality. The leaf contains most of the plant protein and the highly digestible fiber that is easily converted to energy in the animal. The stem, which needs to be more rigid to allow the plant to grow upwards is mostly composed of material called cellulose. The young leaf, which is soft and flexible, is low in cellulose. Cellulose, which is not easily broken down in the goat's digestive system, is low in energy. As a plant starts to grow, the amount (weight) of leaf as a percent of the total plant is high while the amount of stem is low. As the plant matures, the percentage of stem by weight compared to the percent leaf. Thus the more mature the plant, the less leaf by weight indicating less protein and energy contained in the whole plant.

When evaluating your hay for maturity, look for the number of leaves vs. stems. As explained above, you want to see more leaves than stems. Also note that the longer the leaf length, the more mature the hay. As the number of stems increases, the desirability of the hay goes down. Seeing seed heads in the bale indicates a very mature hay with low energy and protein values.

Be sure to look for weeds in the hay. Some weeds may be seen, but you should not see very many. Weeds have very little nutritive value and are low in energy and protein content. The more weeds, the less value the hay.

Moisture content is always a concern when looking at baled hay. If hay is baled wet, you may not see a problem on the outside, but inside that bale where it is nice and dark, that moisture allows mold to grow. Mold raises two concerns. As mold grows, it feeds on the hay's nutrients lowering the protein and energy content. Mold releases a toxin (poison) into the hay as it grows. These toxins can cause some digestive problems and can abort pregnant animals. Moldy hay has lower feeding value and causes health problems, unfortunately the only way to find out is when you break into a bale.

Palatability describes the animal's desire to eat the hay. It's like the difference between spinach and pizza for a teenager. The spinach has more nutritional value, but the pizza gets eaten first. Feed

quality doesn't mean much when your animals won't eat the hay. On the bright side, younger, leafier hays, which are higher in protein and energy, tend to be much more palatable.

If you can get a hay analysis, you will want to look at % dry matter, CP (Crude Protein), ADF (Acid Detergent Fiber), NDF (Neutral Detergent Fiber), and mineral content. Percent dry matter tells you how much water is in the hay and should be more than 90%. If dry matter gets too low, expect problems with storing hay for long periods of time and forage quality. CP estimates the amount of protein in the hay and should match the animal's dietary needs. Extra protein is not easily converted to energy and is not stored by the animal, but is lost in the urine. Thus if your animal needs 12% CP and your hay is 20% CP, the excess protein is helping the grass to grow instead of your animals. NDF, a measure of plant fiber content, is closely associate with feed intake. ADF measures the cell wall content (mostly cellulose) and is related to feed digestibility (how much of the feed is broken down). As the plant matures, NDF and ADF values increase as the amount of cellulose content in the plant increases indicating poorer quality hay. You should look for values for NDF below 50% and ADF below 40%.

Feeding Hay

It is important to maintain a balance between feeding hay and grain. The challenge to maximizing energy intake is providing adequate fiber intake. Higher fiber content means lower energy and protein levels in the feed. While inadequate energy intake will limit growth and milk production in animals, lactating animals require adequate fiber intake. For example, a minimum of 17% crude fiber is required in the goat doe's ration to maintain rumen health and milk fat production.

The key to maximizing required fiber and energy intake is to feed high quality forages. Forages should contain a maximum amount of protein and/or energy allowed for that particular feed. Feeding more concentrates will not substitute for forage quality and satisfy fiber requirements. Feeding high quality hay can fulfill the doe's fiber requirements, provide the doe's need for protein and energy, and substitute for a lower percent of concentrates in the ration. It is important to remember to match the animal nutritional requirement to the feed quality.

The bottom line is that you can tell a lot about the hay by looking at it. Poor hay is not a bargain. Saving a couple of dollars when buying hay means feeding more grain to compensate for the nutritional imbalances which gets more expensive. Feeding high quality hay saves you money.

Module 5, Lesson 2

How to Collect Hay Samples for Testing

To obtain accurate information on the nutritional value of your hay, it is necessary to take a good, representative sample and provide the lab with as much information about the sample as possible. It is best to contact the lab prior to taking the samples to get instructions on how much hay is needed for analysis, as well as obtaining information on components analyzed, cost and turn around time.

1. Use a hay probe with a minimum cutting diameter of 1/2 inch and minimum length of 12 inches
2. Connect the probe shaft to a hand drill and select at least 10-15 bales at random
3. Take samples at a 90° angle to the way the hay is wrapped, from the middle of the bale between the wire or twine probing in toward the center of the bale.
4. Use slow speed when using the drill-driven hay probe (high speeds will heat the sample and can change the composition and moisture level readings).
5. After taking each sample, press the button on the probe shaft to disengage the probe from the drill or hand brace (so that hay sample can be removed).
6. Use wooden rod to push hay sample out of probe.
7. Mix all probe samples thoroughly together in a clean container, and take a subsample.
8. Store sample in an airtight bag for shipment to laboratory (otherwise moisture content will change).
9. Do not send "grab" samples or flakes of hay.

