

Planning a Grazing System: Assessing Resources and Setting Goals

Lesson 1

Introduction

This lesson will offer tools to assess your farm's resources, determine a farm plan by setting, prioritizing and scheduling goals, and establish a monitoring system under a whole farm approach.

There are basically two ways of managing the grazing area on a farm: continuous and managed grazing. Both strategies have advantages and disadvantages. In a continuous grazing system, set-up cost and time required for planning, managing and monitoring are lower. Nevertheless, if stocking rate is low, animals use the pasture resource inefficiently by spot grazing only 30 to 35 % of the forage available. If the stocking rate is too high, overgrazing will occur. Both situations lead to weed problems and depletion of legumes and preferred grasses, resulting in high re-seeding and herbicide costs, and reduced meat and/or milk production per acre.

In contrast, managed grazing promotes pasture productivity and biodiversity (with fewer weeds), and allows for making hay or stockpiling to lengthen the grazing season. These advantages are a result of time spent in planning, managing and monitoring, and higher initial investment in setting up the system.

Whole Farm Planning

Before you start improving a particular area of your farm, it is important to evaluate that area in the concept of the WHOLE FARM. You have a certain amount of resources (time, money, enthusiasm, etc.), that you will split among several objectives, not only for your farm, but for your family life as well. Developing a whole farm plan consists of assessing resources, writing a plan with specific goals, developing monitoring tools to measure progress made towards goals, and finally, evaluating and re-planning as needed.

If you have written farm goals, and devised alternative strategies to reach them, you can make proactive and informed decisions of how to allocate your resources. Without a plan, you will only react to situations, and might regret your decisions later on. For example, you allocate money to farm improvements and also family expenses. What is the appropriate amount for each item? When resources are limited, you use them for what seems most important at that time.

Don't let yourself be a victim of circumstance.
If you plan, you can dodge market, price, and weather changes and also take advantages of opportunities!

First of all, bring together the farm team, that is, people that participate in, and/or are affected by the farm: spouse, children, partner, workers, landlord, etc. Picture the farm not only as a resource to generate income, but also a place to raise your family and a site of natural resources. During the assessment and planning process, be creative but don't overestimate or underestimate your potential and goals!

1. Assessment of Resources

Inventory. Start by making a list of your resources and their condition.

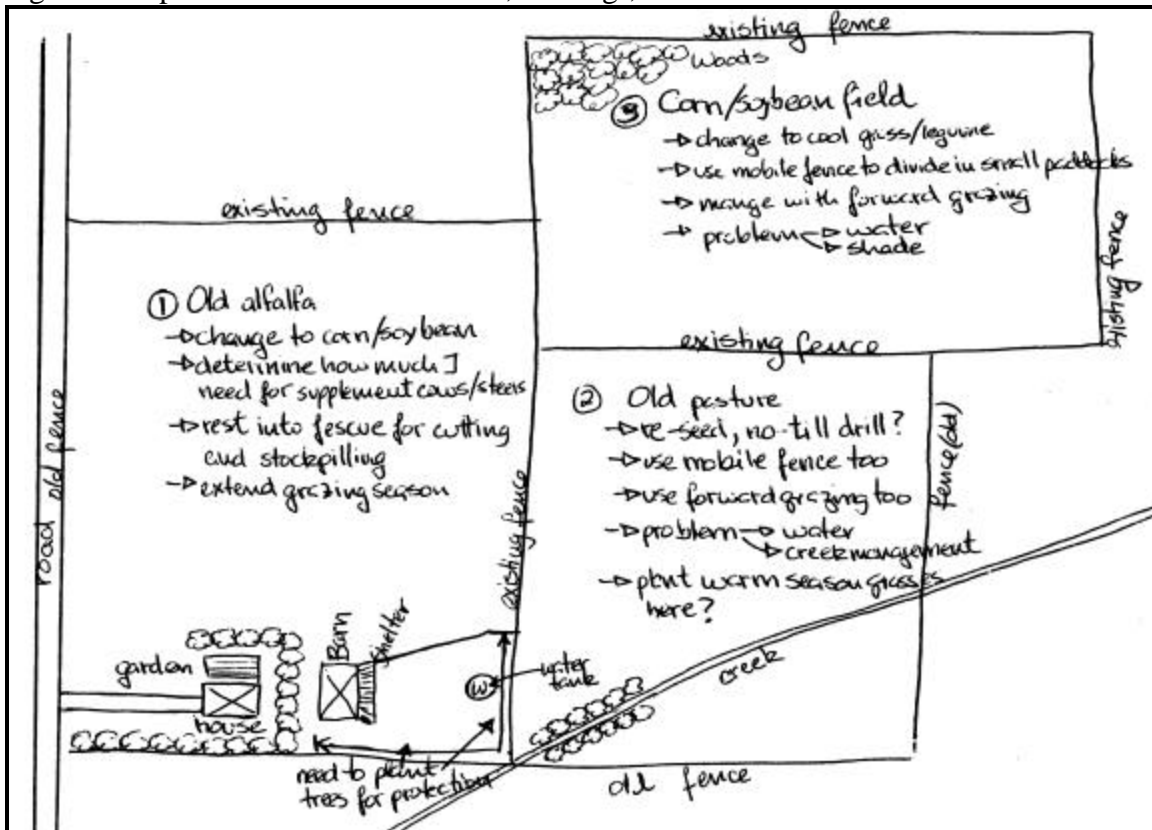
- Personnel
- Animals by species, condition and biological stage
- Facilities
- Feed and forage
- Land resources: owned and rented
- Wildlife

