

Virginia Whole Farm Planning:

An Educational Program for Farm Startup and Development

VIRGINIA
Beginning Farmer & Rancher
COALITION PROGRAM

Sustainable Farming Practices: Animal Husbandry

The purpose of the *Sustainable Farming Practices: Animal Husbandry* module is to help beginning farmers and ranchers in Virginia learn the basic fundamental production practices and concepts necessary to make informed decisions for whole farm planning.

This is one of five modules designed to guide you in developing the whole farm plan by focusing on the following areas:

- Introduction to Whole Farm Planning
- Marketing
- Whole Farm Business Management and Planning
- Land Acquisition and Tenure
- Sustainable Farming Practices

Each module is organized at the introductory to intermediate stage of farming knowledge and experience. At the end of each module, additional resources and Virginia service provider contact information are available to help continue the farm planning process.



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Preface

Welcome to the Virginia Beginning Farmer and Rancher Coalition Project's Whole Farm Planning Curriculum!

How to use this Workbook. This material is organized into five modules that may be used as stand-alone resources to address specific areas of whole farm planning. However, we suggest that the modules may be most beneficial to beginning farmers and ranchers if they are used as a series of educational sessions designed to encourage reflection, goal setting, and steps to organize a new farming enterprise.

Advice for Beginning Farmers. We encourage you to begin by exploring the Introduction to Whole Farm Planning module. This resource will offer you the opportunity to examine your personal and business goals and priorities. Once you have completed this introduction module, you are welcome to explore the other resources in a sequence that best addresses your questions and ideas for your farming enterprise.

Advice for Service Providers. Thank you for choosing to use our curriculum in your whole farm planning educational program. As an experienced education service provider, we encourage you to adapt these resources to best serve the needs of people you work with. The materials are intended to be used as stand-alone pieces or in various combinations of instructional formats, as needed by your program participants.

Modules. Each module is organized at the introductory to intermediate stage of farming knowledge and experience. At the end of each module, additional resources and Virginia service provider contact information are available to help continue the farm planning process.

Module I. Introduction to Whole Farm Planning – The purpose of the first module is to help beginning farmers and ranchers in Virginia make informed farm planning decisions by introducing them to the whole farm planning process.

Module II. Marketing – The marketing module is designed to help beginning farmers and ranchers develop and implement their goals for market analysis, product establishment, and development of viable marketing channels.

Module III. Whole Farm Business Management – In this module, you will develop and implement early financial and resource management goals as part of the whole farm plan.

Module IV. Land Acquisition and Tenure – This module will help beginning farmers and ranchers to develop and implement farm tenure and transfer goals as part of the whole farm plan. Established farmers who are planning for the transfer of their farm may also find this module useful.

Module V. Sustainable Farming Practices – The last module is designed to help beginning farmers and ranchers develop and hone their skills and knowledge in the fundamental production practices associated with establishing and growing a wide range of plants and animals. This module is divided into five sections, each focused on specific aspects of production agriculture: 1. The Place and the Products; 2. Farm Biodiversity; 3. Organisms in the Ecosystem: Beneficials, Pests and Diseases; 4. Soil Management; 5. Animal Husbandry.

Why this Curriculum? The Beginning Farmer Situation

Emerging trends in U.S. agriculture suggest that in order to enhance our agricultural resource base, we need to establish, sustain, and preserve our farms, farmers, and farmland. A growing number of nongovernmental groups, cooperative extension services, and U.S. Department of Agriculture agencies are working to improve the viability of new farms and the economic, social, and environmental fabric in which they are entrenched (Niewolny and Lillard 2010). These initiatives are responding to the overwhelming concern about the steady decline in the number of individuals entering into agriculture, coupled with an increase in the number of exiting farmers and ranchers (Ruhf 2001).

The current population of beginning farmers and ranchers is diverse and varies by location across the nation (Ahearn and Newton 2009). Beginning farmers on average operate smaller farms — in size and gross dollars — compared to established farmers (Ahearn, Yee, and Korb 2005). While beginning farmers tend to be younger than established farmers, about a third of beginning farmers are at least 55 years of age or older (Ahearn and Newton 2009). Beginning farmers, along with limited-resource and socially disadvantaged farmers, make up at least 40 percent of all U.S. farms (Nickerson and Hand 2009).

The Bureau of Labor Statistics (U.S. Department of Labor 2009) recently reported a large job decline for farmers and ranchers and projects an 8 percent decrease in the number of farmers and ranchers between 2008 and 2018. The age distribution of today's farmers and ranchers is also a critical issue. According to the "2007 Census of Agriculture" (USDA-NASS 2009a), the average age of a principal farmer is 57 years old. More than 63 percent of all established farms in 2007 were headed by a principal farmer age 55 or older; only 5 percent of all principal farmers were 35 or younger (Ahearn and Newton 2009). The aging population of U.S. farmers and ranchers is expected to increase by the next census while the number of young farmers is likely to decline.

The 2007 Virginia census also illustrates a significant need to establish and retain beginning farmers and ranchers based on the economic structuring of the industry. Agriculture provides \$55 billion in income per year and about 357,000 jobs, making it an important industry for the commonwealth. Of the 47,383 farms in Virginia, 92 percent reported less than \$100,000 in

sales, while 8 percent of the total farms accounted for 85 percent of total farm sales (USDA-NASS 2009b).

Virginia is also among the most expensive states for farmland, making it difficult for aspiring agriculturists to purchase suitable acreage. The average farm comprises 171 acres, while 77 percent of the total farms in Virginia operate on fewer than 180 acres (USDA-NASS 2009b).

Little is known about the 13,206 principal farmers in Virginia who have been on their current farms or ranches for nine or fewer years. The majority of all farmers in Virginia are white males, though the number of minority farmers such as women and African Americans is on the rise (USDA-NASS 2009b). Production crops and practices differ regionally and culturally, especially between rural and urban centers. Consumer demand for local and regional food, however, is growing at an increasing rate throughout Virginia.