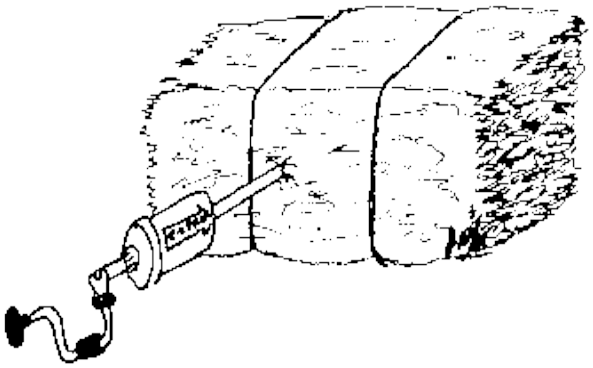

Figure 1. Place the probe at a 90° angle to the way the hay is baled, in the middle of the bale. Image by Jackie Nix, North Carolina Extension

Figure 2. Drill slowly through the bale to avoid heating up the bale, thus changing the composition and moisture level. Picture from Equi-Analytical Laboratories.

Guidelines for Exercise Runs and Paddocks Information Sheet

Another option is to pen your horses up in a paddock or sacrifice area, or an exercise area. Exercise runs or paddocks are usually areas of bare soil or sand/soil mix with little grass or other vegetation. They are fenced, open areas for a horse to use for outdoor exercise. This is also one way to make the grass in your pastures last longer. Horses will eat more than they need if given continuous access to pasture grasses. Because horses do not need access to forage all day, it is suggested that horses be kept in paddocks or exercise runs.

An paddock or sacrifice area should be a minimum of 400 square feet per adult horse.

An exercise run for a horse is different than a pasture or a sacrifice area. Exercise runs are generally attached to the sacrifice area or paddock. They require more land and more money for fencing and other amenities. Horses prefer to run along a fence line. For horses to get the most use of a given exercise area, several long, narrow runs are best. Although square areas require less fencing, several long narrow runs will let separated horses exercise together without interfering with one another. Minimum width is 24 feet; length can be any distance that best fits your plans. Lay out long, narrow runs across a slope to minimize soil erosion. Generally, try to avoid runs on slopes that are greater than 4 percent.

Locate exercise runs and sacrifice areas or paddocks on relatively stone-free, well-drained soils. Improve footing by spreading sand at least two inches deep on existing soils. Add more sand as it becomes mixed with the soil. Sand helps reduce dust, mud and erosion.

Keep exercise runs and paddocks clean by removing accumulated manure frequently. This not only looks tidy, but it reduces pollution of surface water that runs through the area.

Divert clean runoff safely away from areas outside of animal exercise areas to the nearest watercourse or wetland area. Grass filter strips around the edges of an exercise area will greatly reduce any pollutants that might leave the site.

Module 5, Lesson 2

Grazing Planning and Monitoring Activity Sheet

What is my key species? _____

At what height can I begin grazing the key species? _____

At what stubble height should I stop grazing my key species? _____

About how many days of rest should my key species need for recovery after grazing?

Spring _____

Summer _____

Fall _____

What height should the key species reach before I regraze it? _____

Where will I put my animals while pastures are resting? _____

_____

_____

What can I do to ensure forage is evenly grazed? _____

_____

_____

Next, fill out the grazing dates worksheet so you can track how well your animal forage demand meets your land productivity, and whether you're doing a good job of managing grazing to favor your crop: grass.

Grazing Dates Worksheet

Use this worksheet to keep track of the date you started grazing, the number of animals per pasture, and the grass condition (good, fair, poor). Make copies of the blank worksheet so you can fill out a new form for each grazing year.