Something to think about:

- How much capital do you have available for investment?
- What are the feed requirements of your animals?
- Do you have shortage/abundance of forage from your pastures?
- What is the fencing condition?

Map. Get an aerial picture of your farm, or a map of your land from the Natural Resources Conservation Service (NRCS), and draw the items such as buildings, shelters, fences, lanes, water points, wooded areas etc. You can get soil maps at the same time, as they will also provide useful information to make informed decisions on pasture management. Number each field and write notes of changes needed (See Figure 1).

Figure 1. Map of farm with notes of fields, buildings, facilities and natural resources.



Condition of Pastures and Fields. Once you have drawn the farm map, research the present condition of the farm by getting information and making notes about each pasture or field. You can use some of the monitoring tools explained later in this lesson.

Measurements to be taken	Decision to be made	Cost information
Land area	How much into pasture or other crops?	Renting vs. buying
Length and condition of existing fences	Type of fence to use	Fence and fencing supplies
Condition of existing watering system	Type of tanks and lines or ponds	Well, water line, and tank
Pasture composition, condition and productivity	Kind of pasture mix to use: cool and warm season grasses, legumes	Tillage, seed, and seeding. Herbicides and application
Soil characteristics	Kind of fertilizer to use: purchase from dealer, manure, compost	Fertilizer and application
Condition of existing machinery	What equipment is really needed? Till, no-till, animal impact	Repairs, new equipment, rental

2. Writing a Plan with Goals

Set Goals. Together with the farm team, determine your goals, how to accomplish them, how important they are and how to measure progress.

Here are some questions to start off the goal setting task:

- What is your landscape goal?
- Do you want to maintain a herd, maximize production per acre or per animal, clear the land, other?
- How intensive do you want the management to be?
- Are you willing to fertilize and/ or apply chemicals?
- Will supplemental hay and/or grain be fed?
- How much time should be allowed to reach the goals?
- Is there a severe weed problem in the pastures?

It may take more than one farm team meeting for an effective planning process. During the first session, everyone will gain an understanding of the process, and some of the team members may be hesitant about providing their input toward the future of the farm. Give them some time so that each member can think about his/her goals for the farm. Then, get the group back together to brainstorm ideas, determine goals for the farm, realistic measures for those goals, and the necessary steps to get there. Having realistic financial (costs and prices) information is necessary for accurate evaluation. Allow enough time between meetings so that all members can get reliable information to share in the next session.