Background on the USDA Beginning Farmer Rancher Development Program (BFRDP)

Beginning farmer education for adult and young audiences in the United States can be generally traced back to the advent of the 1862 and 1890 Morrill Land Grant Acts. But for the first time, the Food, Conservation, and Energy Act of 2008 (the 2008 Farm Bill), appropriated \$75 million for fiscal year 2009 to fiscal year 2012 to develop and offer education, training, outreach, and mentoring programs to enhance the sustainability of the next generation of farmers.

The reasons for the renewed interest in beginning farmer and rancher programs are:

- The rising average age of U.S. farmers.
- The 8 percent projected decrease in the number of farmers and ranchers between 2008 and 2018.
- The growing recognition that new programs are needed to address the needs of the next generation of beginning farmers and ranchers.

According to the 2008 Farm Bill, a beginning farm is considered one that is operated by one or more operators who have 10 or fewer years of experience operating a farm or ranch. In 2007, approximately 21 percent of family farms met that definition.

Since its inception, BFRDP has funded many projects to train, educate, and provide outreach and technical assistance to beginning farmers on one or more of the following topics:

- Production and management strategies to enhance land stewardship by beginning farmers and ranchers.
- Business management and decision support strategies that enhance the financial viability of beginning farmers and ranchers.

- Marketing strategies that enhance the competitiveness of beginning farmers and ranchers.
- Legal strategies that assist beginning farmers with farm or land acquisition and transfer.
- Other priority topics to enhance competitiveness and sustainability of beginning farmers and ranchers for the next generation.

Background on the Virginia Beginning Farmer and Rancher Coalition Project

The Virginia Beginning Farmer and Rancher Coalition Program aims to improve opportunities for beginning farmers and ranchers to establish and sustain viable agricultural operations in Virginia through the development and enhancement of whole farm planning programs, online resources, and farmer mentoring networks.

Beginning Farmer Audience

This curriculum is aimed at addressing the needs of the spectrum of beginning farmers and ranchers in Virginia. We recognize a diversity of farming experiences, backgrounds, and aims held by Virginia's beginning farmers and ranchers. Many groups find it useful to look at the stages of commitment, decision-making, and skills that farmers pass through as they begin a career in farming. Drawing on the work of Sheils (2004), the following categories are a helpful guide to understanding this pathway.

Prospective or explorer farmers – Individuals interested in starting a farm or ranch. This includes next-generation farm family members as well as those who do not come from a farming background.

Startup farmers – Individuals who are in the early stages of their agricultural operation, often within the first one to three years of farming or ranching.

Re-strategizing farmers – Farmers who are making changes to their operations after farming for approximately four to seven years. These individuals usually have increased decision-making responsibility and commitment to farming.

Establishing farmers – Farmers who are expanding, diversifying, and stabilizing within years eight to 10 of the beginning farmer period.

Transitioning farmers – Individuals who are family farm members who have decision-making roles on the farm without having primary farm operator status.

These categories of farmers are a modification of those referred to by the New England Small Farm Institute. For the full reference, see "What Does the Term 'Farmer' Mean?" (Sheils 2004).

Preface written by Kim Niewolny and Matt Benson, Department of Agricultural and Extension Education, Virginia Tech.

Acknowledgements

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The Virginia Beginning Farmer and Rancher Coalition comprises innovative farm businesses and organizations from across the Commonwealth. These include:

AgrAbility Virginia
Agricultural Development, Fauquier County
Appalachian Sustainable Development
Attimo Winery
Bracketts Farm
Farm Service Agency, U.S. Department of Agriculture
Fauquier Education Farm
Grayson LandCare
Hethwood Market
Laurel Farm
Local Food Hub
Mountain View Farm and Vineyard
Natural Resource Conservation Service, U.S. Department of Agriculture
Piedmont Environmental Council
Rural Development, U.S. Department of Agriculture
SustainFloyd
Virginia Association for Biological Farming
Virginia Cooperative Extension
Virginia Department of Agriculture and Consumer Services
Virginia Farm Bureau Young Farmers
Virginia Farm Credit
Virginia Forage and Grasslands Council
Virginia State University
Virginia Team Ag Ed
Virginia Tech
VT Earthworks
Young Farmers of Virginia

Steering Committee

The Steering Committee consists of seven committed individuals from the Coalition who represent both farmer and service provider perspectives in Virginia. This elected committee is responsible for guiding project activity to best address the expressed needs of the Coalition.

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www.vabeginningfarmer.org



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Planning to Teach this Module

Primary resource materials for this module:

Clark, A (ed.). 2007. Managing cover crops for profitability. Sustainable Agriculture Network, Handbook No. 9). 248 pp.

Magdoff & Van Es. 2009. Building Soils for Better Crops, 3rd Edition

Magdoff, F. 2007. Ecological Agriculture: Principles, practices, and constraints. Renewable Agriculture and Food Systems 22:109-117.

Tugel et al. 2000. Soil Biology Primer. Soil and Water Conservation Society

Virginia Association for Biological Farming information sheets on soil and cover crops. www.vabf.org, click on Library and Resources

In preparation for the planning activities used in this module, we recommend participants...

Contact your Natural Resources Conservation Service (NRCS) district office to find out what soil series (types) are present on your farm, and learn more about your soils at the NRCS web page, Official Soil Series Descriptions, <http://soils.usda.gov/technical/classification/osd/index.html>.

Introduction

Assess where you are:

In the *Introduction to Whole Farm Planning Module* you conducted an inventory of your farm's land and infrastructure resources, and your production and stewardship goals.

Reflecting on your responses, does your previous discussion of the sustainable farming practices of your plan still accurately represent your whole farming plan?

Assess where you want to be

What are your particular questions regarding your planning for your sustainable farming practices?

What do you need to get there?

Sustainable Farming Practices

Individuals who complete this module

The *Sustainable Farming Practices* module is designed to....

The module includes concepts, worksheets, and examples to help you assess your resources and preferences for successful start-up planning.

