

# JOURNEYMAN FARMER CERTIFICATE PROGRAM

## Small Ruminant Production Facilitator Notebook



Supported  
by:



Beginning Farmer Rancher Development Program

Developing the Next Generation of Sustainable Farmers in Georgia  
In partnership with:



# JOURNEYMAN FARMER CERTIFICATE PROGRAM

## Beginning Farmer Rancher

### Development Program:

Developing the Next Generation of Sustainable  
Farmers in Georgia Grant



This material is based upon work that is supported by the  
National Institute of Food and Agriculture, U.S. Department of  
Agriculture, under award number 2015-70017-22861.



# Small Ruminant Production

## General Agenda

### Session One:

- *Breeds and Selection*
- *Nutrition*
- *Body Condition Scoring*

### Session Two:

- *Pasture Management*
- *Predator Control*

### Session Three:

- *Health and Diseases*
- *Breeding, Lambing, and Kidding*

### Session Four:

- *Integrated Parasite Management I*
- *Integrated Parasite Management II*

### Session Five:

- *Meat Production*
- *Marketing*

### Session Six: (Hands On Demonstration)

- *Body Condition Scoring*
- *FAMACHA/ Five Point Check*
- *Foot Trimming, Castrating and Giving Shots*

## Small Ruminant Production Learning Objectives

- Select a breed and breeding stock matching goals/resources
- Identify records needed for future stock selection/marketing
- Understand different animal requirements based on production stage /level
- Identify basic nutrient (protein, energy and fiber) sources for goats and sheep
- Be able to body condition score goats and/or sheep
- Identify forage types and basic nutrient content (i.e. grasses, legumes, forbs and browse)
- Recognize the link between forage height/maturity and nutrient content/quality
- Describe the risks that determine the need for predator control, the types of predator control and the resources needed for each.
- List some of the most common diseases of goats and sheep and understand how to prevent or treat them
- Understand best management practices for breeding and for lambing or kidding
- Understand dewormer resistance (immunity) issues
- Identify small ruminant anthelmintics and common parasites of small ruminants
- List best management practices to avoid parasite infection
- Understand the difference between live weight, hanging weight and retail yield
- Describe how animal age, sex, and management practices affect meat quality
- List opportunities available for marketing live animals and meat
- Demonstrate use of FAMACHA<sup>®</sup> and the Five Point Check<sup>®</sup> to select animals for deworming
- List the two most common castration methods

# JOURNEYMAN FARMER CERTIFICATE PROGRAM

## Small Ruminant Production Breeds and Selection; Nutrition and Body Condition Scoring

### Session One

# Session 1: Breeds and Selection; Nutrition and Body Condition Scoring

## **Introductions (15 Minutes)**

### **Breeds and Selection (35 min, Dr. Niki Whitley, Fort Valley State University)**

- Goat and sheep breeds, including their role in the industry (terminal/maternal types)
- Choosing a breed, breed type or breeding system to match farm resources and markets
- Selection of animals within a breed or breed type

### **Learning Objectives:**

- Select a breed and breeding stock matching goals/resources
- Identify records needed for future stock selection/marketing

**Activity (20 min)** –Selection basics evaluation (PowerPoint)

### **Optional (if you would like to allocate more time to this activity)-**

- Live animals could be used instead of the PowerPoint and this activity could be done at the end of the entire Session along with body condition scoring

## **Learning activity**

This exercise is designed to reinforce the information presented during the Session and help the participants apply their new knowledge. It is designed to be used as a single class learning tool. It will include questioning the participants about their possible selection choices based on visual appraisal and information from records.

### To implement this evaluation activity:

Facilitator note: Using the PowerPoint evaluation, slide 3 (or animals that you have available if doing the optional activity), provide the participants the following information:

FIRST: Determine which of the animals you would select as potential breeding stock and discuss the reasoning behind your decisions.

Facilitator notes: Allow them a minute or two to think of their choices then initiate the discussion by asking them which they would chose and why. Once they have started talking about choices, steer this discussion in the direction leading to how they can know which to buy without more information (records). What if the biggest male was a single or much older than the others? What if some had rare bloodlines and other didn't? How can you compare without more information? For the picture of the females, the solid colored two are at least half Kiko. The really nice, thick red and white paint doeling had the highest internal parasite (worm) egg counts. They were all at least twins, but the smallest was a triplet with the best adjusted weaning weight of the group and really good fecal egg counts. Some are from artificial insemination sires (show bloodlines), some not. Ask them if their decisions would change after knowing some of this information that would be obtained from looking at the animal records.

SECOND: For the conformation slide (4), determine if you would keep the animal based on your visual appraisal of their conformation, assuming all records and health status were good.

Facilitator notes: This discussion can be tailored to the needs of audience. For example, if you have primarily show animal producers, focus some in the discussion on selection based on body conformation, pedigree, if they meet breed standards and show records as applicable.