Prioritize. Incorporate the goals from each member into one whole farm chart (See Figure 2). This will help to prioritize actions and direct allocation of available resources. There are some actions that need to be taken care of right away for the proper functioning of the farm. There are

also actions that are essential for the healthy development of the family. Finally, there are some actions that can wait until next year. Display this chart in a very visible place and use it as a reminder of the farm's goals, and refer back to it to determine the best use of available resources. Get the team together to re-evaluate the chart every year, change or add goals and celebrate those that have been achieved.

Figure 2. The Whole Farm Goal Chart

Lifestyle				Financial			
Goal	Measure	To Do	Rank	Goal	Measure	To Do	Rank
• Play piano	3 times/week	subscribe class	1	• Increase income	60,000	{ - increase sales - off-farm job -> go to fair	
• Vacation	1 week cruise	travel agency	2	• Buy bull			
Production				Natural Resource/Environmental			
Goal	Measure	To Do	Rank	Goal	Measure	To Do	Rank
• Improve conception rate	97%	{ improve nutrition	2	• better soil	organic matter	rotational grazing	
• condition score	6-7 into winter			re-seed clover	1	• more birds	
• Improve pastures	10% CP 350lbDM/AC/in	soil sample					

Schedule an Action Plan. Decide when to do what. Make a calendar for the coming year. Review the example below and see how it matches the map shown in Figure 1.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Field 1				soil analysis	corn						Harvest	
				soil analysis	fescue	fence	graze, cut	Rest	rest	rest, graze	Graze	+ bales
Field 2				soil analysis	reseed cool, mobile fence	graze, rest	rest	Rest	rest, cut	rest	Rest	rest
				soil analysis	warm	rest	rest, graze	Graze	graze, rest			
Field 3				soil analysis	plant cool	rest	cut	Rest	rest, mobile fence, graze	graze, rest	Rest	rest

Keep Records. Keep a notebook to write goals and notes. For examples of worksheets to keep records on your natural resources, see Appendix A.

3. Monitoring

One aspect often overlooked is monitoring the system. How is the farm plan working? Develop a specific set of monitoring tools to measure progress. The indicators listed below give a good framework for a monitoring system that can determine how well the system is working and when adjustments need to be made. It is important to keep records of observations and measurements. The following lists and the forms in Appendix B may be used as examples to record monitoring information, or you can make your own. Do not select more tools than you will use, or tools that are not pertinent to your goals, but DO IT!

Visual Forage Indicators

- ☒ Pasture condition - vigor, health (poor to excellent)
- ☒ Forage density - how thick is desirable vegetation
- ☒ Color - degree of greenness
- ☒ Pasture productivity - rate of regrowth
- ☒ Uniformity of grazing

Environmental Indicators

- ☒ Erosion problems and soil characteristics
- ☒ Trails or paths developing
- ☒ Streambank erosion and cover
- ☒ Plant diversity
- ☒ Manure distribution
- ☒ Earthworm populations
- ☒ Wildlife presence or use

Monitoring tools

Soil. Take soil samples to determine soil pH and fertility. Identify soil type. Soil analysis results will offer lime and fertilizer recommendations for the crop that you are planning. Fertilizing without previous analysis can lead to under- or over-application, which is a waste of money and a potential pollution source.

Plant diversity. Walk in a zigzag pattern across each pasture. At several points toss a one-foot square grid, count how many legumes, grasses, shrubs and weeds are in each square. Take notes as you walk the pasture. Add up all legumes, grasses, shrubs and weeds in the pasture and total them. Finally, divide the number of each type of plant by the total number of plants and multiply by 100 to determine the percentage of each type of plant in the pasture (See Figure 3). Repeat this process each year to determine improvement.

Figure 3. Notes on pasture composition, condition, production, and soil characteristics.