Participants will understand

-
-
-
-

Portfolio Pieces Developed in this Module

-
-
-
-

Sustainable Farming Practices: Animal Husbandry

Unit 1: Land preparation

- Assess property for suitability of chosen animal species
- Identify hazards within the facilities or pastures (eg: poor construction, old metal equipment, wells, predators)
- Choose fence that is adequate for containing animals in, predators out
- Create lanes or pasture connections that will allow for animals to be brought back to a handling area for processing, treatment or breeding
- Invest in a handling system that will meet your needs to process your livestock. Consider possible sharing of portable systems
- Water sources identified and laid out to provide for moving the location to reduce pasture damage
- If necessary, rehabilitate old cropland with forage species that will tolerate grazing. Be aware that some types of forages can have other issues (ex: fescue)
- Document pasture use, number of animals, length of time animals grazed, regrowth for future information on management of the area
- Decide whether to include grazed/harvested cover crops for animals as part of a cropping system

Teaching & Learning Tools

Activity:

Walk intended pasture area with an experienced producer or extension professional to individually assess and gather ideas for use and design.

Read:

Refer to a fence building guide to plan your fence type and the materials needed to construct. Planning and Building Fences on the Farm (University of Tennessee, PB1541)

<https://utextension.tennessee.edu/publications/documents/pb1541.pdf>

Read:

Livestock Water Development – Ohio State Fact Sheet

<http://ohioline.osu.edu/anr-fact/0012.html>

Read:

USDA resources for managed grazing
<http://afsic.nal.usda.gov/grazing-systems-and-alternative-livestock-breeds/grazing-systems-and-pasture-management>

Activity:

Seek out producer groups to join membership. This will provide personal contacts as well as access to seasonal meetings that focus on topics that can include pasture design and management.

Unit 2: Animals and materials needed

- Identify within the business plan the market that you desire to provide a product
- Consider the challenges and benefits to breeding stock vs. market stock. Some farm resources might be more appropriately matched with seasonal stocking of the farm, and market stock can be integral in this approach
- If raising breeding stock and market stock, different management groups will be necessary. This makes pasture utilization and planning more complex
- Do you desire to raise purebred stock or grades/crosses? Can you sell your stock for similar prices that you are purchasing them for? Some breeders have a long established reputation and offer marketing options for their customers that a newcomer may not be able to provide. Keep this in perspective. It may be more financially stable to start with a herd mix of registered and grades if you are intending to sell market animals first and then move towards a purebred breeding stock market as you develop your breeding program.
- What physical resources do you need for various species? What are your physical resources to be able to work with large or small livestock animals?
- Select animals appropriate for your market, and your management system. Purchase animals from individuals or farms/ranches that have a similar management style as you would like to adopt. For instance, do not buy breeding stock from a confinement operation that houses stock in barns if you are planning on raising your animals on 100% pasture/forage
- What types of shelter will your animals require? What types of natural shelter exist on the farm already, what kind can you cultivate and what needs to be constructed as a temporary or permanent structure?
- What are your feed resources? Forage adequate? How will forage be stored for maximum quality and quantity? If feeding grain, is there an ability to purchase in bulk? Contact local feed mills to learn their minimum orders, and availability of feeds for the type of animals you are raising
- How will you feed your animals when necessary? Hay feeder types and silage/grain feeding have many different methods. Have you investigated the lowest labor methods that exist?
- Will you need equipment to move feed and water? What are the small equipment items that are necessary?

Teaching & Learning Tools

Activity:

Contact your local extension office to inquire about producers in the area. Determine if you will have more of the same for an unsaturated market, or if you should develop a different product as there is already enough produced within the area.

Read:

Maryland Small Ruminant webpage if you are interested in raising small ruminants
www.sheepandgoat.com

- Consult your veterinarian before you obtain animals to determine disease concerns and testing options before you bring animals home. If you already have some animals, what diseases in this species are most concerning? What would you do if you found these diseases in the herd/flock? Develop a disease management plan and discuss with your veterinarian, creating a Veterinarian-Client-Patient-Relationship (VCPR). Participate in a meat animal Quality Assurance program to gain more techniques and strategies to keep your animals healthy and provide safe food products
- Also working with your veterinarian or another skilled mentor, develop a first aid kit and necessary items to have on hand for your type of animal enterprise
- Consider some of the third party review programs that advocate humane farm animal production. Some provide grant opportunities for animal handling and facilities, in addition to creating a link to consumers. Alternatively, you can learn what aspects of humane animal handling are of a concern to address, and implement them on them on your enterprise even if you do not participate in the programs

Teaching & Learning Tools

Unit 3: Animal Evaluation and Selection

Teaching & Learning Tools

Unit 4: Aquaculture

- “Fish farming” is a growing segment but does face significant challenges. Before deciding to begin an aquaculture enterprise, know your market (what are you selling to whom?) and be sure to check on federal and state regulations, disease challenges, and any local opposition to an aquaculture business.
- Decide which species. Farmed fish include catfish, trout, salmon, tilapia, hybrid striped bass, crawfish, mollusks and shrimp. Within many of these families, there are multiple species from which to choose. Part of the decision is based on climate: which fish will do best in your area? How much fresh water is needed at what rate (trout need more moving water than catfish, for example)? Harvest methods also vary by species, which will play into the decision, along with labor requirements and availability.
- Decide how you will stock your ponds: start with brooders? Eggs? Fry? Fingerlings? Much of these decisions will depend on species and environment (pond vs tank vs cage).
- Decide on size of the enterprise: how many and how large will your ponds/tanks be? This will be a function of land availability and stocking rates. Stocking rates vary depending on species, production system (growth stage of fish, dissolved oxygen levels, etc.) and management expertise. The higher the stocking rate the greater the chance of health and/or nutritional problems. Creativity can be useful. A farm in Nebraska repurposed a hog barn into a crawfish enterprise by setting up tanks in the hog pens.
- As with other animals, feed is the largest cost of production. Feed a good least-cost commercial diet balanced for the particular species. Form follows function: catfish feed, for example, is available in sinking, slow-sinking or floating varieties, depending on management and weather.
- Management to prevent disease is key. Water quality, oxygen availability, correct pH and avoidance of pollutants are critical factors, along with stocking rate. Minimizing stress to improve disease resistance is extremely important since there are essentially no vaccines available and treatment of a disease outbreak is expensive and difficult.