Possible additional discussion points include:

- Select based on records (performance) first, then looks
- For conformation, be sure to look at reproductive external genitalia and teat structure
- Best to select animals that were born and raised twins or better (or those that have only had twins)
- Best to select animals raised in an area similar to theirs with a similar management style
- Have minimum standards in mind

While on slide 5 note the following:

- A - the udder attachment is not good – the teats hang below the hocks so it is possible that the kids/lambs will not be able to nurse on their own (and this can be a genetic issue); the doe also seems to have knee issues and possible rear pastern issues
- B – this is a hair sheep ewe, so tails stay clean with no need to dock them; the udder is nice, no lumps/bumps, it is even on both sides with what looks like plenty of milk and teats that a lamb can easily nurse
- C – Note items on the slide
- D – this yearling does is just not put together very attractively and seems like she would have a shorter productive life; she seems to have excess curve to her back legs (sickle hocked), a very short, steep hip, she seems to dip quite a bit behind her shoulders and seems over at the knee; it may be you would consider her for commercial meat production only if she and her bloodline were proven extremely outstanding in growth and meat yield with no longevity issues and she were reasonably priced
- E – a split scrotum is related to reproductive problems in the male and possibly in their offspring and it is genetic; Boer goat judges disqualify bucks in shows with more than a 1” split in the scrotum

Optional (if time):

THIRD: For the last part of this activity, briefly discuss the type of records you would like to get from owners of animals you wish to purchase. Given this information, list/discuss the type of records you would need to keep and present to buyers for marketing your own animals (and to choose which of your own to keep or cull).

Facilitator – this discussion can follow the flow of the discussion from the first part. For example:

If you want to buy breeding stock, select breeding stock from your own farm, or market breeding stock to other people, we have talked about things to select for – what records would be needed in order to support those selection decisions?

- To buy or select only animals born and raised twins, one of the records you need would use are birth records and weaning records; you could also look at the dam and sire information and look at other offspring from the dam to determine the family history of twinning
- Health records are also very important – How often has the animal been dewormed or treated for disease? How often have the feet had to be trimmed? This information should be recorded for use in selection. If the farm is involved in NSIP, is there an available fecal egg count EBV (estimated breeding value)?
- Other records to look at (and keep) include those for growth (birth and weaning weight) records as actual numbers, ratios (above or below 100% of the group average), or even better, EBVs/EPDs (males or females) or how they did in a buck or ram test (males)

***How they can use this at home (or you may use this as a homework assignment if you allocate extra time in the next session to discuss)*** – Identify a breed to meet farm goals/resources and develop a list of questions to ask potential sources of breeding stock; if selecting from your own farm instead of buying new animals, develop a list of criteria to use for selection (in the order of importance) and explain.

BREAK

***Nutrition (40 min, Dr. Lawton Stewart, University of Georgia)***

- Nutritional/nutrient requirements for goats and sheep based on stage of production
- Sources of different nutrients (feeds/feedstuffs)
- Vitamins and minerals – importance of ratios/balance

***Learning Objectives:***

- Understand different animal requirements based on production stage /level
- Identify basic nutrient (protein, energy and fiber) sources for goats and sheep

**Body Condition Scoring (10 min, Dr. Niki Whitley, Fort Valley State University)**

- What is body condition scoring
- How to body condition score

**Learning Objectives:**

- Be able to body condition score goats and/or sheep

**Optional Activity (30+ min)** – If animals are available, allow participants to body condition score sheep or goats; this activity may be conducted with the Breed and Breeding Stock Selection optional activity or during Session 5 instead.

**Homework Assignment** – Evaluate the farm feeding plan and determine if it would change based on information learned in the Nutrition and Body Condition Scoring presentations.

**JOURNEYMAN FARMER**  
CERTIFICATE PROGRAM

**Small Ruminant Production**

---

---

---

---

---

---

---

---

**Session 1**  
**Breed and Breeding**  
**Stock Selection**



Dr. Niki Whitley  
Animal Science Extension Specialist  
Fort Valley State University

Some slides and photos used with permission by Susan Schoenian,  
University of Maryland Extension and Baalands Farm




---

---

---

---

---

---

---

---

**Purpose of selection**

- Choose breed/animals that will fit best on your farm?





---

---

---

---

---

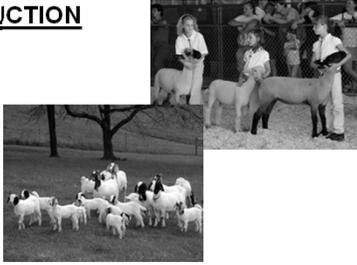
---

---

---

### TYPE OF PRODUCTION

- Commercial
  - Meat
  - Wool/Fiber
- Seed/Breeding stock
  - Show
  - Wool/Fiber
  - General
- Club lambs/kids
- Dairy production



Photos: Susan Schoenian, Baalands Farm




---

---

---

---

---

---

---

---

### RESOURCES

- Farm size
  - Pasture number/size
  - Stocking rates
- Structures
  - Barns
  - Shelters
  - Storage/Other
- Labor
- Funds
  - For above
  - Feeding
  - Vet/Health Care
  - Marketing



[www.odditycentral.com/animals/the-unbelievably-cute-blacknose-sheep-of-vlasis.html](http://www.odditycentral.com/animals/the-unbelievably-cute-blacknose-sheep-of-vlasis.html)



[www.livestockconservancy.org](http://www.livestockconservancy.org)

### MARKET

- Market want?
- Availability
  - Different markets
  - Stock
- Competition
- Profit likelihood
  - With your resources
  - With your market(s)




