Grazing Heifers:
An Opportunity for Large Dairy Farms

CONTENTS: An Overview of economics and 10 Fact Sheets covering the resources required to operate a farm owned heifer grazing system or contracting with a Custom Grazer.

1. ***Grazing Management***
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8. ***Avoiding Pasture Pitfalls***
9. ***Grazing Checklist***
10. ***Custom Grazing Contract***

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Through the combined use of Management Intensive Grazing and winter confinement, Dairy Farmers can raise heifers that fit their operations through:

- Reduced Cost of Feed and Labor
- Targeted Growth Goals
- Increased Fitness due to Exercise
- Decreased Post Calving Metabolic Problems

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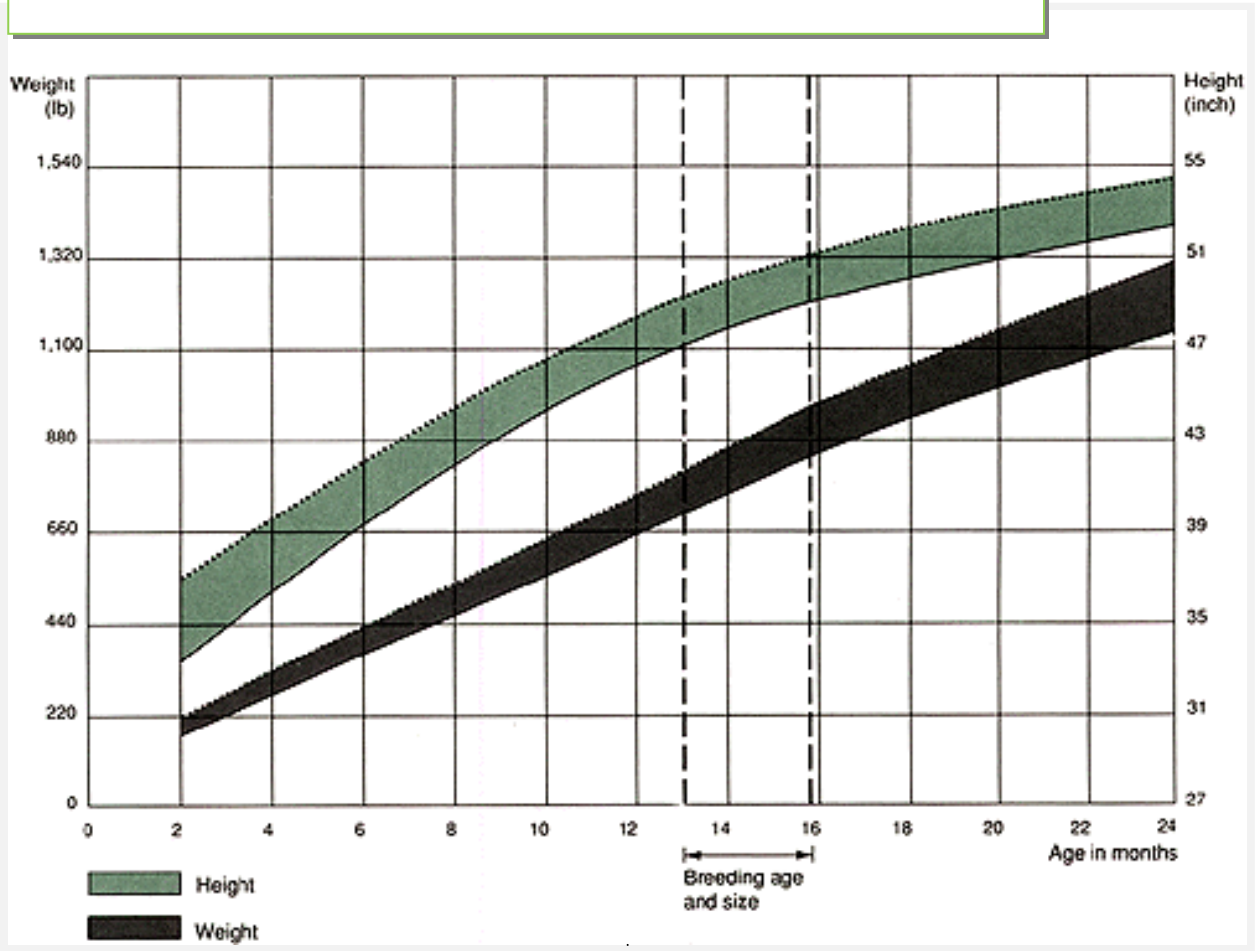
Sustainable Agriculture Research & Education

Targeted Growth Rate for Holstein Heifers –

Source: Heinrichs, Jud. 1998. Monitoring dairy heifer growth.

College of Agriculture Sciences, Penn State University.



This Project Had the Help of a Group of Farmers Who Helped Keep the Project Relevant and Useful to Other Farmers. They Were:

- Steve Paladino - With Hardie Farms, Lansing NY
- Dale Matoon - With Pine Hollow Dairy, Locke NY
- John Noto – Eden Valley Dairy, South Dayton NY

REDUCING THE COSTS OF RAISING DAIRY HEIFERS BY GRAZING

But Still Achieving Targeted Growth Goals

Fay Benson, Cornell cooperative Extension - South Central New York Dairy Team

Dairy replacement programs within dairy farms are one of the largest expenses for dairy farms. In a 2008 study from Cornell's Department of Applied Economics and Management (AEM), seventeen above average herd size farms with high levels of management, showed dairy replacements entering the herd with a total investment of $1,884 per animal. These animals were calving at 22.9 months of age and weighing 1290 pounds. The animals averaged 1.73 pounds of gain per day at a total raising cost of $2.49 per day per heifer, or $1.45 per pound of gain. Feed costs were the most significant cost, followed by labor. Through the use of management intensive grazing some New York Dairies are savings $130 - $330 in labor & feed costs per animal entering the herd. If we were to update the 2008 feed costs with today's cost of forage and grain the savings would be higher.

STAGE OF HEIFER GROWTH	201 – 700 LBS	701 – 850 LBS	851 - Calving
Confinement Feed and Labor~	$2.18	$2.76	$3.69
Management Intensive Grazing*	$1.30	$1.50	$1.50
Cost Difference /Day	$0.88	$1.26	$2.19
Times 150 Day Grazing Period	$132	$189	$329

~Confinement Feed & Labor Costs taken from "**Dairy Replacement Programs: Costs & Analysis" AEM - EB 2008-16**

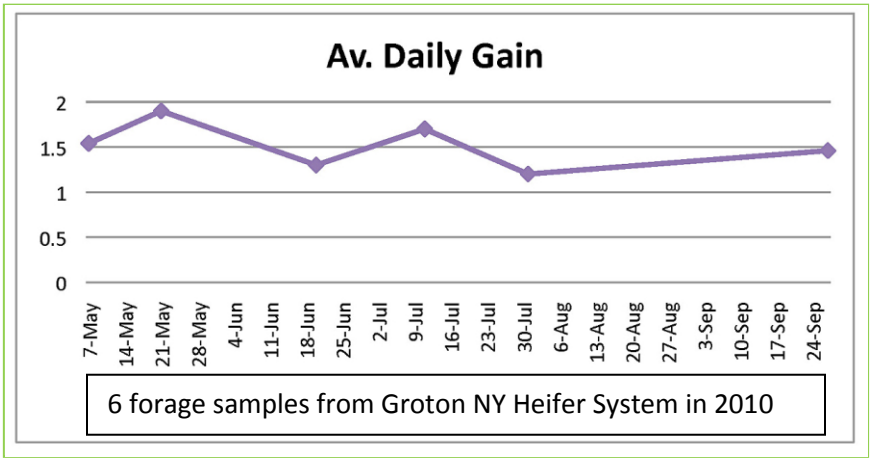
***Typical daily charge for custom heifer grazing in 2011.