Teaching & Learning Tools

[need to add good guides for each species...]

Read:

Overview of Aquaculture in the United States. Center for Epidemiology and Animal Health, Fort Collins, CO. USDA (1995)

Refer to:

Virginia Aquaculture Association

http://www.virginiaaquaculture.org/Home_Page.html

Refer to:

VCE Aquaculture resources

<http://www.ext.vt.edu/news/mediakits/aquaculture.html>

Unit 5: Irrigation or water needs

- What do you need water for? A few head of cattle? A fish pond? Irrigated hay fields? Determine how much and what quality are needed then assess existing and potential sources.
- What water sources are already available? If you plan to use springs, streams or existing ponds, check that you are in compliance with applicable regulations and ownership. Pumping from springs and streams is legal in Virginia with a few caveats but many springs have multiple owners/users. There is a strong push to fence animals out of streams and there may be cost-share programs to help that process. If there is an existing well, test it for water quality. A good source of clean water is a must for optimum animal performance. If you need to drill a well to provide water, make sure that cost is included in your initial plans.
- How will you ensure animals have all the water they need? It can be as simple as running a garden hose from the house to a water tank or it can be a system of frost-proof automatic waterers. There is almost always a tradeoff of labor and capital investment. If you plan to use a rotational grazing system water availability will be one of your major constraints: every paddock must have a supply of water, temporary or permanent.
- Make sure you have a backup plan. The electricity goes out, a stream dries up, and your animals will be in trouble. If you have only a few smaller animals the backup may be five-gallon cans but a single lactating cow could drink up to 20 gallons a day in July.

Teaching & Learning Tools

Read:

DEQ Water Supply and
Quantity

[http://www.deq.virginia.gov/
Programs/Water/WaterSupply
WaterQuantity.aspx](http://www.deq.virginia.gov/Programs/Water/WaterSupply/WaterQuantity.aspx)

Unit 6: Livestock and Poultry Housing and other infrastructure needs

- For your location, what are the basic animal health and welfare needs required of housing? Can older animals be housed outdoors with a windbreak? Is this relatively free from mud during wet weather periods?
- If you have smaller animals and sheds are used, can all animals congregate within them? Are there restrictions or potential animal injuries based upon animal pecking orders that may occur?
- For all shelter areas – are they easily accessible during inclement weather to monitor animal health? Do they have safe and secure footing? Can they be bedded, if necessary, with ease?
- For catching animals to perform vaccinations, deworming, treatments, pregnancy checks, shearing, etc; is there an appropriate handling area? Is it safe for the animals (footing, space, free from hazards that can cause bruising or cuts)? Is it appropriate for their conformation and behavior (gentle “s” shaped curves instead of right angles to turn)? Is it safe for the humans that are working the animals (chutes with convenience doors for vaccinating, at a location that doesn’t involve strenuous exertion to deliver vaccination or restrain animals)?
- Quarantine area established that has access to shelter, feed, water and appropriate fencing materials, located in a non-central area to reduce risk of transfer of disease to other animal groups.
- Feed storage – hay and straw stored out of the elements? Is a barn necessary, or can you adapt a roof or tarping system? Grain and supplements in an area that is able to be closed/locked from animal intrusion or security, dry to preserve quality, enough room to mix products if necessary? Medicines and treatments can also be stored near this area as long as temperatures are within the recommendations for the products.
- Washing area – water available to wash items to maintain animal health and cleanliness of facilities.
- Water availability – is there adequate water flow with current well? Has it been tested free of contamination?
- Equipment storage – to preserve and extend the length of your investments! Remember to think of all things you might

Teaching & Learning Tools

Read:

Safe handling of livestock, understanding animal behavior

www.grandin.com

Read:

Designing a cattle handling system, Ohio State Bulletin 906, “Cattle Handling and Working Facilities”. This document provides more behavior discussion and design plans

<http://ohioline.osu.edu/b906/index.html>

need to store – feeding equipment, handling equipment, fencing materials, tools, management equipment, large and small machines used for feed handling and manure management.

- Salable product storage – freezer or refrigerator located away from animal production materials to preserve integrity of product.
- Processing area – egg wash, milk handling, on farm meat animal processing
- Manure handling (perhaps compost?) located both convenient, and out of the way
- Fencing thoughtfully laid out to allow for moving animal groups with minimal set up/labor.

Teaching & Learning Tools

Unit 7: Feeding/nutrition

7.1 Introduction to animal feeding and nutrition

- Animals need to have the following components in their diet: water, carbohydrates, fats, proteins, minerals and vitamins
- Producers should be familiar with the components of the feedstuffs that are provided to livestock animals. Feed analysis tests should be submitted to generate this information, or determination of the feed values collected through feed composition tables (most closely accurate if feed is a monoculture).
- Understand that all feed consumed isn't all used for growth or fat accretion. Percentages of the feed digested is excreted in feces, urine, respiration, and metabolized for temperature maintenance.
- Animals that are mature can be provided with less nutrient dense feeds, and many often fatten upon these types of feeds, as they have already satisfied the nutrition needed for growth. Additional feed resources are needed during late gestation, lactation, egg laying, wool production, and/or finishing.
- Select animals that will be successful within your methods of raising and feeding. Animals develop upon a growth curve and accretion of tissue types is generally similar across all species – skeleton, muscle and fat – and these accrete in this order. Therefore, an animal on a good plane of nutrition will accrete most of its muscle mass before beginning to accrete fat storage. Breed and animal genders also differ in terms of the chronology, and to an extent the physiology of this accretion.

7.2 Ruminants – cattle, sheep and goats

- Providing feed resources to ruminants to allow for coarse fiber utilization with minimal concentrate input (especially for breeding stock that is not considered as an animal to marketed for meat)
- Main feed provided in most cases is forage or roughage. There is a limit to the amount an animal can consume in a feeding period, so quality factors of the forage will determine if adequate nutrition is obtained from this roughage. If a concern, testing for feed components can be a useful tool to control costs and maintain nutritional balance when attempting to enhance nutrition by adding concentrate feeds.