5/10/99	COMPOSITION					condition % ground covered	production (visual) avg. height	organic matter	SOIL TEST				
	legumes	grass	shrubs	weeds	total				pH	N	P	K	
<i>Pasture 2</i>													
point a	6	23	2	1		80%	7 1/4						
point b	5	17	5	3		85%	8 1/4						
...													
total	11	40	7	4	62								
percentage (%)	$\frac{11 \times 100}{62}$ 17.7	$\frac{40 \times 100}{62}$ 64.5	$\frac{7 \times 100}{62}$ 11.3	$\frac{4 \times 100}{62}$ 6.5		82.5	7.5	2.8	7.3				
Notes/Comments :	<ul style="list-style-type: none"> • control weeds with application of herbicide directly to each plant + clipping • seed legumes → frost seeding next winter → no-till drill : find out cost <p>Productivity: $7.5 - 3 = 4.5$ in available for grazing</p>												

Pasture Condition. How much bare soil can you see? Based on a visual estimate of green plant ground cover after the paddock has been grazed leaving a 2-4 inch residual stubble height, determine if it is fair, good or excellent based on the following criteria:

- Fair** – Less than 75% ground cover or greater than 25% bare ground.
- Good** – 75 – 90% ground cover or 10-25% bare ground.
- Excellent** – At least 90% ground cover or less than 10% bare ground.

Pasture productivity. As you walk your pastures to determine composition, you can follow the visual or the clipping method to determine productivity and forage available for grazing or cutting for hay.

A. Visual Method. Measuring pasture height is a tool for making quick estimates of the pounds of forage dry matter in the field at the time measurements are taken. Determine the average

vertical height of the undisturbed stand of forage species in inches, and use the table and instructions shown in Appendix C to estimate the amount of forage available for harvest.

- B. **Clipping Method.** To estimate pasture productivity more accurately, use the clipping method explained in Appendix D.

After determining productivity, condition and composition, go back to the map drawn on the aerial picture. Make notes on each field about present condition and plans for improvement.

4. Evaluate and Change

Use your records! Compare these numbers to the written goals in your plan. Is your farm moving in the right direction? Do you need to make changes in management? Maybe you have new or different goals that you want to incorporate into the plan and need to adjust your management accordingly. Once gain, take notes as you do your evaluation, and seek advice. You can find professional information locally at your County Extension office, Natural Resource and Conservation Service, Soil and Water Conservation District, etc. You can also find valuable advice from your neighbors or other people in the industry.

Resources and Reading

- Whole Farm Planning, series
Sources: The Minnesota Project
(651) 645-6159
- Pasture Management Guide for Northern Missouri
Source: USDA Natural Resources Conservation Service
- Pastures for Profit, A Guide to Rotational Grazing
Sources: University of Wisconsin
(608) 262-3346
University of Minnesota
(612) 625-8173 publication
A3529
- Holistic Resource Management Workbook
Authors: Sam Bingham and Allan Savory
Source: Center for Holistic Management
(505) 842-5252
- The Monitoring Tool Box
Source: Land Stewardship Project
(507) 523-3366
- IRM Desk Record
Source: National Cattlemen's Beef Association, PO Box 3469, Englewood, CO 80155
(303) 694-0305
- Beef Farm Sustainability Checklist
Source: ATTRA Livestock Series
www.attra.org
(800) 346-9140

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APPENDIX A

CLIMATIC CONDITIONS

Month	PRECIPITATION			TEMPERATURE		
	Rainfall	Snow	Total Precip.	Ave. Temp	Ave. Low	Ave. High
January						
February						
March						
April						
May						
June						
July						
August						
September						
October						
November						
December						
Total						

PASTURE INVENTORY RECORD

Pasture #	Name and Description	
Acres	Suggested Stocking Rate	
Type (Native, Tame)		Ownership
GRAZING		WATER
Grazing System		# of Watering Points
Key Management Plant		Type
Primary Growth Period		Condition of Source & Facility
Past Use (Severe, Heavy, Moderate, Slight)		Condition of Water
Overall Condition		Last Water Test
Problems?		Problems?
Condition of Riparian Areas/Wooded Draws		
Special Consideration		

APPENDIX B

This Job Sheet was designed for use by persons with different levels of technical ability. It can be used quickly and without tools, to visually estimate the condition and trend on grasslands. For example, when it asks for a %, the user should make their best visual estimate. It reminds the user to evaluate 10 items important to grassland condition/trend. With experience, condition/trend surveys will be quite consistent between users.

Use this form to inventory up to 5 different fields or sites, or to record change on the same field or site for 5 years. Enter the Pasture Type for the site being evaluated. Acres can be the total acres in the field or the acres represented by the evaluation. The month and year should be recorded at M___ and Y___.