---

---

---

---

---

---

---

---

### COMMERCIAL MEAT PRODUCTION

#### Important

- Performance
  - Reproductive efficiency
    - lb offspring weaned
  - Growth and carcass (sire)
    - Post-weaning ADG
    - Market suitability
- Fitness
  - Disease-resistant
  - Longevity
  - Easy-care



Photo: Susan Schoenian, Baalands Farm



#### Less important (ewe/doe)

- Body conformation
- Fiber/Wool




---

---

---

---

---

---

---

---

**BREEDING STOCK**



**Important**

- What the market is looking for (pedigree/bloodlines, breed character)
- Reproductive efficiency
  - Production/Profitability
- Body conformation
  - Structural correctness related to performance/longevity
- Current fad?

JOURNEYMAN FARMER  
CERTIFICATION PROGRAM

---

---

---

---

---

---

---

---

---

---

**U.S. SHEEP BREEDS BY PURPOSE**

Meat	Wool	Multi purpose	Minor
<u>Hair</u> American Blackbelly/Barbado California Red Dorper Katahdin Romanov Royal White St. Croix Willshire Horn	<u>Fine wool</u> American Cormo Booroola Merino Delaine-Merino Debouillet Rambouillet Panama	<u>Wool</u> Columbia Corriedale Finnsheep Polypay Targhee	Black Welsh Mountain Blueface Leicester Calif. Variegated Mutant Clun Forest Gulf Coast Native Hog Island Icelandic Jacob Karakul Navajo-Churro Scottish Blackface Shetland Soay
<u>Woolies</u> Cheviot Dorset Hampshire Montadale North Country Cheviot Oxford Shropshire Southdown Suffolk Texel Tunis	<u>Long wool</u> Border Leicester Coopworth Cotswold Leicester Long wool Lincoln Perendale Romney Wensleydale	<u>Dairy</u> Awassi East Friesian Lacune	

Adapted with permission from: [www.sheep101.info/201/breedselection.htm](http://www.sheep101.info/201/breedselection.htm)

JOURNEYMAN FARMER  
CERTIFICATION PROGRAM

---

---

---

---

---

---

---

---

---

---

**SHEEP TERMINAL (SIRE BREEDS)**



Suffolk, Hampshire – Frame/growth (feedlot)



Texel– Muscling/carcass (pasture)



Dorper – Muscling, hair (pasture)

Photos: Susan Schoerian, Baalands Farm

JOURNEYMAN FARMER  
CERTIFICATION PROGRAM

---

---

---

---

---

---

---

---

---

---

**SHEEP MATERNAL (EWE BREEDS)**



**Dorset – Dual:  
reproduction,  
good growth**



**Katahdin – Fitness,  
reproduction**



**Polypay – prolificacy,  
mothering**

**Rambouillet –  
Maternal wool**



Photos: Susan Schoenian,  
Baalands Farm




---

---

---

---

---

---

---

---

**PRIMARY U.S. GOAT BREEDS BY PURPOSE**

Meat	Dairy	Multi purpose	Heritage/Other
<b>Boer</b> <b>Kiko</b> Myotonic or Tennessee Fainting <b>Savanna</b> <b>Spanish</b>	Alpine Golden Guernsey LaMancha Nubian Oberhasli Saanen Sable Toggenburg	Angora Cashmere Kinder Nubian Nigerian Dwarf Pygmy	Arapawa San Clemente




---

---

---

---

---

---

---

---

**GOAT TERMINAL (SIRE BREEDS)**



**Boer, Savanna – muscling, growth**



**Kiko – growth, fitness (dual?)**

Photos: Susan Schoenian, Baalands Farm




---

---

---

---

---

---

---

---

### GOAT MATERNAL (DOE BREEDS)



**Spanish – Fitness, mothering**

**Kiko – dual?; fitness, mothering, growth**

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### SELECTION (AND MARKETING)

**Individual Performance/Looks\***

- How an animal performs
  - Individual performance levels
- What an animal looks like
  - Visual appraisal



**Environmental Factors**

- Nutrition
- Health
- Weather
- Season
- Management
  - Animals
  - Pasture
- Housing
- Age



\*What they look like/how they perform depends on genes and the environment; so it's good to select good animals from farms raising animals the way you want to raise them

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### SELECTION (AND MARKETING) TOOLS

The environment changes. Genetics is/are permanent.

**Genetic make-up**

- **On-farm records**
  - Adjusted weaning/post-weaning weights (age, dam age, number born/raised)
  - Adjusted litter weights
  - Fecal egg counts
  - Flock EPDs (expected progeny difference)/EBV (expected breeding values)
- **Across-flock**
  - EPDs or EBVs (NSIP)
  - Differences in performance at Central Ram/Buck Test Stations
- **Individual genes (sheep)**
  - Fecundity gene
  - Myostatin gene
  - Scrapie-resistance



nsip.org – EPDs/EBVs for sheep and goats

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### **SELECTION**

- Decide traits you want
- Balanced selection - select for one thing and can de-select for others (i.e. milk and muscling); can select for multiple traits
- Set minimum standards



Example (females):