Teaching & Learning Tools

Read:

Body Condition Scoring guide:
<http://www.extension.purdue.edu/extmedia/as/as-550-w.pdf>

Read:

A Beef Cow Nutrition Guide published by Kansas State University is available at <http://www.ksre.ksu.edu/library/lvstk2/c735.pdf>

Activity:

Consult with local feed mills and if you have significant numbers, consult a nutritionist.

Read:

There are many guides to feeding small ruminants on the Maryland Sheep and Goat page, but a useful spreadsheet called Ration Evaluator created by Dr. Susan Schoenhein on this page will help balance a ration and determine the daily cost of the feeds.
www.sheepandgoat.com

- Make feed transitions over a length of time (few days to a week) to minimize digestive upsets. Supplement with more concentrated feeds when greater demands are upon the animal (late gestation and early lactation). If weaning nursing offspring, keep on forage and gradually introduce concentrates if they are not currently fed concentrates.
- Make weekly observations of body condition scores. Also observe manure to determine if appropriate nutrient utilization is occurring.
- Provide a locally recommended mineral free choice. You can obtain in bulk if this makes purchasing easier. However, if blended with vitamins be aware that they are organic and will degrade over time.

7.3 Non-Ruminants – hogs and poultry

- Pigs and birds are omnivores and as such can utilize almost any feedstuff to some extent. They cannot, however, efficiently digest forages and other high-fiber diets so pigs and poultry raised on pasture still need concentrate (grain) supplements.
- To obtain optimal production and health, it is important to feed a daily ration that meets all the nutrient needs of the animal, including quantity. Labels on commercial feeds will give you that information. If you plan to make your own feed, be sure to get a good recipe from your extension agent.
- A traditional basic diet for non-ruminants includes corn, soybean meal, salt, di-calcium phosphate, trace minerals, vitamin premix, and water. Quantities of each ingredient will vary depending on the species and life stage. Feed companies often substitute other grains for some or all the corn, other protein supplements can replace the soybean meal, and the salt, minerals and vitamins may all be included in a single premix but the end result should be a balanced diet that meets the needs of the animal.
- Young, growing pigs and poultry do very well when given unrestricted access to feed that has been formulated to meet their nutrient requirements. Hand feeding or limit feeding these animals will cause them to grow more slowly.
- Breeding animals may have free access to forage or other roughages but usually need to be limit fed concentrates as they will quickly become obese if fed too much. Lactating sows and laying hens are the exception. They have a higher nutrient demand and must be fed accordingly. Calcium and

Teaching & Learning Tools

Read:

The Pork Information Gateway (PIG) has a wealth of information on swine nutrition. Two factsheets that may be of particular interest include “Feeding for Niche Swine Production”:
<http://www.porkgateway.org/FileLibrary/PIGLibrary/Factsheets/a6464v1-0.pdf>

Read:

“Example diets for swine”:
<http://www.porkgateway.org/FileLibrary/PIGLibrary/Factsheets/a6451v1-0.pdf>

Read:

Phil Clauer’s websites at Penn State have a wealth of information on poultry production. One link takes you to “Nutrition for Backyard Chicken Flocks”:
<http://www.aces.edu/pubs/docs/A/ANR-1317/ANR-1317.pdf>

phosphorus become very important since milk and eggs both have high levels of these important minerals.

7.4 Pasture and forages

- With poultry and hogs as an exception in this category considering forage as a major portion of the diet, it is wisest to start with good to excellent quality forages FIRST to feed to your animals, and then supplement with more expensive grain and supplement products
- Test pasture resources if you are unsure of the quality that exists (extension personnel can be helpful here!)
- To obtain the greatest amount of use of forages, develop a rotational grazing plan. Use strategies of different species, cutting/mowing for hay to allow for a break of 45 to 60 days between grazing times on any pasture. This reduces parasite exposure
- Learn strategies like FAMACHA (for sheep and goats) for controlling and monitoring parasite levels within a herd/flock while reducing anthelmintic use and parasite resistance to certain chemical dewormer families.
- Consider grazing hay fields as an alternative to harvesting hay crop when weather or time resources have restricted ability to harvest a quality crop. A side benefit is the fertilization of the field by animal activity
- Plan for months when grazing is not possible to have forage stored to provide for what the animals will consume, what they will waste (depends upon your storage and feeding methods) and how long they will need stored forage. Plan for at least 10% more in the event of a weather challenge
- If pasturing hogs and poultry, recognize that they still need a concentrate supplement.
- Hogs can be quite damaging physically to a pasture. If you do not want to repair major damage, plan to frequently rotate hogs. Plan to have hogs move as well to control parasite infection.
- If pasturing poultry, some types (layers) can work well to follow other species (cattle or sheep) and break down manure into smaller units. Be aware of some diseases that poultry carry that might need more than a year to break the cycle (ex: blackhead in turkeys) and plan to have poultry in different areas in different years.

Teaching & Learning Tools

Activity:

Test your soils to determine if any amending of the soil needs to be done. Samples can be evaluated at the Soil Testing lab

<http://www.soiltest.vt.edu/index.html>

Activity:

To test forages, or identify plant or insect pests, contact either your local extension personnel or the diagnostic laboratories. A list that describes each is located at <http://www.anr.ext.vt.edu/diagnosticlabs.html>

Activity:

Participate in a pasture walk organized by local producers to further your understanding of managing pastures and animals

Unit 8: Equipment/machinery

- What equipment/machinery is needed will vary considerably, depending on land resources, financial resources, animals raised, marketing strategy, etc.
- In general, there is a trade-off between machinery and labor but the more complex the machinery the more likely it is to need maintenance and repair.
- As with most things, it is best to start simple, and it often is advantageous to consider leasing and/or sharing larger pieces of equipment.
- Consider safety and reliability as well as initial investment and long-term costs in choosing specific equipment and machinery. Farm accidents are one of the leading causes of injury and death in the United States. Finding a good deal on a piece of machinery then spending an inordinate amount of time repairing it is probably not a good investment.