CATEGORY:

- 1) Plant Population - Visually estimate the % composition by weight of each plant grouping and assign a weighted value. Desirable, intermediate and undesirable will vary with site, kind of grazing animal and intended use.
- 2) Plant Diversity - The number of different kinds of plants that are well represented on the site. If only one kind of plant occurs, diversity is narrow; if six or more kinds are present, diversity is broad.
- 3) Plant Density - Ignore undesirables and visually estimate density of living desirable and intermediate species that would be present at a two-inch stubble. Is there room for more desirable and intermediate plants?
- 4) Plant Vigor - Are the desirable and intermediate species healthy and growing at their potential? Some things to look for are; color, leaf area index, reproduction, presence of weeds, rate of growth and regrowth, etc.
- 5) Legumes in Stand - Visually estimate the % composition by weight of the legumes present in the stand for the area being evaluated.
- 6) Severity of Use - Close and frequent use causes loss of vigor, reduces desirable species, and promotes erosion and runoff. Light use allows excessive residue buildup, blocks sunlight, and reduces palatability.
- 7) Uniformity of Use - Uniform grazing has all plants grazed to a moderate, uniform height throughout the field. Spotty grazing appears uneven, with some plants or parts of the field grazed heavily and others lightly.
- 8) Soil Erosion - Visually observe and collectively evaluate all types of erosion and determine the severity for the area being surveyed.
- 9) Woody Canopy - Estimate the percent canopy (shaded area at noon) of woody cover over six feet tall.
- 10) Plant Residue - Appropriate residue provides adequate ground cover to retard runoff, returns nutrients to the soil, and provides a favorable microclimate for biological activity.

VALUE:

Where needed, use weighted values and interpolate. For example; if you can't decide between a value of 2 or 3 use a value of 2.5.

DETERMINING GRASSLAND CONDITION / TREND

Owner/Operator:			Date:				
Field Office:			Technician:				
Field #:							
Pasture Type:							
Acres:							
Month and Year:			M__Y__	M__Y__	M__Y__	M__Y__	M__Y__
CATEGORY	PARAMETER	VALUE	VALUE	VALUE	VALUE	VALUE	VALUE
1) Plant Population The estimated % by weight is mostly	Desirable Intermediate Undesirable	3 4 1 2 0					
2) Plant Diversity The diversity of plant species is;	Broad > 5 Medium 4-5 Narrow < 4	3 4 1 2 0					
3) Plant Density Desirables and intermediates are;	Dense > 85% Medium 75-85% Sparse < 75%	3 4 1 2 0					
4) Plant Vigor Desirables and intermediates are;	Strong Medium Weak	3 4 1 2 0					
5) Legumes in Stand Percent of legumes by weight make up;	>40% 20-29% 30-39% <10% 10-19%	3 4 1 2 0					
6) Severity of use The degree and frequency is;	Light Moderate Heavy	2 0 2 4 0					
7) Uniformity of Use The uniformity of grazing use is;	Uniform Intermediate Spotty	3 4 1 2 0					
8) Soil Erosion Sheet, rill, gully and stream bank is;	Slight Moderate Severe	3 4 1 2 0					
9) Woody Canopy The canopy over 6 ft makes up;	<11% 21-30% 11-20% >40% 31-40%	3 4 1 2 0					
10) Plant Residue Dead and decaying plant material is;	Excessive Appropriate Deficient	2 0 2 4 0					
TOTALS							
PASTURE CONDITION / TREND							
0-10 = VERY POOR	11-20 = POOR	21 - 30 = GOOD			31 - 40 = VERY GOOD		

APPENDIX C

VISUAL METHOD TO ESTIMATE STAND PRODUCTIVITY

Determine the average vertical height of the undisturbed stand of forage species in inches and use the table below to estimate the forage available for consumption.