- Twin or better (males too)
- Dewormed once as lamb (males too)
- Weaning wt ratio above 100% (and post-weaning for males)
  - $\frac{\text{Individual weaning wt}}{\text{Average group weaning wt}} \times 100\%$




---

---

---

---

---

---

---

---

### **EVALUATION METHODS**

#### **Performance (objective)**

- Birth records
- Growth records
- Ultrasound
- Actual carcass measurements
- Fleece weights/Micron testing
- Milk yields
- EPDs/EBVs
- Genetic testing



#### **Visual appraisal (subjective)**

- Body conformation
- Udder conformation
- Live evaluation/handling
- Visual evaluation of wool
- Show winnings




---

---

---

---

---

---

---

---

### **FOR WITHIN HERD (ON FARM) SELECTION**

Look at:

1. Pedigree/Breed – to control inbreeding and breed purity
2. Data/records – within the breed or breed type
3. Problems/issues – health, behavioral
4. LAST: Visual appraisal – reduces temptation to keep bad genetics in a pretty animal




---

---

---

---

---

---

---

---

**FOR PURCHASES FROM OFF FARM**

Consider/ask about:

1. Farm Health Status - problems/issues, vaccinations, routine treatments
2. Management - feeding, housing, lambing assistance, records/information kept
3. Records specifically for all animals for sale
4. LAST: Visual appraisal if no problems related to health and management, visually appraise animals chosen based on records



Photos: Susan Schoenian, Baalands Farm




---

---

---

---

---

---

---

---

**VISUAL APPRAISAL**

- Health/Soundness
  - Bright, alert, front of flock/herd?
  - Good body condition
- Problems (do not buy)
  - Limp
  - Abscesses or pink eye
  - Sore mouth lesions
  - Respiratory symptoms
    - Snotty nose
    - Labored breathing
  - Extremely poor condition



More info: <http://www.sheep101.info/201/acquiringstock.html>  
Photos: Susan Schoenian, Baalands Farm




---

---

---

---

---

---

---

---

**GENERAL VISUAL APPRAISAL**

- Males look masculine, females look feminine
- Udder connection good, no lumps/bumps, no teat defects/extra teats (males too), seem functional
- Testicles firm, no lumps/bumps, normal size



Photos: Susan Schoenian, Baalands Farm




---

---

---

---

---

---

---

---

**GENERAL VISUAL APPRAISAL**

- Good conformation overall (legs/body, mouth)
- Mouth:
  - Top palate and bottom teeth should meet
  - No undershot bottom jaw (monkey mouth) or overshot top (parrot mouth)



Undershot jaw/underbite

Photos: Susan Schoenian, Baalands Farm




---

---

---

---

---

---

---

---

**GENERAL VISUAL APPRAISAL**

- Good conformation overall (legs/body, mouth)
- Legs: knees in line with legs; do not toe in or out, pasterns (ankles) are not close to ground or too upright, hocks do not point in and are in line with rest of the leg from side view
- Body – back strong/straight/very little dip, no extreme angles for hips and shoulders



Photo: Susan Schoenian, Baalands Farm

LEGS- see: [www.danekeclublambs.com/SheepFeetandLegStructureTest.html](http://www.danekeclublambs.com/SheepFeetandLegStructureTest.html)




---

---

---

---

---

---

---

---

**SUMMARY ADVICE**

- Select a breed based on your farm goals, market and resources
- For stock selection, get accurate, objective, comparative data first, then do visual appraisal (if buying or selecting from own farm)
- Buy from reputable breeder (with management similar to your own)
- Don't buy from sale barn unless from a specific production sale with biosecurity measures in place
  - Be aware of disease issues with grouped animals
  - Quarantine (isolate) animals from another farm for at least 30 days




---

---

---

---

---

---

---

---

### References and Additional Resources

Small Ruminant Webinars:

- [www.sheepandgoat.com/#!/webinars/cu81](http://www.sheepandgoat.com/#!/webinars/cu81)

Goats:

- [www.famu.edu/cesta/main/assets/File/coop\\_extension/small\\_ruminant/goat\\_pubs/Selecting\\_Goats.pdf](http://www.famu.edu/cesta/main/assets/File/coop_extension/small_ruminant/goat_pubs/Selecting_Goats.pdf)
- [www.aces.edu/pubs/docs/U/UNP-0110/UNP-0110.pdf](http://www.aces.edu/pubs/docs/U/UNP-0110/UNP-0110.pdf)
- [extension.psu.edu/courses/meat-goat/basic-production/selecting-meat-goats](http://extension.psu.edu/courses/meat-goat/basic-production/selecting-meat-goats)

Sheep:

- [www.aces.edu/pubs/docs/A/ANR-0821/index2.tml](http://www.aces.edu/pubs/docs/A/ANR-0821/index2.tml)
- [www.sheep101.info/201/acquiringstock.html](http://www.sheep101.info/201/acquiringstock.html)




---

---

---

---

---

---

---

---



This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2015-70017-22861.