Targeted Growth Goals with Grazing Forage Alone or Through Feeding Additional Concentrate

Through a NE Sustainable Agriculture Research and Extension Grant (NE SARE) regular forage samples from pastures being grazed by dairy heifers. The samples were entered into Cornell's CNCP model,it showed grazing forage varied throughout the season, this meant that the ADG varied as well. See ADG Table below.

The forage grazed by the heifers varied throughout the season. This was due to the changes to the forage plants and the maturity of the pastures given to the heifers. The computed ADG if pasture was the only feed was 1.54 lbs/day. The actual result for ADG for the group of heifers in this study was 1.7lbs per day. To achieve this, select feeding of concentrate was used to offset the transition to grazing the

heifers were fed 2lbs of concentrate the first 2 weeks, and 2lbs again during the final 3 weeks to compensate for the declining pasture quality. These changes increased the ADG to 1.7 lbs/day for the group of heifers.



The points in the table to the left indicate the ADG for heifers fed pasture forage alone.

These results can be manipulated to reach desired goals by careful grazing management or additional grain being fed.

To achieve targeted goals it is important to follow guidelines set out in the fact Sheets included in this publication or available soon at: http://grazingguide.net/extension

There are many more variables to grazing heifers vs. feeding them in confinement. Understanding the variables and managing them will allow dairy farmers to take advantage of the costs savings which are associated with grazing. For more information on nutrition for grazing Heifers see Fact sheet #2 "

Health Benefits of Grazing Dairy Replacements in New York

A. Fay Benson NE SARE Partnership Grant 2009

Introduction

Early lactation health problems were reduced on first calf heifers which were rotationally grazed for 5 months prior to their freshening date, compared to a duplicate group which was raised in confinement prior to freshening. These results were consistent with previous research completed by the University of Minnesota from 2000 through 2002, which also compared raising pregnant dairy replacements in confinement vs rotationally grazed. Their results showed that the animals raised in MIG had fewer post partum problems then their counterparts. Since this research was conducted on University of Minnesota's research farm it was the intention of the Principal Investigator (Fay Benson) to design a study in New York using animals from two separate commercial herds of over 1000 milking animals. By designing the study to mimic the prior study at UMn there would be three benefits: first our study would take its information from commercial herds instead of a research farm where variables are strictly controlled. Secondly, possibly corroborate the UM's study and thirdly we could use some of the findings of the UM study to explain our results.

Background

A check of prior research was completed looking for studies that dealt with comparing the health of grazed dairy replacements vs confined replacements. A study from the University of Minnesota was identified. The study was completed by Laura Torbert, a Graduate Student of Professor Hugh Chester-Jones. She looked at health indicators of the animals in the two systems. Torbert's study had shown significant differences in the postpartum health of the animals kept in grazing regimes and those kept in confinement. Here is the table from her study that highlighted these differences:

Parturient Disorders

	Continuously Grazed Paddocks	Rotationally Grazed	Feedlot or Confined
# of animals	20	21	21
DA's	3	2	7
Difficult calving	2	3	5
Metritis	0	0	1
Ketosis	2	0	3
Skeletal injury	0	2	2

These differences between the grazed animals and the confinement animals were what attracted the PI to duplicating the study. In our New York study there were only two groups: MIG and Confined.

Performance Targets and Objectives

The objective was to duplicate the study using large commercial dairies which would allow the comparing of information gathered from herd mates. If the SARE study showed similar results as the MN study this information would aid other large dairies to see the benefit of raising heifers on pasture and adopt the practice. Increasing the number of animals grazing in NY would have many advantages:

1. Decreasing the amount of manure that feeds into a large farm's CAFO plan.
2. Creating opportunities for contract graziers
3. And finally, raising replacements that are healthier and require less medical interventions at the beginning of their first lactation.

Materials and Methods

The NY study would use a larger study group; 100 animals vs. 42 animals used in the MN study. The other difference was that the SARE study would be conducted under actual conditions on two different dairy farms. The animals were taken from two large commercial herds which had a sufficient number of animals bred in the window required for the study. Each group of heifers came back to be housed and managed together on the home farm. In April of 2005 the animals were selected from two farms: Farm 2 in Cayuga Co. and Farm 1 of Schuyler Co. The 50 animals from each farm were weighed and sent to their regime within two days of each other. That grazing season was a challenging one in 2005 due to the lack of rain. The Schuyler animals had to be removed from the grazing system 30 days ahead of schedule, and a portion of the Cayuga animals came off a week early due to the lack of pasture growth. The expected result of the shortening of the grazing period was that since the animals from the two regimes spent more time together under the confinement regime there would be less of a difference between them. This was not the case. After collecting the data on post-partum problems from the two farms there was a significant difference between the health care requirements of the animals under the two regimes on both farms. The following are the results and the discussion:

Results and Discussion:

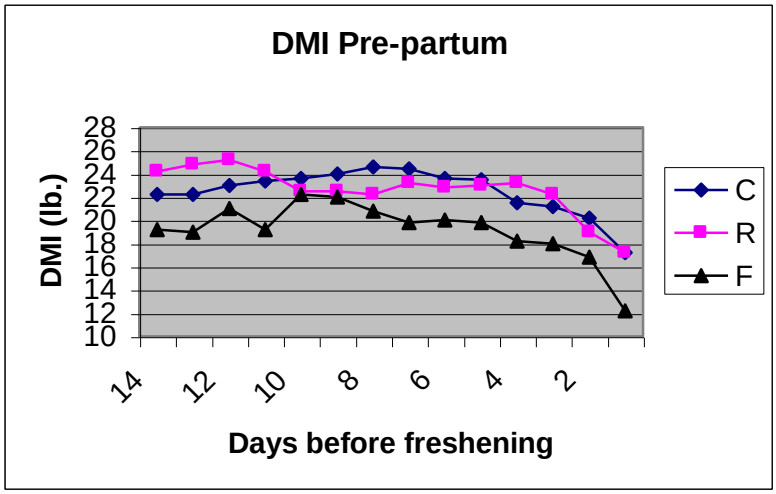
Farm 1	Number of animals in trial	No. of animals requiring treatment	Calving Ease
Grazed	25	6	1.26
Confinement	25	12	1.6
Farm 2			
Grazed	25	0	1.62
Confinement	25	12	1.75

After the animals returned from pasture they were combined with the confinement group. The study was designed so that the animals would have between 30 and 60 days post treatment before calving.