	Pasture 1		Pasture 2		Pasture 3		Pasture 4		Pasture 5	
	Dates grazing started and ended	Pasture condition	Dates grazing started and ended	Pasture condition	Dates grazing started and ended	Pasture condition	Dates grazing started and ended	Pasture condition	Dates grazing started and ended	Pasture condition
January										
February										
March										
April										
May										
June										
July										
August										
September										
October										
November										
December										

Living on the Land

Stubble Height and Regrowth Recommendations Information Sheet, page 1 of 2

	Suggested Height at Start of Grazing (inches)	Growth Stage at Start of Grazing	Minimum Stubble Height (inches)
Grasses			
Tall fescue	8	Early boot	4
Orchardgrass	8	Boot	3
Smooth bromegrass	8	Early boot	4
Meadow bromegrass	8		3
Meadow foxtail	10		4
Basin wildrye	10		8
Crested wheatgrass	4	Vegetative	2
Tall wheatgrass	10	Vegetative	6
Intermediate wheatgrass	8	Early boot	4
Pubescent wheatgrass	8	Early boot	4
Timothy	8	Boot	3
Kentucky bluegrass	6	Vegetative	3
Reed canarygrass	12	Vegetative	4
Legumes			
Alfalfa	6-18	Mid to late bud	2
Red clover	6	Early bloom	3
Alsike clover	6	Early bloom	2
Sweetclover	8		6
Ladino clover	4-8	Early bloom	3
Strawberry clover			2
Broadleaf birdsfoot trefoil	8	Early bloom	3
Narrowleaf birdsfoot trefoil	8		3
Sainfoin	12	Early bloom	6
Cicer milkvetch	8	Early bloom	4

These figures are from Nevada. Tailor this information to local climate and growing conditions.

Stubble Height and Regrowth Recommendations Information Sheet, page 2 of 2

Species	Regrowth time (days)
Alfalfa	28-40
Trefoil	24-30
Clover	20-26
Sainfoin	28-40
Milkvetch	24-30
Orchardgrass	20-36
Tall fescue	20-36
Timothy	28-36
Intermediate wheatgrass	24-30
Smooth bromegrass	24-30

These figures are estimates for Nevada. Tailor this information to local climate and growing conditions.

The values are for dryland conditions. Regrowth rates for irrigated pastures will be different. The data is representative of hot summer conditions when plant growth slows considerably. The above figures do not apply during the early spring when grasses are growing fast. At that time of year, regrowth may occur in as little as 10 to 14 days. As the weather gets warmer and rainfall slows down, so does grass growth.

Managing Grazing for Sustainable Pastures Glossary, page 1 of 2

Animal days per acre (ADA): the amount of forage that will be removed from each acre of land by a given number of animals in a specific amount of time.

Animal unit (AU): Forage required for one 1000-pound mature cow, with or without a calf of up to six months old, or an equivalent.

Animal unit month (AUM): The amount of forage required per month for one 1000-pound mature cow, with or without a calf of up to six months old, or an equivalent.

Carrying capacity: The average number of livestock and/or wildlife that may be sustained on, with out being detrimental to, a range or pasture.

Feed: For purposes of grazing management discussions, feed is defined as hay you provide an animal.

Forage: For purposes of grazing management discussions, forage is what your animals consume by grazing.

Forage yield: The actual amount of forage available, generally reported on a per acre basis.

Grazing management: The manipulation of animal grazing in pursuit of a defined objective.

Overgrazing: Grazing regrowth on forages that have already been grazed once without an adequate rest period.

Paddock: Aka sacrifice area. Small field or enclosure used to confine animals when they are not grazing, generally for horses.

Palatability: The tastiness or desirability of a particular plant. Depends on plant species and stage of plant growth.

Pasture: Ground or field suitable for grazing.

Rangeland: Land that is dominated by native vegetation.

Selective grazing: Grazing of certain plant species, individual plants or plant parts to the exclusion of other plant species, individual plants or plant parts.

Severe grazing: Removing more of the grass plant that is desirable. Not to be confused with overgrazing, which occurs when plants are regrazed before sufficient rest and recovery has occurred.

Stock day: The amount of forage required to support one animal for one day.

Stock days per acre (SDA): The number of animals that can be supported on one acre for one day.

Stock density: The number of animals in a particular area at any moment in time; expressed in terms of number of head per acre.

Stocking rate: The feed demand of grazing livestock.

Stubble: The basal portion of herbaceous plants remaining after the top portion has been harvested, either artificially or by grazing animals.

Managing Grazing for Sustainable Pastures

Web sites for further information

Colorado State University Cooperative Extension Small Acreage Management, http://www.ext.colostate.edu/sam/pasture.html

Pasture and Forages – WSU Small Farms: http://smallfarms.wsu.edu/crops/pastureforage/

Pastures – OSU Small Farms: http://smallfarms.oregonstate.edu/pastures

Cornell University Forage – Livestock Systems, http://www.forages.org/

Oregon State University Forage Information System: http://forages.oregonstate.edu/

Kansas State University Forage, http://www.asi.k-state.edu/research-and-extension/forage.html

University of Nebraska, Lincoln, Institute of Agriculture and Natural Resources, Center for Grassland Studies, http://grassland.unl.edu/

Ohio State University Extension Forage Network: http://forages.osu.edu/

Module 5, Lesson 2

ABCs of Rotational Grazing

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What kind of fencing should I use?