Teaching & Learning Tools

Read:

A short factsheet on equipment maintenance:

<http://extension.umass.edu/cdle/sites/extension.umass.edu.cdle/files/factsheets/pdf/Equipment%20Maintenance%2008-41.pdf>

Unit 9: Integrated and biological pest and parasite management

- Historically, animals were tended and brought to the feed resources, then left and allowed for recovery of those resources. When we developed boundaries and kept animals for extended periods of time in areas that were proximal to their waste products, internal parasites were given an advantage as this allowed for more consumption of larvae. Dewormers were developed that allowed for control of these parasites. However, the parasite has evolved, and we are finding in many species that the effectiveness of dewormers is diminishing as the parasite genetics are passed on for resistance to most of the products available for parasite control.
- Animals have in our most recent past been dewormed upon a management schedule. Certain events or particular days in the year were targeted as the deworming time, and typically all animals in the group would be treated at one time. These methods have only persisted in increasing the parasite selection for genetic resistance, and we need to utilize different methods if the current deworming products are to remain effective on your farm.
- Current practices of internal parasite management include the following: identification and level of infection (fecal analysis), level of resistance to infection, additional signs of infection (pale membranes, rough hair coat, loose manure, parasites passed in feces, coughing). One needs to remember that as long as you have your animals in a dynamic environment, you will NEVER have a completely parasite free animal. Animals also develop resistance to parasites as they mature, so while they may have a breeding population of parasites in their bodies, their own immune system suppresses the success of the breeding process.
- Sustainable animal producers are transitioning to a method of scheduling assessment of parasite infection, rather than schedule deworming events. In the flock or herd, animals can be treated individually, instead of the entire herd/flock. This benefits two-fold: one, money is saved on the treatment as well as the labor/equipment used to treat the animal; as well as maintaining genetic diversity in the parasite population. Retain careful records on animals that are treated – if you notice a trend of a few animals needing continual treatments, strongly consider culling these from your herd/flock as well as their

Teaching & Learning Tools

Activity:

Learn the FAMACHA method of parasite management University of Georgia publication for parasite control in cattle, as well as products for control of internal parasites:

http://www.caes.uga.edu/applications/publications/files/pdf/B%201086_2.PDF

Activity:

Learn how to identify parasite eggs in fecal samples

http://www.microscope-microscope.org/applications/animals/fecal_analysis.htm

offspring. These animals are generally the greater contributors to the number of parasite eggs placed on a pasture or paddock area.

- Treat for parasites as needed, not on a schedule.

Unit 10: Slaughter facilities

- Familiarize with local, state and federal regulations for the sale of animal products.
- Custom processing might be performed on farm – limit stress on animal, trucking; however might incur more challenges to consider with disposal of offal, increased cost of processing, marketing abilities of the final product
- State/federal inspected facilities offer more marketing options. Visit with other producers in your area to identify a plant that you could approach to work with your type of animals and product line. This is especially true if you are attempting to market unique cuts that the plant does not usually create (ex: flat iron steak, tri-tip)
- Recognize that many facilities have filled harvest dates, especially in the late summer/fall. Schedule well in advance!
- Determine costs of processing: some may have one fee, others may itemize each cost: harvest, processing per animal or per pound HCW, wrapping/packaging materials, boxes, splitting or quartering carcasses for different customers, offal handling/disposal.
- May consider slaughter facilities that have additional certifications and/or processing options (ex: Animal Welfare Approved to add to label, meat jerky products) in order to enhance your product or branch out for other options
- If considering erecting your own slaughter and processing facilities, have you researched:
 - Regulations of construction including types of materials and their costs?
 - Availability of federal or state program oversight
 - How frequently will it be used, and what additional training for the personnel that are working within the facility is needed?
 - How efficient is the facility – cost of electricity, need for clean water, disposal ability of offal and wash water among the considerations
 - Can this be leased to other producers if you will not be using it continuously? If so, what are insurance or other legal/operational costs that would be possibly incurred?
 - For the initial investment, as well as the maintenance of the investment, does it prove to have an advantage over bringing your animals to currently established facilities?

Teaching & Learning Tools

Read:

Virginia regulations and rules regarding harvest, processing and sale of meat and poultry at:

<http://www.vdacs.virginia.gov/meat&poultry/index.shtml>

Activity:

Use the following link to contact officials if you are planning on constructing your own facilities

http://pubs.ext.vt.edu/448/448-195/448-195_pdf

Unit 11: Milking facilities and equipment

- Make sure you are familiar with regulations (local, state, and/or federal) pertaining to milking facilities. Part of that is deciding how you want to market the milk: direct to processor, direct to consumer, as products such as cheese? Sanitation is paramount
- Factors to consider: how many animals will be milked in the facility; is expansion a possibility; what milking procedures and routine will be used; where will cows be in relation to the facility (how far will they have to walk); what parlor type is preferred; how many people will be milking; what financial resources are available?
- Other considerations: land availability (topography, proximity of neighbors, drainage; environmental issues); vehicle access; water resources (40-50 gallons/lactating cow/day); waste water and manure handling system; electricity (access to three-phase power; 200-amp, 230-volt entrance; thorough grounding); security and safety
- Since this is a typically a major investment, it pays to spend some time visiting facilities and talking with farmers using different systems

Teaching & Learning Tools

Read:

“Selecting and Managing Your Milking Facility”:

<http://www.asi.ksu.edu/doc4131.ashx>

Unit 12: Animal fiber harvest

- Wool and other animal fibers (mohair, alpaca, etc.) are renewable resources, with animals being sheared once a year. Proper nutrition and other management practices will result in better quality fleeces but the baseline quality is determined by genetics. Fine wool breeds of sheep like Merino and Rambouillet produce better quality and quantity of wool than other breeds. Specific preferences by artisanal spinners and weavers may also present an opportunity for specific breeds.
- Shearing is both a science and an art, and it takes practice to get good at it. Many producers simply hire it out, but there are several shearing schools available through Extension (Virginia offers one). It is often possible to learn from a more experienced producer as well.
- Facilities and equipment needed include a level spot (a tarp on the ground or a concrete pad make it easier to gather the fleece and keep things clean), preferably with a roof (fiber that gets wet will rot), a set of shears (hand shears are available but most professionals will use electric), and a bag in which to put the fleece. Check with your customer(s) to find out what kind of bag is preferred or required. Wool and other fiber can be stored for extended periods of time as long as it is kept dry but storage does take space. Find out when customers need the fiber and plan shearing time based on that. From the animal's standpoint, shearing in the spring after the weather warms up but before it gets hot is preferred.
- If possible, keep animals off feed and water for several hours prior to shearing. They are easier to shear and less likely to soil the fleece.