Calving Ease
The heifers on both farms were selected to freshen in the period between November of 2005 and January of 2006. The calving ease was determined by the difficulty the heifer experienced delivering her calf. A score of 1 meant that there was no difficulty, 2 some assistance was necessary, and 3 meant there was exceptional difficulty. The difference between the two farms can be explained by the somewhat subjective nature of scoring.

Animals requiring treatment
Both farms had similar protocol for the monitoring of health of the newly fresh animals. On both farms there was a recent fresh group separate from the other cows. Each animal had her temperature taken every day and if there was a temperature of 102 degrees or higher for two consecutive days, an antibiotic treatment was initiated. The usual cause of an elevated temperature is metritis, which is a vaginal infection connected to calving. Bill Stone, DVM, with Cornell PRO-Dairy, and also a collaborator on this study, commented on the increased temperature. He stated that metritis is often an indicator of sub-clinical ketosis or an energy imbalance. An animal reducing her dry matter intake could cause the imbalance. Using the results of Torbert's study we can see the different dry matter intake leading up to the day of freshening. At the MN. research farm they were able to monitor dry matter intake (DMI) for each animal 2 weeks before they freshened.

Using prior study to help explain SARE study
In the chart below, Torbert showed her three regimes: Continuous grazed (C), rotationally grazed (R), and confinement (F). Note that the animals that had been in a grazing regime were consuming more throughout the two weeks prior to freshening, and 17 lbs DMI the day of calving. The Confinement animals dropped to 12 lbs DMI. This difference in consumption would explain the higher incidence of sub clinical ketosis and the resulting metritis in the confined group.



C= Continuous Grazing
R=Rotational Grazing
F=Feedlot/Confinement

In this data from the University of Minn. the grazing animals were consuming higher amounts of Dry Matter than the confinement animals, Pre Partum. This reduced metabolic problems Post Partum.

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Cooperative Extension

Dairy Heifers
Utilizing Management
Intensive Grazing Systems
Fact Sheet Series: 1 of 10

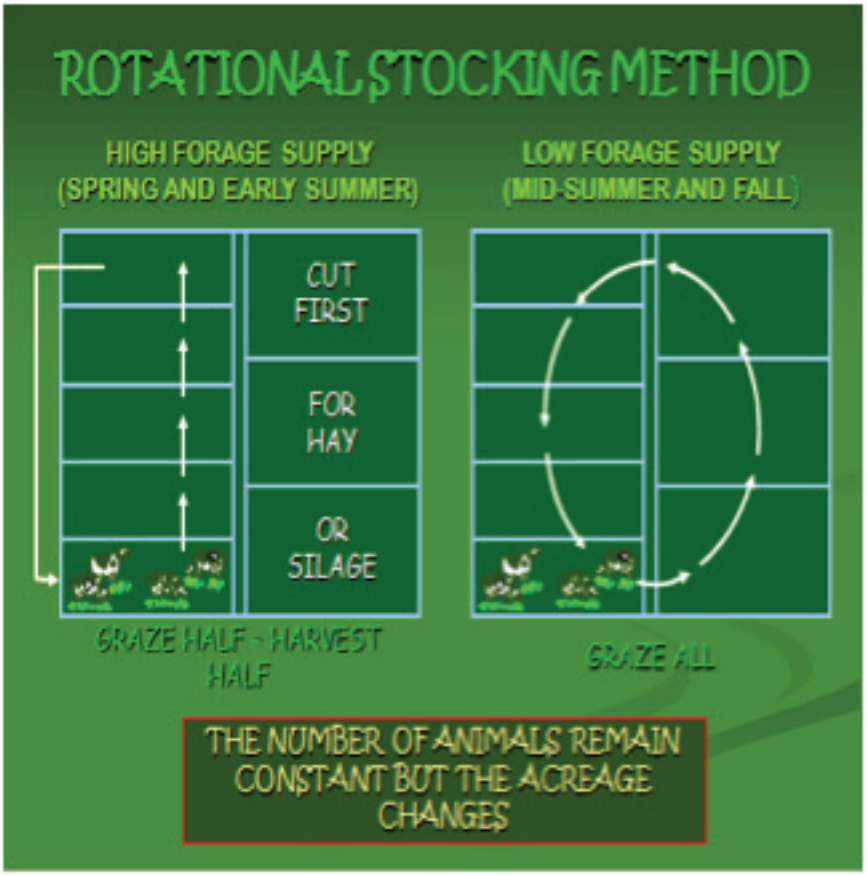
Grazing Management for Dairy Heifers

by Fay Benson
and Dr. Sam Leadley

The gift and curse of grazing with any type of animal is managing the variability in pasture forage quality and density, and the changing needs of the animals thoughout the season. Good management is the key to achieving the constant average daily gain which is paramount to the dairy heifer owner.

Grazing Management Definitions

- **Rotational Grazing with Fixed Stocking Rate:** the number of animals stays constant but the area grazed varies to accommodate variations in pasture growth (see illustration below).
- **Rotational Grazing with Variable Stocking Rate:** the area grazed remains constant but number of animals changes to accommodate for variations in pasture growth.
- **Grazing System:** includes individual paddocks, laneways, and water system.
- **Residency:** the time (weeks, days, or hours) the animals remain in a paddock. Shorter residencies result in higher grazing efficiencies.
- **Rest Period:** the length of time the forage plants of a paddock are allowed to re-grow before grazed again. Rest Period change over the grazing season is usually 15 days in early summer, increasing to more than 30 days in the fall.
- **Over Grazing:** happens when animals are left on too small of a paddock for their forage requirement; results in animals damaging the most desirable pasture plants. If this is repeated, those plants die out of the pasture mix.
- **Under Grazing:** if too large of a paddock is given to animals, this lowers the efficiency of the pasture, and also requires the clipping or cutting of the pasture to "reset" pasture for the next grazing period.
- **Pasture Nutrient Management:** Approximately 65% of the nutrients consumed by the animals on pasture are excreted back on the pasture. Managing where this takes place affects the sustain-ability of the pasture.



Dairy Heifers Utilizing Management Intensive Grazing Systems

FACT SHEET SERIES

1. Grazing Management
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7: Fly Control
8: Avoiding Pasture Pitfalls
9: Grazing Checklist
10. Custom Raising Contract Sample

The Northeast Sustainable Agriculture Research & Education program (SARE) provided funding for this fact sheet series.

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Steps for Sizing Paddocks

Photo: Fay Benson

1. Determine forage availability for land used as pasture. This can be done by two methods: first estimating past hay yields. A yield of 5 tons per acre per year converts to 2,000 lbs dry matter (DM) per grazing rotation. The rotations would have a 15-day rest period between grazing in early spring, gradually increasing to 30 days in the summer. Yet at each grazing there would be 2,000 lbs DM/acre.

The other method is to use an online calculator developed by Cornell University and online at www.forages.org. It uses location and soil type to set DM production and then with information entered concerning animal and grass type it provides DM production and requirement.

2. Determine forage requirement: the number and size of the animals grazing and the residency of time in the paddock. For example:

- 50 heifers weighing an average of 600 lbs = 30,000 lbs of animals
- The estimate of DM consumption is 3% of body weight or 900 lbs of forage required per day
- A grazing efficiency of 60% would be appropriate for dairy heifers newly introduced to grazing; leaving 40% of the forage in the paddock.