**USDA** Beginning Farmer Rancher  
**Development Program**  
 Developing the Next Generation  
 of Sustainable Farmers in Georgia Grant




---

---

---

---

---

---

---

---

# JOURNEYMAN FARMER CERTIFICATE PROGRAM

## Small Ruminant Production



## Session 1 Activity

### Breed and Breeding Stock Selection

Dr. Niki Whitley  
Animal Science Extension Specialist  
Fort Valley State University

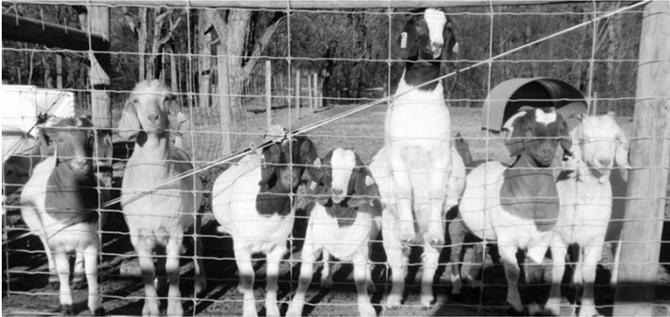
Photos: Susan Shoanian, Baalands farm  
and Dr. Niki Whitley



# SELECTION



• Which Spanish buck would you buy?



• Which yearling doe would you buy?



# SELECTION

After records and health status are all deemed satisfactory.....keep/buy or cull/do not buy for breeding stock?



A



B

Lactating females – doe and ewe (both nursing twin offspring)



C

Young ewe lamb



D

Yearling doe



E

Young male



# SELECTION

After records and health status are all deemed satisfactory.....keep/buy or cull/do not buy for breeding stock?



A-Bad



B-Good



C - ?



D-Not good

Yearling doe



E - Bad

Young male – Split scrotum

Young ewe lamb – Seems to be a little post-legged in rear and crooked in front; maybe choose if excellent records and not really expensive



This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2015-70017-22861.

## USDA Beginning Farmer Rancher Development Program



Developing the Next Generation of Sustainable Farmers in Georgia Grant



**JOURNEYMAN FARMER**  
CERTIFICATE PROGRAM

**Small Ruminant Production**





---

---

---

---

---

---

---

---

**Session 1**  
**Small Ruminant Nutrition**

Dr. Lawton Stewart  
Extension Animal Scientist  
University of Georgia

Susan Schoenian  
Sheep and Goat Specialist  
Western Maryland REC



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

**Learning Objectives**

- Identify basic nutrient (protein, energy and fiber) sources for goats and sheep
- Understand different animal requirements based on production stage /level

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Basic Nutrition

- Six Key Nutrients
  - Protein
  - Carbohydrates
  - Fats
  - Minerals
  - Vitamins
  - Water



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Six Essential Nutrients

- Many (most) feedstuffs contain more than one of the essential six nutrients.
- Feedstuffs vary considerably in their content of the six essential nutrients.
- No single feedstuff can supply all six essential nutrients that an animal needs to survive and thrive.



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Water



Quantity + Quality

- The most critical nutrient.
- Has many important functions in the body.
- Needs vary by species, stage and level of production, and climate.

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Water Content of Feeds

Feedstuff	Water	DM
Orchardgrass pasture	76%	24%
Wet distiller's grains	75%	25%
Corn silage	66%	34%
Molasses, cane	24%	76%
Grass hay	12%	88%
Whole corn	12%	88%
Ground limestone	2%	98%
Urea	1%	99%



- All feedstuffs contain water. This must be considered when balancing rations.
- Rations are balanced on a dry matter (DM) basis.

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

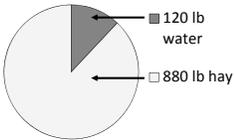
---

---

---

### Dry Matter

- The % of a forage of a feedstuff that is not water.
- Feeds will be listed as pounds of dry matter (DM – without water) or As Fed (AF - with water).
- **Example:** If a 1,000 lb bale of hay is 88% dry matter:



**RULE OF THUMB for Nutrients:**  
 •DM to AF → multiply by%DM  
 $12\% \text{ CP} \times 0.88 = 10.6\%$   
 •AF to DM → divide by%DM  
 $10.6 \div 0.88 = 12\%$

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

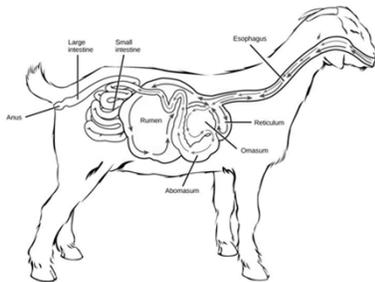
---

---

---

---

### The Small Ruminant Digestive System



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

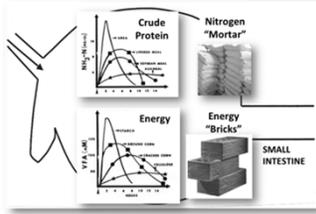
---

---

---

### Crude Protein

- Protein is often the most expensive feedstuff, but as the building block for animals, is an important one
- Ruminant animals can convert nitrogen to protein due to the microbes in their rumen
- Energy is needed to create and to digest protein



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Energy - Carbohydrates

- Energy is needed in the greatest quantity; it is the building block for other nutrients.
- Requirements change based on age, sex, stage of production, and work.
- Sources of energy are starch, fat/oils, protein and cellulose (in forages).
- Fat/oils (i.e. corn oil) provide the most energy.
- Dietary excess is stored as fat.
- Expressed as total digestible nutrients (TDN), net energy (NE) or metabolizable energy (ME)



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Energy content of feeds



Feedstuff	% TDN
Urea	0%
Oat straw	48%
Orchardgrass hay	59%
Grass silage	61%
Fescue pasture	64%
Dry beet pulp	75%
Barley	84%
Corn	88%
Bread by-product	91%
Distiller's grains	92%
Fat	195%

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### What about fiber?