Estimated dry matter yield in pounds per acre per inch of height for pasture types and stand conditions

Pasture Species	Stand Condition, (lb./acre/inch)		
	Fair	Good	Excellent
Bluegrass/Clover	150-250	300-400	450-550
Bromegrass/Legume	150-250	250-350	350-450
Orchardgrass/Legume	100-200	200-300	300-400
Tall Fescue/Legume	200-300	300-400	400-500
Tall Fescue + Nitrogen	250-350	350-450	450-550
Mixed Pasture	150-250	250-350	350-450
Alfalfa or Red Clover	150-200	200-250	250-300
Tall Warm Season Grasses	50-100	100-200	200-300

For rapid regrowth and to maintain a healthy stand, forage crops should not be grazed below 2-4 inches for most cool season grasses and legumes and 6-8 inches for warm season grasses.

For example, a bromegrass/legume pasture in excellent condition with an average undisturbed height of 7 inches will have 4 inches of usable forage (3-inch stubble height left after grazing). The available forage dry matter would be **estimated** to be 350-450 pounds/acre-inch or 1,400-1,800 pounds/acre.

Use the following formulas to calculate the number of animals that can be grazed or the approximate number of days the pasture can support a specific group of animals:

$$\text{Days} = \frac{\text{Total lbs. Forage/Ac.} \times \text{Ac.} \times \% \text{ Grazing Efficiency}}{\text{Avg. Animal Wt.} \times \text{Intake Rate in \% Body Wt.} \times \text{Animal \#}}$$

$$\text{Animal \#} = \frac{\text{Total lbs. Forage/Ac.} \times \text{Ac.} \times \% \text{ Grazing Efficiency}}{\text{Avg. Animal Wt.} \times \text{Intake Rate in \% Body Wt.} \times \text{Days}}$$

Pasture system	Grazing Efficiency (total season)
Continuous	30 %
4 pastures	35%
8 pastures	50%
12 pastures	65%
24 + pastures	75%

For example,

$$24 \text{ Animals} = \frac{1,600 \text{ lbs. Forage/Ac.} \times 1 \text{ Ac.} \times .75 \text{ Grazing Efficiency}}{1,250 \text{ lbs. Animal wt.} \times 4\% (.04) \text{ of Body Wt. Intake} \times 1 \text{ Day}}$$

APPENDIX D

CLIPPING METHOD TO ESTIMATE STAND PRODUCTIVITY

Clipping method.

1. Clip the forage in 1 square yard of pasture. Clip at the height to which you would like to graze. (This varies with species.)
2. Weigh all of the forage collected. Record the total weight of the sample (for example, 2.07 lbs./sq. yd).
3. Determine the % forage dry matter (DM):
 - a) Weigh an empty paper plate. Record weight of plate (for example, 1 oz).
 - b) Take a 1/2 lb (approximately) subsample of the forage. Place it on the plate and weigh it accurately. Record original weight of subsample (for example, 9 oz).
 - c) Place the plate and forage in a microwave oven with a cup of water and turn the microwave on high for three minutes. Note: It is extremely important to leave water in the microwave throughout the drying process. Water reduces the chance of ruining the microwave or possibly starting a fire.
 - d) Weigh.
 - e) Place back in microwave for 1 minute.
 - f) Repeat steps 3d and 3e until no additional weight loss occurs. Record final weight of subsample (for example, 3 oz).
 - g) Calculate % forage DM as:

$$\% \text{ Forage DM} = \frac{(\text{final weight of subsample}) - (\text{weight of plate})}{(\text{initial weight of subsample}) - (\text{weight of plate})} \times 100$$

For example,

$$25\% \text{ Forage DM} = \frac{(3 \text{ oz}) - (1 \text{ oz})}{(9 \text{ oz}) - (1 \text{ oz})}$$

Note: Be sure to account for weight of plate before and after drying.

4. Determine pasture yield (lb/acre) as:

$$\text{Pasture yield} = \frac{(\text{total sample wt}) \times (\% \text{ forage DM}) \times (43,560 \text{ sq. ft/acre})}{(9 \text{ sq. ft/sq. yd})}$$

For example,

$$2,505 \text{ lbs./acre} = \frac{(2.07 \text{ lbs./sq. yd}) \times (.25) \times (43,560 \text{ sq. ft/acre})}{(9 \text{ sq. ft/sq. yd})}$$

Notes