> 50 heifers x 600 lbs = 30,000 lb. animal weight x .03 DM intake =
> 900 lbs DM requirement x 60% grazing efficiency =
> 1,500 lb DM need from pasture per day

For a 2 day residency, 3,000 lbs of forage would be required. Using the information of forage availability from above: 2.5 acres of pasture producing 3 ton of DM of hay per year would be required.

Shade or No Shade?

It is recommended to keep shade out of paddocks. This benefits two aspects of grazing management. First, many studies have shown that shade in a pasture reduces the amount of the animals' grazing time. Secondly, animals concentrate manure and urine in shaded areas. Removing shade helps manage nutrient cycling for pasture soils.

If shade is needed on days of high humidity or temperatures above 90 degrees F, two solutions would be to allow animals to go into a barn with good ventilation or into a fenced-in shaded area. Both of these solutions only need to be used for no more than 4-6 hours on the worst days. Grazing animals will make up for lost grazing time in the evening and at night.

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Dairy Heifers Utilizing Management Intensive Grazing Systems Fact Sheet Series: 2 of 10

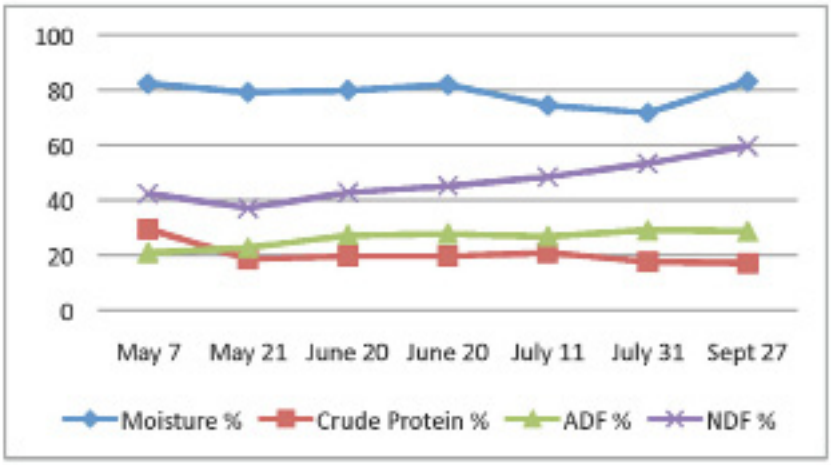
Nutrition for the Grazing Heifer

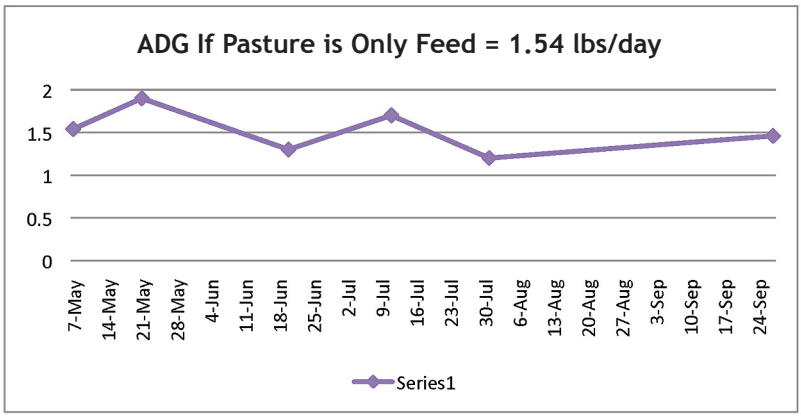
by Fay Benson and John Conway, Cornell PRO-DAIRY Program

Heifer owners have high expectations for the future milking animal. Animals that do not achieve appropriate physical size or 82% of maturity before they enter the milking herd will not be able to achieve their milking potential, which affects the profitability of the overall dairy. Heifers needs to reach this size as quickly as possible to reduce the cost of raising them. According to a study released in 2008 by Cornell University's Department of Applied Economics and Management, the cost of raising heifers from birth to freshening was $1,734 in confinement housing. Of that amount, 51% was for feed. Grazing the animals 150–300 days during heifer stage could result in substantial savings in feed costs, provided that the animals receive adequate nutrition. Below are management areas for attention to assure that the grazing heifer receives adequate nutrition.

Pasture Nutrition Changes Daily

The nutritional needs of the dairy heifer can be met for most of the grazing season with just pasture mix, providing the mix is of mostly cool season grasses 8-10 inches tall with approximately 10% legumes. The top graph shows random samples taken from pasture available to a group of heifers throughout the 2010 grazing season at Benterra Custom Grazing in Central New York. The analyses of the samples were entered into the Cornell Net Carbohydrate and Protein System (CNCPS) to compute daily (weight) gain achievable with the forage available to the heifer on that day (bottom graph). Even if the pasture manager strives to keep consistent quality of forage for the heifers, changes in forage composition and density affect its nutritional value.





Supplementing for ADG — *Top: Analysis of forage samples entered into Cornell's CNCPS. Bottom: Model results calibrated into lbs. of average daily gain (ADG) that forage could support. The average for the 2010 season if pasture was the only feed was 1.54 lbs/day. To increase the rate of gain, 2 lbs. of 15% heifer grain was fed for the final 30 days to attain 1.7 lbs./day for the 60 animals grazed.*

The fluctuation of the pasture analysis (top) points to weather effect on pasture density (quantity) and quality. Ultimately, the heifers averaged gains of 1.7 lbs/day (ADG), but, likely never had the same gain day to day. Intakes get proportionately larger as the heifers grow, so lesser

quality forage has a diminished negative influence on ADG. If the heifer owner/managers want these heifers to stay on track to be 825 lbs. at 14 months (breeding age) and freshen at 23 months at 82% of their 1,500 lb. mature weight, then a target ADG of 1.86 lbs/day for the summer pasture season is needed. Here's how we calculate the rate:

Heifers enter system	May 7	7.5 months old	500 lbs.
Heifers leave system	Oct 21	13 months old	
Target weight for	Nov 21	14 months old	825 lbs.
Weight gain needed			325 lbs.

Weight gain needed ÷ grazing season of 174 days = 1.86 lbs/day

Producers have two options to reach their target goal. Considering the dynamic of concentrate costs, future milk prices, freshening schedules, labor costs to feed the concentrate, etc., they can either combine a little bit of grain with the pasture to up the ADG by 0.16 lbs./day (about 0.5-1 lb. corn meal equivalent) or accept that breeding will be delayed by about 28 days. These heifers would still freshen with a post-fresh weight of 1,275 lbs., but would freshen at 24 months instead of 23. Both options will work; the one chosen will depend on circumstances that will be different year-to-year.

The heifer owner needs to establish goals for the pasture manager at the time a contract is written, or if the owner is managing the grazing, then goals needs to be tracked to be sure of the outcome.

Transitioning On and Off the Pasture

The switch from the heifers' confinement diet to a grazing diet of fresh grass can cause a lag in dry matter intake. The time needed for the animals to get used to the new method of foraging and, at the same time, for their rumens to adjust to the new diet, will negatively impact their rate of gain.