Is not a nutrient, but is essential dietary component for ruminants



TDN is calculated from ADF

- 1) Acid detergent fiber (ADF)  
Cellulose + Lignin  
↑ADF ↓Forage quality
- 2) Neutral detergent fiber (NDF)  
Hemicellulose + Cellulose + Lignin  
↑ NDF ↓ Intake




---

---

---

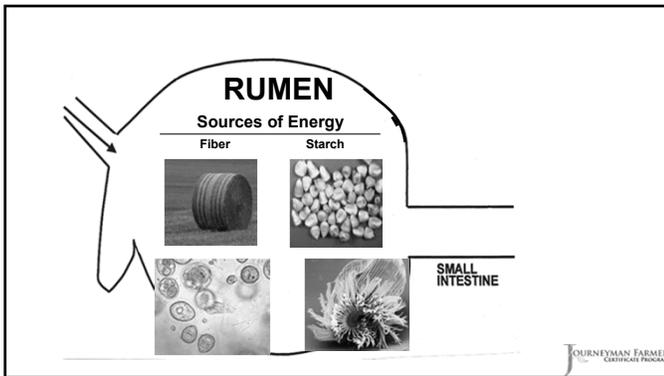
---

---

---

---

---




---

---

---

---

---

---

---

---

### Energy – Fats/lipids



- Cheapest energy source.
- 2.25x as much energy as carbohydrates.
- Used to raise energy level of feed, improve flavor, texture, and palatability.
- Source of heat, insulation and body protection.
- Essential fatty acids.
- ⇒ Can manipulate to change nutritional profile of meat.




---

---

---

---

---

---

---

---

### Fat content of feeds

Feedstuff	% EE
Urea	0%
Dry beet pulp	0.7%
Barley	2.1%
Alfalfa hay, mid-bloom	2.3%
Orchardgrass hay	3.3%
Corn	4.3%
Fescue pasture	5.5%
Corn distiller's grains	10.5%
Whole cottonseed	17.8%
Whole soybeans	18.8%
Fat	99%

Ruminant diets are typically < 4% fat



Fat can be used to help increase body condition score/provide energy to high producing animals

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

---

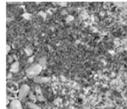
---

### Minerals

1) Macro  
 Needed in gram amounts  
 Ca, P, Na, Cl, Mg, K, S



2) Micro  
 Needed in milligram amounts  
 Co, Cu, F, I, Mn, Mo, Se, Zn



• Multiple functions in body

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

---

---

### Ca and P content of feeds

Dry matter basis	Ca	P	Ca: P
Corn	0.02%	0.30%	0.07
Barley	0.06%	0.38%	0.16
Soybean meal	0.28%	0.71%	0.39
Orchardgrass hay	0.32%	0.30%	1.07
Fescue pasture	0.48%	0.37%	1.30
Soybean hulls	0.55%	0.17%	3.24
Alfalfa hay, mid-bloom	1.4%	0.24%	5.83
Dried kelp	2.72%	0.31%	8.77
Dicalcium phosphate	22%	18.65%	1.18
Bone meal	27%	12.74%	2.12
Ground limestone	34%	0.02%	1700

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

---

---

### Minerals

- Georgia soils are low in Se and Cu
- Goats have a much higher Cu (copper) requirement than sheep
- Sheep are more likely to experience copper toxicity.
- Use a mineral designed for your species and state/region/area.
- Loose minerals are better to use than a mineral block.



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Vitamins

- 1) Water soluble  
B & C
- 2) Fat soluble  
A, D, E, & K

- Multiple functions in body.
- Requirements increase with age.
- No dietary requirement for vitamin K or B complex.



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Vitamin sources

Vitamin	Feedstuff
β-carotene (vitamin A)	Green, pasture forage; dehydrated hay; cured hay, vitamin supplements
D	Ultraviolet irradiation, sun-cured hays, vitamin supplements
E	High quality legume hay, dehydrated alfalfa, wheat germ, vitamin supplements
K	Green, leafy feedstuffs (K1). K2 synthesized in rumen
B	Not required in diets of ruminants



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Nutrient requirements depend on ...

- Species
- Size (weight)
- Sex
- Age
- Genetics
- Stage and level of production
- Climate, environment, and activity
- Body condition



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

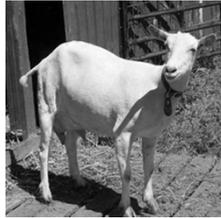
---

---

---

### Nutrient needs – general

- Sheep have lower maintenance requirements than goats.
- Dairy goats have higher maintenance requirements than meat and fiber goats.
- Females with a higher genetic potential for milk production (meat or dairy animals) have higher nutritional requirements.