Teaching & Learning Tools

[need some on other fibers...]

Read:

University of Maine site on handling and marketing wool:
<http://umaine.edu/publications/2070e/>

Read:

Sheep 201 Wool Marketing:
<http://www.sheep101.info/201/woolmarketing.html>

Read:

Sheep 201 Shearing:
<http://www.sheep101.info/201/shearing.html>

Read:

The Shearing Network has a list of shearing schools:
<http://www.shearingnetwork.com/learn-how-to-shear/shearing-schools/>

Unit 13: Marketing fresh and processed meat

- Determine market options and customer demand. Especially a challenge with a new customer base and marketing a fresh and perishable product.
- Review your insurance policy to ensure coverage of meat, dairy and egg products sold to consumers.
- Conform to safe food product handling procedures. Do you have a cooler/freezer that can hold the product at a proper temperature? Can this holding system preserve the quality of the wrapping of the product (and thus the appeal to consumer?) Check with local department of health regulations to assure product is handled and labeled correctly.
- Display and promotional items for your product that are consumer friendly. Realize that many consumers do not want to see the ACTUAL animal that was harvested, nor do they want to know its name. It may be safer to have signs with general farm scenes or include nutritional information from various species organizations. Include some of your favorite recipes – you may partner with other vegetable/fruit vendors or farms in your area to increase sales by suggesting an entire meal option.
- Provide samples of your product if you find it is moving slowly. However, check with local health department regulations to assure that this is legal.
- Be sure you price your products appropriately. Consider all of your costs and then include the profit to the operation before setting the first product price. Don't under cut the "competition" – they may be including costs in their product that you are not aware that you should be including (for example, trucking to slaughter facilities, cost of energy use of freezer holding product before sale, samples, insurance).

Teaching & Learning Tools

Unit 14: Animal health

- Animal health is an area of management of your livestock that is impacted by your decisions in the animal enterprise. For example, if you reduce quarantine time or testing, you may introduce a new virus. If you fail to provide a proper balance of calcium and phosphorus, you may have cases of urinary calculi. If you fail to bed pens properly, you may end up mastitis or respiratory disease. Your main success in the area of animal health ultimately is your ability to provide a level of prevention for various diseases and observing your livestock to recognize alterations in their behavior that indicate illness is imminent.
- Ways to prevent disease would be best enhanced by a consultation with individuals skilled in maintaining healthy animals – a veterinarian, or experienced producer working with the species you are including on your farm enterprise. When working with a veterinarian, develop a health management plan with which they approve of the procedures, timing and type of health management and disease prevention products that you intend to implement. This works into what is known as a Veterinarian-Client-Patient-Relationship (VCPR) and can be extremely valid in those inconvenient timed animal emergencies. When selecting biological or pharmaceutical drugs to use on your livestock, be sure that they will be legal and effective to use by discussing your choices with your veterinarian. If a product is not labeled for use on your type of livestock animal, your veterinarian can, if they believe it is a wise product to use, write an “extra label” use approval. It is advisable to extend the withholding time period on these types of situations to assure that all product has reduced levels in your animal.
- Create a guideline calendar for the year highlighting times when certain animal health protocols would be implemented. For example, if you are lambing in April, you would want to booster vaccinate ewes in late February with a tetanus toxoid to provide immunity levels in colostrum for the lamb crop. This calendar could also include other major events, such as breeding, weaning, marketing, sorting and evaluation that would evolve into the plan of work for your day/week/month to maintain focus and production of animals that are working for you, when you provide them with the proper inputs.
- Sanitation and cleanliness of animal housing as well as areas that contain the feed and equipment are very important. Reduce vectors of disease

Teaching & Learning Tools

Read:

BQA online information: <http://www.bqa.org/codeguidelines.aspx> . You may also contact beef organizations within your geographic area as many host yearly BQA training sessions

Activity:

PQA has trainers within many states. Check <http://www.pork.org/Certification/Default.aspx#.UCKABY592OI> for materials and contact information for current trainers available.

Read:

Merck has a searchable veterinary manual online and also you can purchase a hardcover manual: <http://www.merckmanuals.com>

Worksheet:

Complete the worksheet located at http://www.farmandranchbiosecurity.com/Develop_Biosecurity_Plan_form.pdf to be aware of and strategize to control diseases and injuries to your animals.

such as rodents in the grain room and kittens in the hay mow. Disinfect pens after cleaning. Compost manure piles away from animal loafing areas. Reduce items that clutter the environment as they can be a physical danger if animals get loose, a chemical danger if they are toxic, and a convenient hiding place for rodents.

- Properly balanced nutrition provides animals with stronger immune systems that help to reduce disease when exposed to viruses, bacteria or parasites. Be aware of the more nutritionally demanding times (late gestation, early lactation, weaning, shipping) and provide the supplemental nutrition (usually in the form of increased energy or protein, or vitamins and minerals). Consult with specialists in your livestock animal area for more details on how to transition between the higher and lower nutritional demand times. Some may desire to plan their farm forage use around the cycle of reproduction rather than delivering “out of season” as it is more economically feasible and less labor intensive.
- Keep records on animals. This involves primarily creating an individual animal identification, and proceeding to note on either an individual animal page (can use computer software or paper) or a monthly journal the observations of animal health, the treatments provided as well as the outcome of those treatments. This also can be referred to in the future as a source of direction for health management on the farm to either prevent or treat animal illnesses.
- Be mindful of what you or visitors can bring to your farm livestock when visiting other farms or allowing people/vehicles that have been in contact with others exposure to your animals. A sound biosecurity plan should be developed and also be practical for you to implement.
- If your species offers a Quality Assurance program (very popular for beef and pork), participate in training and obtain certification. This will likely expose you to many of the main concerns of the particular industry and can also improve your marketing opportunities if you are selling feeder or finished livestock to outside sources.
- If you aren’t familiar with behaviors of your animals, be sure to note them. One of the greatest ways to be successful in the area of animal health is to be sure to look at each animal, each day, and determine if they are behaving normally. Knowledge of individual behavior can alert the dedicated producer to early signs of illness and can allow for quicker treatment and less

Teaching & Learning Tools

Activity:

Attend the harvest of your market animals and dissect the offal – see if you can find evidence of parasite infection and to what degree. Use this evidence to treat appropriately. Also, look for evidence of respiratory disease in the lung tissue.

recovery time and expense.