To not fall behind on gain, a concentrate feed should be fed during the transition period of approximately two weeks. The carbohydrate in the concentrate is reminiscent of the confinement diet. Since usually only a small amount - approximately 2 lbs/animal/day - will be required, it is important to be sure there is adequate bunk space for all animals to reach the concentrate.

At the Benterra grazing system, two bunk feeders on wheels allow for adequate room so all 60 animals can reach the concentrate. Since the bunks are movable, their movement assists in training the heifers to move from one paddock to the next.

After two weeks, the transition to pasture forage is complete. One of the bunks is removed and one remains that contains salt, minerals, ionophore lick, and a fly repellent rub.

To prepare animals to return to the confinement diet, it is recommended that the same amount of concentrate be given to the animals two weeks prior to them leaving the grazing system. The carbohydrate will aid the rumen in transitioning to the confinement diet. In the top graph on the front page it can be seen that Neutral Detergent Fiber (NDF) rises throughout the grazing season. As NDF increases, the plants' digestibility decreases. Adding concentrate improves the overall diet for the heifers at the end of the grazing season.

Dairy Heifers Utilizing Management Intensive Grazing Systems

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Dairy Heifers
Utilizing Management
Intensive Grazing Systems
Fact Sheet Series: 3 of 10

Animal Control & Movement

by Fay Benson
and Dr. Sam Leadley

The goals of biosecurity are to improve the farm's chances that heifers will live, stay healthy, and grow rapidly enough to calve at a profitable age. Farm procedures for animal control and movement must keep the safety of the animals and the safety of handlers foremost. It is important for the manager of a pasture system to realize animals have a different perspective of fences versus the walls of a confinement barn.

Safety First: Dealing with the Fear Factor to Handling Heifers on Pasture

A pasture manager needs to be mindful of the fear factor whenever handling animals. Pasture fences are not physical barriers like barn walls. The pasture animal, especially the recently-introduced heifer, sees the fence as a penetrable barrier. Only after the fear of electrical shock is established does the fence become a mental barrier. When handling heifers in a pasture system, fences are functional as barriers provided that the fear of electric shock is not eclipsed by other fear prompts, e.g., a predator or loud noise.

The Animals' First Experience Needs to be Good

- Make the introduction to grazing or handling a positive experience. For example, if a squeeze chute will be used during the summer, allow the animals to walk through with no action the first time. This will make subsequent use less stressful on the animals.
- Move slowly and be quiet around the animals.
- Do not yell; loud noise is very stressful for the animals.
- High pitched noises are especially stressful.
- If you establish a positive first experience, when the actions are repeated, it will be less likely to trigger a fear response.

Hungry Heifers Handle Easier

- Combine feeding and moving times. Whether moving animals to pasture for the first time or moving them to the barn for sorting, heifers will leave the primary site more easily if there is no food, and they will be less rambunctious if there is fresh food in the new site.

Photo: Fay Benson

A calm routine and some directional guidance helps heifers move from pasture to pasture or barn.

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Attraction Rather Than Prodding

- When moving animals in a confinement barn, it is usually done from behind the animals by prodding them to move forward. It is the opposite in a pasture system. The pasture manager will usually lead the animals to the new location from the front.
- Animals need to be attracted to move to the new site, either by grain or fresh pasture.

Training Heifers to a Sound Helps Manage Movement

- When heifers first arrive at pasture, it is usually recommended to feed grain to ease their transition diet.
- Using a heifer grain which contains molasses will help imprint any sound made during this feeding to a positive experience for the animals. Whether the sound is a vocal call or drumming on the empty 5-gallon bucket which carried the feed, this sound can be used throughout the summer to help manage movement.

Routine Equals Calmness to Animals

- Anyone who works with dairy animals has realized they like routine. When attempting to reduce fears for pasturing animals, this is especially important. The animal's routine not only includes activities, it also can involve sounds and vision.
- Pastured animals which are subjected to a new sound, such as a clamoring hay wagon or a loud truck, will be nervous and the fear of the unknown could eclipse their fear of the electric fence and cause them to bolt.
- When introducing a new activity to pastured animals, do so slowly and quietly.

Respect Herd Mentality

- Learn about the dynamics of a dairy herd at various ages.
- Dr. Temple Grandin, a well-known designer of livestock handling facilities and a Professor of Animal Science at Colorado State University, has written about "Flight Zones." She says an animal's flight zone will vary depending on how calm it is. The flight zone gets bigger when an animal becomes excited. The flight zone is also bigger when you approach "head on."
- Calm cattle are easier to move. If cattle become excited, it can take 20-30 minutes for them to calm back down.

For More Information

- **Cornell University PRO-DAIRY Program:**
  http://www.ansci.cornell.edu/prodairy/
- **Dr. Temple Grandin's teachings:**
  http://www.grandin.com/behaviour/principles/flight.zone.html

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Dairy Heifers
Utilizing Management
Intensive Grazing Systems
Fact Sheet Series: 4 of 10

Infrastructure: Fencing

by Fay Benson
and Dr. Sam Leadley

The goals of biosecurity are to improve the farm's chances that heifers will live, stay healthy, and grow rapidly enough to calve at a profitable age. Proper fencing is a key factor in managing the heifers' ecosystem, safety, and health as well as for the safety of their human handlers. A good system also allows for one person to manage the movement of the animals to any of the paddocks.

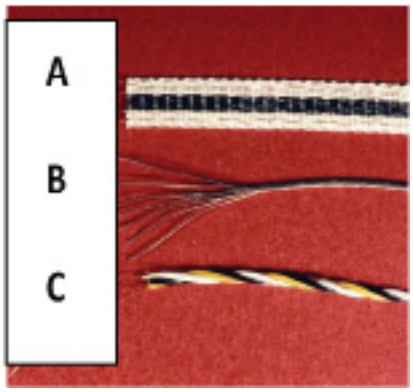
Fencing Standards for Dairy Heifer Grazing

Your fencing system should be up to USDA Natural Resource Conservation Service (NRCS) standards which can be found online at http://www.ny.nrcs.usda.gov/technical/practices/ or at your county Soil and Water Conservation District office. This fact sheet makes additional suggestions to reduce the risk to the heifer, the grazier, and the public.

A high-tensile fence system with mechanically pounded posts is the most appropriate fencing system for heifers. It combines physical strength and an electric deterrent, making it desirable for use with heifers that move with a herd mentality and are not familiar with fences.

Heifers from a large dairy have typically been raised in a confinement system. The switch to a grazing system is a big change for the animal. This quite often results in heightened physical activity which can lead to injuries and fence failures. The adjustment for the animal should be made in small steps:

1. Familiarize the animals to the electric fence - best done while the animals are still in an enclosed or confined area. Not all animals need to feel the electric shock. Once they are aware of the perceived danger of shock, their sensory system can feel the electric charge from a distance of 2 feet from the fence.
2. Once the animals are familiar with the electric fence, they can be let out 5-10 at a time to a small paddock of an acre or so with at least a 3-wire high-tensile system.
3. To help them see where the fences are, strips can be tied to the fence to make it more visible. A preferred method is to use 1-inch electric conducting vinyl fence tape (*A at right*) as one of the wires. Placing it at the heifers' eye height allows the animals to see the fence, even if they are running.