It's your choice. But whatever you use, I suggest building as many permanent paddocks as you think you'll need. I think permanent fencing actually adds to your flexibility because you can hook up polywire almost anywhere if you need to subdivide further. The secret is to have enough permanent subdivisions in the system so you can't go wrong if your labor resources get stretched thin.

I'm wary of setting up systems that require you to move temporary fencing every time you move livestock. Moving wire is very labor intensive. Some farmers enjoy it. But for many, the thrill wears off pretty fast. Some say it only takes them 20 minutes to move fence. It takes me 10 minutes just to get my boots on and get out the door!

When there's a cold rain falling, you don't want to spend 20 minutes moving fence. That's why I suggest designing your permanent fencing so all you have to do is open a gate before going to supper.

What shape should my paddocks be?

For best use of forage, the closer to square your paddock is, the better. Rectangles are OK as long as they are not more than four times longer than they are wide. With longer rectangular paddocks, livestock will graze the gate ends more heavily than the far nooks and crannies. If you must build long paddocks, use polywire or other temporary fencing to break them up into shorter rectangles or squares.

How should I orient my paddocks on slopes?

Don't run rectangular paddocks up and down slopes, with gates and water at the bottom. Livestock will graze halfway up the slopes, then come back for water and start grazing againg at the bottom. You end up with overgrazing at the low end and undergrazing at the far end. Whenever practical, make your paddocks run along the contour and run lanes up and down the slope.

How tall should the pasture be when I start grazing?

With most improved pastures consisting of grasses like Brome, Fescue, Orchardgrass, and Timothy as well as legumes like Red Clover, Ladino Clover, and Birdsfoot Trefoil, I tell farmers to start grazing when the plants are about 8 to 10 inches tall. In early Spring, you can start grazing when the plants are about 4 to 6 inches tall. That saves you a few extra days of winter feed plus it helps stagger pasture regrowth a little bit. Don't be tempted to start too soon or you'll damage the pasture and it won't recover. I'd rather have the grass ahead of the cows than the cows ahead of the grass. Don't start grazing in the same paddock every year.

When should I move livestock to new grass?

Some people will suggest that you graze pastures right down to the dirt before moving them. I don't. With the improved forage species I mentioned above, leave at least 2 to 3 inches of stubble so that there is enough leaf area to ensure quick regrowth. It's about 2 inches from the tip of my middle finger to the knuckle. I simply stick my hand down through the grass to the ground to measure it.

If you do not leave about 2 inches, those improved species won't bounce back quickly. Weeds and other less productive species will move in and take over. Also, if you leave livestock on too long, they will have to work too hard to get enough dry matter.

Should I drag my pastures?

With continuous grazing, dragging is almost a necessity. But once you get a good rotational system down, you probably won't need to drag very much. You'll find that the livestock will distribute the manure more evenly and it will break up and disappear faster. You may still need to drag near waterers and loafing areas.

I've done everything that you suggested and I'm still not getting the production. What should I do?

First, you can live with pastures that aren't very productive even under intensive management. Cut down the number of animals you are grazing or increase your pasture acreage.

The next troubleshooting step is to take a good hard look at your soil test. Ideally, you should test your soil before you set up your pasture system. But with the low priority most pastures have gotten in the past, soil testing usually comes as an afterthought.

Even if you do soil test first, don't run out and order enough fertilizer and lime to grow 10 ton per acre alfalfa. Most intensive grazing systems do just fine at moderate pH and fertility levels. If your soil is very acidic, lime to bring the pH up to about 6.0. Bring P and K levels up to the medium to high range suggested by your land grant university for grass/legume hay at yields appropriate for your fields.

Should I reseed my pastures?

If production is still less than you want after correcting any fertility problems, consider changing your pasture species. From my experience, this should be a last resort. But, for years, it's been the first solution that people think of. The typical scenario is this: "Your pasture wears out. So you seed in some legumes or grasses and maybe put on some fertilizer. Then you go on grazing it continuously and the new species disappear again".

You've got to change your management first. When mismanaged, grazing animals are nothing more than destructive pasture predators that can eat themselves out of house and home. Until you control your animals, reseeding is a waste of time and money. Only after you have established the grazing system, soil tested, and fertilized should you even think about reseeding a pasture.

If you do reseed, don't plow up your pasture. Frost-seed or drill new species into the existing sod. If you really did pick species that are better for your soils and management than the ones that are already there, the new ones will take over. Develop a good grazing system and you will get several tons of the cheapest high-quality feed you've ever raised. It may be the best move you've ever made.