Unit 15: Animal reproduction

- The key to profit on many enterprises! If the animal is not born, it cannot be raised or harvested!
- While a goal of 100% of exposed females giving birth is a lofty goal, it is not always obtained, especially when numbers on the farm increase. There are many ways to try and achieve this however:
- Maintain healthy animals free from contagious diseases. Diseases can be a drain on the animal's immune system. Reproduction is a function that is NOT necessary for the animal to live; therefore a pregnancy may not be supported when the body needs resources to supplement the immune system. Animals presenting with difficult birth deliveries, or other post partum challenges that will be expected to cycle soon (as is traditional in beef and swine) should receive extra attention to improving their state of health so as to not fall out of the breeding cycle.
- Maintain adequate nutrition, and even exceed nutrition in the period just prior and early into the breeding period. As mentioned above, reproduction is not necessary for the animal to live, and if nutrition is inadequate it may not support early embryo development and uterine environment. If nutrients are provided in slight excess, it can influence ovulation rates to increase recruited ova to develop in multiple offspring bearing species. Provide for adequate nutrition after giving birth in species intended to be reproductive soon after the birthing process (hogs, cattle).
- Be familiar with your species heat cycles (are they seasonal?), time between each possible breeding period, length of pregnancy (gestation) and target your herd or flock for a particular time to deliver. Some species commonly use prescription hormones to help target a specific time to come into heat and ultimately deliver. However, you can use exposure to the male, and placement of the male in the breeding herd/flock to achieve some of these plans without the use of these types of hormones.
- If utilizing artificial insemination, realize you will never be as successful as a determined male of the species. You will very likely realize an extended birthing season. This can be acceptable for some management plans, but others prefer to have the animals born within a certain window so that they are more easily managed as a group together.

Teaching & Learning Tools

Read:

From Colorado State: Calving and Handling Calving
Difficulties:
<http://www.cvmbs.colostate.edu/ilm/projects/neonatal/Calving%20and%20Handling%20Calving%20Difficulties.pdf>

Read:

From Purdue University: How to handle difficult farrowings:
<http://www.extension.purdue.edu/pork/health/farr.html>

Read:

From Infovets for small ruminants:
<http://www.infovets.com/books/smrm/C/C460.htm>

Read:

To accelerate lambing, (and some might want to try similar practices with goats) you can apply some of the concepts of the STAR System, developed and described by Cornell University:
www.sheep.cornell.edu

- When breeding using AI, coordination with a technician is recommended. You should plan in advance for the sires to be selected, and if you are planning to work your animals as a group, the heat cycle management supplies need to be obtained.
- If using a herd sire, treat him as you do the rest of the herd for testing of communicable diseases, vaccinations and observations of his performance traits that he can contribute to the offspring he will create. It is also strongly advisable that he have proper vitamin and mineral nutrition before being turned in with females, as well as a breeding soundness exam. Observe him breeding females, and note when services have been completed for future due dates, as well as to assure that he is settling females.
- Select genetics that are reasonable in price for you to obtain, but still have the performance that you desire in your offspring to be created. Some producers utilize crossbreeding and different mating systems to enhance the performance of their brood herds, especially if their goal is to create animals for meat markets.
- Late gestation is the last third of the gestation period. Up until this part of the pregnancy, it was not much of an extra demand on the dam to carry the developing offspring. It is important to provide an increase in feed/nutrition (for example: excellent quality second cutting in place of medium quality first cutting hay) during this time to accommodate for this increased physiological demand.
- Failure to provide can cause problems before birth (toxemia), during birth (weakened dam, poor muscle tone) and after birth (retained placentas, ketosis, milk fever, reduction in milk production).
- Too much of a good thing is also a negative! Heavy supplementation of nutrient dense feeds in the late gestation period can increase offspring birth weights and influence birthing challenges. It can also influence metabolic problems (fatty liver disease).
- Be prepared for parturition – have necessary supplies on hand, veterinarian and experienced producer phone numbers, clean and well bedded birthing areas, draft free or reduced draft areas for offspring to get a good start. Colostrum replacer or frozen colostrum should be obtained before birth season. Review materials that illustrate proper birth positions, and how to correct improperly presented offspring.
- As dam's go into labor, you will find they exhibit different

Teaching & Learning Tools

Read:

If you are hand rearing calves, this fact sheet from the University of Kentucky is a good reference:

<http://www.ca.uky.edu/agc/pubs/asc/asc161/asc161.pdf>

Read:

If you are hand raising lambs or kids, this booklet from UC Davis is a good reference:

<http://anrcatalog.ucdavis.edu/pdf/8160.pdf>

Activity:

Obtain reproductive tracts from harvested intact males and females to learn the parts and understand the internal anatomy of the animal, especially for when you are needed to assist with births.

behaviors – many will want to separate from the herd/flock. They will vocalize and nest. Observe for progression of the birthing process, including passing mucous plugs and fluids. Allow your dams to go through the birth process on their own without assistance – if you try to help too soon, you can cause internal damage. Consulting an individual with experience with your species can help you determine when and if you need to assist in the process.

- After the offspring is delivered, it should nurse the dam within an hour ideally. If not, you may need to assist suckling, and even milk out the dam and artificially feed the offspring the first meal. They should be successful on the subsequent feedings.
- Observe offspring within the first week for signs of lethargy and address any problems soon. Newborns can dehydrate quickly and this can be devastating to their ability to survive.

Teaching & Learning Tools