Fencing Materials

The electric fence charger is the heart of the entire system. It is recommended that grazers not skimp on quality. A unit that can produce 15-30 Joules of power is recommended for a heifer system. This size charger would require at least 4 ground rods.

Two new fence products that are allowed under the NRCS Fence Standards are "Polyflex" electric rope (*C above*) and plastic-coated hi-tensile electric fence (*at right*). Both of these fence wire types are larger in diameter and so are more easily seen by running heifers. Electric rope works well for temporary break wire use in a paddock. The plastic-coated wire is for permanent situations and can be used either as the perimeter wire at the eye height of the heifers or, for more visibility, all the wires of the perimeter fence can be of this type.

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Photo: Fay Benson

Fence Maintenance

- Use an electric fence tester to regularly measure output of fence charger.
- Regularly inspect fences for any problems that need attention
- Inspect fences after storms.
- Make repairs in a timely manner.
- Annually inspect and clean electrical connections.

Animal Handling Infrastructure

- Fencing systems may need to be supplemented by animal handling equipment, for example, to aid in sorting and applying fly control applications, a narrow squeeze chute is recommended (photo above).

For More Information

- **USDA Natural Resources Conservation Service**: http://www.ny.nrcs.usda.gov/technical/practices/

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Infrastructure: Water and Minerals

by Fay Benson
and Dr. Sam Leadley

The goals of biosecurity are to improve the farm's chances that heifers will live, stay healthy, and grow rapidly enough to calve at a profitable age. Decisions about facilities, nutrition, and paddock management need to be focused on achieving and maintaining a high level of vitality among the heifers. Meeting the heifers' water and minerals requirements is a critical component of good management.

Water Requirements for Heifers

- Depending on the age of the heifers being grazed, each animal will require 10-20 gallons of water a day. This requirement should be met in the design of the tub and waterline system.
- Another factor in designing water systems for heifers is the distance of the water trough from the grazing area. The water source should be within 1,000 feet of the grazing area. Any longer distances will result in lower efficiency grazing as the animals will waste time in walking to and from the area, and they usually stand around the water trough longer when the grass is farther from the water.
- If the water trough is further than 200 feet away, water times are done as a herd activity and so the water supply must be adequate for the entire herd or tipping of the water trough is likely.

An Example

- A group of 50 heifers requires 20 gallons a day/animal. Total water required = 1,000 gallons.
- With a 100-gallon tub size, 4-5 animals can drink at one time
- At any one time, an animal may drink up to 3 gallons in 2 minutes.
- The water trough is 500 feet from the grazing area, which means the entire herd will drink at once
- A flow rate of 7-8 gallons/minute is required to keep the water tank from becoming empty.

Other Water Considerations

With many animals congregating in one area, the soil is subject to denudation and, in wet weather, will become muddy, attracting flies as a breeding site.

To reduce the risk of this potential problem, producers can prepare each high traffic water trough site per the USDA Natural Resource Conservation Services pasture standards, or not use the site for more than 1-2 days at one time, to allow the vegetation to maintain soil structure.

Photo: Fay Benson

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Mineral Needs for the Grazing Heifer

Supplementary minerals are important when looking at various aspects of the present and future performance of grazing heifers*:

1. Daily gain — influenced by mineral deficiencies
2. Condition of legs and hooves
3. Immune status
4. Fertility: how easy is it to make the heifer pregnant after the summer grazing? Heifers with free access to supplementary minerals can become pregnant more easily.
5. Milk production in first lactation.

The most common method of providing supplemental minerals to cattle is through a protein/energy supplement or through a free-choice mineral supplement.

Free-choice supplementation requires additional equipment for delivery to cattle. Mineral waste and spoilage from moisture can be minimized with a number of commercially available mineral feeders designed to minimize mineral exposure to wind and rain.

Animal-to-animal variation in intake is greatest with free-choice mineral supplements. Some cattle consume no supplement while others may consume as much as four or five times the intended daily amount. This variation is reduced considerably when minerals are incorporated into protein/energy supplements that are provided on a regular basis.

For More Information

- **USDA Natural Resource Conservation Services:** http://www.ny.nrcs.usda.gov/technical/practices
- **Cattle Handling and Working Facilities, Ohio State University Cooperative Extension Publication 906**: Livestock handling facilities for small & large herds: www.ohioline.osu.edu/b906/pdf/b906.pdf
- * **Supplementary minerals for grazing dairy heifers:** http://www.microfeeder.com/swedish_trial_uk.PDF

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Immunity & Vaccinations for Grazing Heifers

by Fay Benson
and Dr. Sam Leadley

The goals of biosecurity are to improve the farm's chances that heifers will live, stay healthy, and grow rapidly enough to calve at a profitable age. A proper program for managing vaccinations is a key component for meeting these goals.

It is more profitable to prevent diseases than to treat infections. A good vaccination program promotes stronger immunity against infections. Every farm should have a strategic health care and vaccination program developed by the herdsperson and the herd veterinarian.

Considerations for All Vaccination Programs

- Vaccines will not work unless they are given to the heifers. Buying them and leaving them in the refrigerator does not equal immunity.
- Vaccines need to be selected to match the health risks on the individual farm. Consult with the herd veterinarian to select the ones that will give protection for your heifers.
- Vaccines must be handled properly. They all need to be kept cold, not frozen, and out of direct light.
- Modified live vaccines must be used within hours after they are reconstituted. Never save them to use the next day or next week.
- It is a best management practice to follow up initial inoculations with a booster injection for both killed and modified live vaccines. Booster injections are most cost-effective when given between two and four weeks after the initial inoculations.
- Timing of pinkeye vaccinations should be appropriate for the local grazing season. In the Northeastern US, pinkeye vaccinations are most effective when given in March and April – well ahead of the fly season.

Farmer-Administered Vaccines

- Learn the proper techniques for injecting vaccines – ask the herd veterinarian to demonstrate these techniques.
- Know the proper needle size to use based on animal age, route of administration, and injection site.
- Learn the proper method for reconstituting modified live vaccines.
- Do not contaminate vaccines by putting used needles into bottles.

Photo: Lexy Roberts Imaging

Work with your herdsperson and herd veterinarian to develop a strategic vaccination schedule.

General Suggestions for a Vaccination Schedule

2-4 Months of Age

- Administer a 7-way clostridium, two doses 2-4 weeks apart.
- At certain times of year, consider a product that includes pinkeye protection.

5-8 Months Old

- If not done earlier, administer the initial dose of a modified live vaccine for respiratory virus (IBR, PI3, BRSV with leptosporidia bacterin).
- Approximately 2-4 weeks later, booster this initial injection.

Before Breeding Heifers

- Booster earlier vaccinations with a modiflied live vaccine that covers respiratory viruses and leptospirosis.
- If using natural service, talk with your herd veterinarian about risk for vibriosis.

For Pregnant Heifers

- Booster earlier vaccinations with a modified live vaccine that covers respiratory viruses and leptospirosis.
- Consider using a vaccine product approximately two months before calving that will booster antibody levels in colostrum against bacteria and viruses.