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Nutrient needs – adult size/age:

- Bigger (mature weight/frame size) animals need to eat more and consume larger quantities of nutrients.
- However, smaller animals need to consume a more nutrient-dense diet.
- Mature females are usually bigger and need to eat more to get the greater pounds of nutrients needed.
- However, young females need a more nutrient-dense diet.



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Nutrient requirements – stage of production, females:

- Energy requirements during late gestation are more than 50% higher than for maintenance.
- Females require a more nutrient-dense diet during late gestation and lactation.
- Protein requirements increase in late gestation or when the female begins to lactate.



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Nutrient needs – number of offspring

- Females carrying or nursing twins and triplets need to eat more of a more nutrient-dense diet.
- Those carrying triplets need 43% more energy than those carrying a single fetus.



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Nutrient needs - milking:

- The more milk a female produces the more nutrients she needs to consume.
  - Energy
  - Protein
  - Minerals
- In some cases, animals can simply be fed more, but in the case of higher-producing animals, a more nutrient dense diet must be fed.
- Nutrient requirements are significantly higher for dairy does and ewes.



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### What about growing lambs and kids?

- Their nutritional requirements are affected by many of the same factors.
  - Age
  - Species
  - Size
  - Genetic type and potential
  - Level of performance
  - Environment, activity



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Nutrient needs - lambs:

- Assuming the same size and rate-of-gain:
  - Young lambs convert feed more efficiently, but need a higher percentage of protein in their diet.
  - Older lambs need to eat more and require a more digestible diet to achieve the same rate-of-gain.
  - Later maturing (larger breed) lambs need to eat more, but have lower protein requirements.



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Nutrient needs – kids, size:

- Assuming the same rate of gain (0.22 lbs/day):

- Smaller kids (weight) need to consume a more nutrient-dense diet, both energy and protein.
- Bigger kids need to consume more quantity of nutrients, but the diet does not need to be as high quality (% TDN, CP).

Weight	% TDN	% CP
22	87.5%	16.5%
44	87.1%	11.2%
66	87.0%	10.7%
88	48.9%	7.6%

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

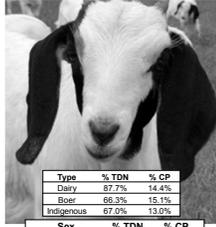
---

---

---

### Nutrient needs – kids, type/sex:

- Assuming the same rate of gain (0.44 lbs/day).
  - Dairy have the highest energy needs.
  - Boer bucks need to eat the most, and have the highest requirements for protein.
  - Indigenous (local/native) breed goats have lower requirements for protein than improved breeds.
- Bucks need to eat more than does.
- Bucks and does require the same amount of protein, but since does eat less, they require a higher percentage of protein in their diet.



Type	% TDN	% CP
Dairy	87.7%	14.4%
Boer	68.3%	15.1%
Indigenous	67.0%	13.0%

Sex	% TDN	% CP
Doeslings, wethers	65.8%	15.9%
Intact males	66.3%	14.5%

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

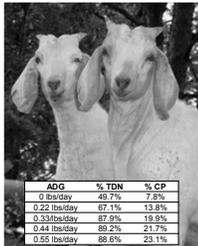
---

---

---

### Nutrient needs – kids and lambs:

- Assuming the same genetic potential for growth:
  - The more you feed a kid or lamb the more it will gain.
  - Better performance requires both more feed and better quality feed.
    - Higher% TDN
    - Higher% CP
  - The bigger question is: is better performance economical?



ADG	% TDN	% CP
0 lbs/day	49.7%	7.6%
0.22 lbs/day	67.1%	13.6%
0.33 lbs/day	87.9%	19.9%
0.44 lbs/day	89.2%	21.7%
0.55 lbs/day	88.6%	23.1%

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

---

---

### Summary

- Different feedstuffs offer different levels of nutrients; for example, grains, quality forages/hay, and fat sources provide more energy; soybean products and legumes provide more protein.
- Minerals are important and should be fed based on species, location and in loose form.
- Animals with higher nutrient requirements may need supplementation: young, growing animals and females in late gestation and lactation (especially with twins or more)

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

---

---

### Additional Resources

Goats:

- <http://extension.psu.edu/courses/meat-goat/nutrition>
- <http://www2.luresext.edu/goats/training/nutrition.html>

Sheep

- <https://pubs.ext.vt.edu/410/410-853/410-853.html>
- <http://www.sheep101.info/201/>




---

---

---

---

---

---

---

---



This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2015-70017-22861.

**USDA** Beginning Farmer Rancher  
**Development Program**  
 Developing the Next Generation  
 of Sustainable Farmers in Georgia Grant




---

---

---

---

---

---

---

---

**J**OURNEYMAN FARMER  
CERTIFICATE PROGRAM

# Small Ruminant Production

USDA NIFA    FORT VALLEY STATE UNIVERSITY  
A State and Land-Grant Institution • University System of Georgia    UGA extension

---

---

---

---

---

---

---

---

## Session 1 Body Condition Scoring



Dr. Niki Whitley  
Animal Science Extension Specialist  
Fort Valley State University

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## Learning Objective

- Be able to body condition score goats and sheep



Photos courtesy of Susan Schoenian, Baalands Farm

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### How fat?