Special Notes about Purchased Bred Heifers

- Not commingling heifers is a disease prevention strategy.
- Purchasing bred heifers from a source that will allow testing before you bring them to your farm is a good way to control disease.
- Your herd veterinarian can select the appropriate tests, e.g., BVD, salmonella, leukosis, to make before the sale is final.
- Given the risk of introducing new pathogens, consider isolating purchased animals for 3 weeks before integrating them into the herd.
- A bred heifer that tests BVD-negative can carry a persistently infected BVD calf. Test calves from all purchased heifers for BVD-PI status.

For More Information

- **New York State Cattle Health Assurance Program:** http://www.nyschap.vet.cornell.edu
- **Northeast Pasture Consortium:** http://grazingguide.net

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Fly Control for Grazing Heifers

by Fay Benson
and Dr. Sam Leadley

The goals of biosecurity are to improve the farm's chances that heifers will live, stay healthy, and grow rapidly enough to calve at a profitable age. Internal and external parasite control is a key factor in managing the heifers' ecosystem and health.

Controlling flies on pasture requires a daily regime of observation. Identifying when flies begin to affect the heifers is the time for action. Waiting until problems arise requires a much more time and money intensive solution.Work with your veterinarian to establish fly control protocols that fit your area. Proper protocols will help minimize the risks associated with heifer exposure to flies.

Risks associated with flies and fly control

- Mastitis and high SCC have been identified with the horn fly.
- Pinkeye, transmitted by face flies, can cause an animal to be blind in one or both eyes. Cattle with white around their eyes are more susceptible to pink eye.
- Thresholds of 50 horn flies or 10 stable flies can annoy a cow and prevent her from eating.
- Anaphylactic shock may follow vaccination - as a best practice, while giving vaccines, carry a bottle of epinephrine to treat this shock.

Tips for developing your pasture fly control program

- Begin your fly control program early. June is often the month when flies start to become a nusiance to animals on pasture. If controls are not in place by July, production losses can occur.
- Learn to identify problem flies and how to control them.
- Watch for heifers grouping together; this may be due to annoying flies.
- Heifers breaking into a sudden run may be due to numerous horse or deer flies causing a panic reaction or to cattle grubs or gad flies (http://entomology.cornell.edu for traps and control solutions).
- Monitor heifers for problem thresholds. Count different flies separately. Compare your separate counts for flies on the heifers' faces, backs and bellies to thresholds for action for each type of fly (*see reverse*).
- Stable flies attack the legs of animals on pasture and in confinement. Clean up rotting organic material, e.g, silage around blower or calf hutches, or round bales left in one place too long.
- Practice farm cleanliness. Clean up feed spills and manure piles. Face fly and horn fly: two of the three most common flies affecting animals on pasture, breed in undisturbed manure piles. Stable flies breed in moist rotting organic material.
- Water trough areas are a prime site for fly breeding. Troughs should sit on gravel pack for drainage; move troughs each time animals enter a new paddock.
- For immediate control, direct fly sprays can control certain flies for up to a week. Apply by handsprayer or install walk-through spray unit.

Photo: Fay Benson

At right is a simple cattle rub that applies fly repellant to the heifers when they come to eat.

Develop a pasture fly control program for your farm

- Avoid pasturing in mature grass with seed heads that can injure eyes.
- Use fly-control ear tags for pastured heifers.
- Cattle rubs with repellent or insecticide are an inexpensive, low-maintenance control for face and back flies. Follow manufacturer's use recommendations.
- Pour-on chemicals can be effective up to 4 weeks for protection vs. face flies and horn flies and for limited control of other pests.
- Ecological management of flies is more cost-effective than large doses of chemical treatments that reduce their own efficacy.
- Use chemicals as a last resort. The use of feed-through insecticides is allowed, but will harm many other insects, some of which are beneficial in controlling the harmful and bothersome insects.

Common Pasture Flies

Face Fly: Found on cows' faces; similar to common house fly • Breed in undisturbed manure piles • Feeding behavior around eyes spreads pinkeye • Enough flies can overwhelm pinkeye immunity encouraged by vaccine • Problematic at 10 flies on face at one time

Horn Fly: Found on cows' backs and bellies; half the size of face fly • Wings at 45° • Problematic at 50 per side

Stable Fly: Found on cows' legs on pasture & in confinement; similar size to face fly, spear-like mouth • Breed in moist, rotting organic material: straw bedding, at base of big bales on ground; poorly composted grass clippings • Problematic at 10 or more flies/cow on at least 15 animals often stomping their feet or standing in wet, muddy areas

Photos: University of Nebraska/Jim Kalisch

For More Information

- **Cornell University Department of Entomology:** http://entomology.cornell.edu/cals/entomology/extension/vet/
- **New York Livestock & Field Crop IPM Program:** http://www.nysipm.cornell.edu/livestock

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Avoiding Pasture Pitfalls

by Fay Benson and
Dr. Sam Leadley

The goals of biosecurity are to improve the farm's chances that heifers will live, stay healthy, and grow rapidly enough to calve at a profitable age. The common health risks for dairy cows apply to heifers. The young age of the heifers makes them more susceptible. Cautions and tips for prevention follow.

The best method to protect heifers on pasture is to prevent problems through good management. Below are areas for attention by grazing operations.

Before Turnout

- For extra proteciton, heifers going out on pasture for first time, a clostridial vaccine, e.g., Alpha 7 or Ultrabac 7, is warranted. The Alpha7/MB vaccine also acts as a pinkeye preventative.
- Bloat can result from overeating a legume pasture, for example, pasture rich with alfalfa, clover, trefoil, and vetch. One preventive tactic is to fill the heifers up with hay before turning them out to graze.
- Check pastures and pasture edges for plants that are poisonous for cows, e.g. Black Cherry growing in hedge rows can be deadly. Review the Cornell University Department of Animal Science "Plants Poisonous to Livestock" resource online at http://www.ansci.cornell.edu/plants/.
- An influx of estrogen from eating too much red clover may cause the udders of some heifers to swell.
- Check pastures for storm debris that might cause injury, such as Black Cherry limbs (wilted leaves contain cyanide).
- Don't let animals graze around machinery where batteries, antifreeze, or engine oil could pose a problem.

Worms

- To aid in control of worms in heifers, it is best to keep pastures exclusively for heifers. Older animals tend to have higher parasite loads to which they have become immune.
- Develop a strategic worming program that includes a pre-pasturing treatment with retreatment as needed.
- Among the worms that can impact cow health are round worms, lungworms, and flukes (most prevalent where snails act as an intermediate host).
- Protect young cattle (up to 24 months old), particularly first-calf heifers by keeping pasture areas dry to discourage flukes.
- To help monitor a pasture's parasite load, send a representative fecal sample through your vet to the Cornell Diagnostic Lab for a fecal count. Respond accordingly to results.
- Carefully read anthelmintic treatment labels. Some flukicides are only effective against adults. Rotate treatments to lessen resistance buildup.
- Well-fed animals have more immunity to parasites.

Photo: Fay Benson

Eating St. John's wort may have caused this heifer to have a photosensitivity reaction.

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Monitor Your Heifers

- Monitor the health and appearance of your heifers. Sub-clinical disease may only appear as an animal not quite up to par.

External Pests

- Pasture flies are a common problem. Horn flies can draw up to 33 ounces of blood from a cow in one day. See this Fact Sheet Series' flier on Fly Control for tips on using treated ear tags, sprays, tunnels and other means of control.

Pinkeye

- Fly populations can increase problems with pinkeye infections. See this Fact Sheet Series' flier on Fly Control.

Foot Rot

- Foot rot can cause permanent damage. Rough and wet ground can cause foot rot. Pasture debris can also influence injury and infection.
- Treat animals quickly. If more than five percent of your heifers show signs of foot rot within a short span of time, ask your veterinarian about treating the entire herd with antibiotics.

Toxicity and Deficiency

- Walk your pastures to be sure overgrazing is not putting your heifers at risk for eating toxic plant species that they generally avoid due to unpleasant taste.
- Do not dispose of Japanese yew bush clippings in grazing areas.
- Remove any pesticide, used oil, or other contaminant containers from pastures.
- Grazing animals may bloat on drought-tolerant legumes.
- Be watchful of animals turned out on pastures that have received an abundance of nitrogen or potassium fertilizer.
- Feed a high quality trace mineral to animals on pasture to assure proper selenium level.

For More Information

- **Northeast Pasture Consortium (NEPC):** http://grazingguide.net/
- **USDA NRCS Grazing Land Conservation Initiative Grazette:** http://www.ny.nrcs.usda.gov/technical/pasture_grazing/grazette/index.html

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Managed Intensive Grazing Heifer Checklist

by A. Fay Benson and Dr. Sam Leadley

Do your farm's managed intensive grazing procedures provide your heifers with the opportunity to grow into their genetic potential?

See how your measure up against this checklist of standards.
When making this evaluation, I like to use these scores:

1=never 2=seldom 3=often 4=usually 5=almost always.

The goal is to have practices that bring scores of 5.

_____ 1. I have a plan to transition heifers from a milk/grain ration to grass that avoids post-weaning slump.

_____ 2. I have selected grass species that will provide good quality feed throughout the grazing season.

_____ 3. I manage my paddocks by harvesting surplus forage and clipping so that the available grass is high quality.

_____ 4. I have arranged my paddocks, gates and lanes to make it easy to move animals into and out of paddocks. [Low stress on both humans and animals.]

_____ 5. I have reviewed with my nutritional consultant the ration for my replacement heifers to ensure an age-appropriate ration for each group.

_____ 6. I group replacement heifers by similar age and weight.

_____ 7. I have a written vaccination program to follow for all replacement heifers (IBR, PI3, BRSV, BVD–Types 1 & 2, lepto, and clostridials).

_____ 8. I treat replacement heifers for internal and external parasites.

_____ 9. I routinely monitor growth. I use weight, height and body scores.

_____ 10. If replacement heifers are moving from grazing to confinement housing and feeding, I have a transition plan to maintain consistent growth.

_____11. By means of daily visual inspections, I monitor heifer well being and the availability of high quality feed making timely changes to maintain good health and growth.

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Use this space to brainstorm ideas for improving your grazing heifer checklist scores.

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Custom Grazing Contract Sample

Adapted by Fay Benson from National Sustainable Agriculture Information Service publication: https://attra.ncat.org

This contract is for the purpose of custom grazing heifer calves belonging to _____ (referred to as "owner") on property belonging to or leased by _____(referred to as "grazier"). This contract takes effect upon the signing date and remains in effect until all the calves are redelivered to owners.

1. Owner will send grazier #__ to #__ head of approx. 500 lb. average weight heifers approx. on (date)_____ (final cattle numbers and dates to be agreed upon) and pick them up by (date: month/year)_____, dependent on pasture and weather conditions. Cattle owner will make monthly payments of $_____ to grazier to be paid by the (date) of each month beginning in May and through October. Balance of payment is due within 10 days of cattle redelivery date. Grazing rate will be $____/hd/day at < 500 lb ave in-weight, with sliding scale of $_____/cwt over 500 lb (ex: $0.755/hd/day will be used for cattle ave in-weight of 600 lb). Owner may supply bulls processed before delivery as necessary for breeding. Owner will pay grazier $____/hd/day for all bulls grazed.

2. Grazier agrees to provide adequate feed solely as pasture for owner's animals through end-(month) _____, except in a situation of severe drought.

3. Owner to provide round bales grass hay or corn silage to supplement pasture in the case of a severe drought, and by (month)_____ through redelivery date (month) _____. Grazier is responsible to feed hay supplied by owner. Whenever owner provides feed, grazing payment rate will be reduced by the actual cost of the feed (dry matter basis) delivered and fed (dry matter cost of feed not to exceed $_____/ton).

4. Owner will provide receiving and grazing season supplies:

External parasite control	7-way Blackleg plus Haemophilus somnus
Pinkeye control	Numbered ear tag
2 fly control ear tags	Wormer at receiving and at appropriate intervals
Modified live virus, 4-way	through the grazing season (per product use).

5. Owner to administer above supplies and provide equipment, with grazier's assistance and facilities (for processing heifers only; bulls to be processed before delivery) if requested.

6. Owner to provide mineral if he desires it to be fed.

7. Owner will pay for any veterinarian costs, antibiotics administered, and all ancillary expenses throughout the grazing period. If for some reason grazier must supply additional labor above and beyond normal animal care, it will be billed at $____/hr.

8. Owner will pay for all shipping, scale fees, and any buyers or sellers fee.

9. Owner will pickup any calf considered wild, chronically sick, or not maintaining the habits of the group.

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10. Owner will be able to pick up the cattle at any time if he feels they are not being taken care of.
11. Owner will acquire an insurance policy on the cattle covering fire, lightning, wind, and storm, or be responsible for loss due to the same.
12. Owner will acquire an insurance policy on the cattle covering theft, vandalism and liability, or be responsible for loss due to the same.
13. Owner agrees to assume all legal responsibility as owner of the animals and will not hold the grazier liable for any injury or death loss to the animals, except those due to negligence on the part of the grazier.
14. Grazier will provide the receiving facilities, treating chute, sick pen facilities, feeding equipment, grazing pastures, and shipping facilities.
15. Owner will provide heifers from his own herd that have been together for 60 days or more. This contract is not for the purpose of conditioning cattle gathered from different sources. Owner agrees to provide animals that have received Lepto and Brucellosis vaccinations, and that have been dehorned at least 60 days prior to receiving.
16. Graziers goal will be to put 1.5 lbs or more of gain per day on each heifer.
17. Grazier, or individuals under the supervision of grazier, will personally care for the animals on a daily basis and will not contract the work out to another party.
18. Owner's animals will be kept separate from other animals on the farm at all times.
19. In the event that the owner is unable to make payments due and owing to the graziers, then the grazier may hand pick heifers from the owner's herd and retain ownership of some to the dollar value required to cover the past due account. Value of heifers will be determined by actual value at the time of transfer of ownership from owner to grazier.
20. If a situation arises which owner and grazier cannot agree upon, refer to paragraph 9, or the disagreement will be refereed/arbitrated with a third party mutually chosen by each of owner and grazier.

Accepted by:

Owner:_____ **Date:** _____

Grazier: _____ **Date:** _____