- Ultrasound
- Carcass tests
- **Body Condition Scoring**



Photos: Susan Schoenian, Baalands Farm

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

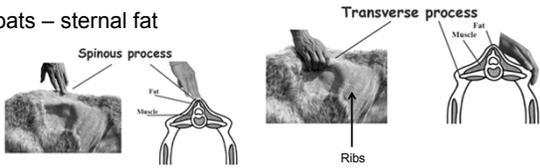
---

---

---

### Body Condition Scoring (BCS)

- Must get your hands on them
- At least backbone and ribs
- Goats – sternal fat



www2.luresext.edu/goats/library/field/bcs07.pdf

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Body Condition Scoring Overview

Score	Spinous process	Rib Cage	Loin
BCS 1 Emaciated (Very thin)	Easy to see and feel, sharp	Easy to feel each rib	Little muscle, no fat covering
BCS 2 Thin	Easy to feel, but smooth	Smooth, slightly rounded, can feel ribs with slight pressure	Has muscle, thin fat cover
BCS 3 Good Condition	Smooth and rounded	Smooth, even feel	Muscle is full, moderate fat cover
BCS 4 Fat	Can feel with firm pressure, no points felt	Individual ribs not felt, can feel indentation between ribs	Muscle full, thick fat cover
BCS 5 Obese	Smooth, no points, may slightly dip in	Individual ribs not be felt. No separation of ribs felt	Muscle full, very thick fat covering

Adapted from a presentation by Scott Sell, Clemson University

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### BCS 1 – Emaciated (very thin)

- Very thin, weak animal; individual backbone points and ribs easy to see and feel; fingers fall into spaces between the ribs easily
- Can easily grasp the top and sides of the spine; saw-tooth appearance of backbone; very little muscle and no fat felt along backbone, dip between top and side of backbone (over the loin)



Photo: Susan Schoenian, Baalands Farm




---

---

---

---

---

---

---

---

### BCS 1



- Sternal fat can be easily grasped between thumb and fingers and moved from side to side.

[www2.luresext.edu/goats/research/BCS\\_factsheet.pdf](http://www2.luresext.edu/goats/research/BCS_factsheet.pdf)




---

---

---

---

---

---

---

---

### BCS 2 Description

- Backbone is visible; some ribs can be seen/all can be felt and fingers can still go between ribs
- Can grasp backbone between the thumb and forefinger and still grasp side of backbone but points on the side are harder to see; can feel some muscle, but still a depression over the loin (between top/side of backbone)



Photo: Susan Schoenian, Baalands Farm




---

---

---

---

---

---

---

---

### BCS 2



- Sternal fat is wider and thicker but can still be grasped and lifted by the thumb and forefinger. The fat layer can still be moved slightly from side to side.

[www2.luresext.edu/goats/research/BCS\\_factsheet.pdf](http://www2.luresext.edu/goats/research/BCS_factsheet.pdf)




---

---

---

---

---

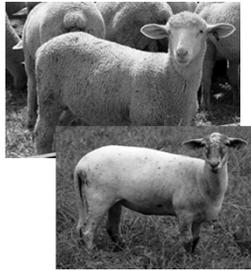
---

---

---

### BCS 3

- Backbone not sticking up but can feel a slight dip between points; can barely see ribs and have even layer of fat over them; space between the ribs felt with pressure
- Side of backbone not easily grasped; smooth over the loin from the top to side of backbone; can barely see the outline of the side of the backbone



Photos: Susan Schoenian, Baalands Farm




---

---

---

---

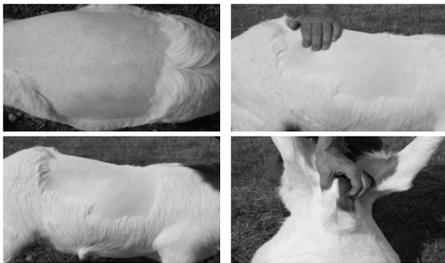
---

---

---

---

### BCS 3



- Sternal fat is wide and thick. It can still be grasped but has very little movement.

[www2.luresext.edu/goats/research/BCS\\_factsheet.pdf](http://www2.luresext.edu/goats/research/BCS_factsheet.pdf)




---

---

---

---

---

---

---

---

### BCS 4

- Backbone and ribs cannot be seen; cannot grasp the top of the backbone due to muscle and fat; loin is rounded; smooth sided
- Cannot see outline of the side of the backbone; points of the side are smooth and rounded – no individual points felt; muscle and fat thick over loin



Photos: Susan Schoenian, Baalands Farm




---

---

---

---

---

---

---

---

### BCS 4



- Sternal fat is difficult to grasp because of its width and depth. It cannot be moved from side to side.

[www2.luresext.edu/goats/research/BCS\\_factsheet.pdf](http://www2.luresext.edu/goats/research/BCS_factsheet.pdf)




---

---

---

---

---

---

---

---

### BCS 5

- Backbone is buried in fat so cannot feel; ribs not visible or felt and covered with excessive fat
- Thick muscle and fat over the loin, making a bulge so that there is a dip over the backbone; side of backbone cannot be found and is impossible to grasp



Photo: Susan Schoenian, Baalands Farm




---

---

---

---

---

---

---

---

### BCS 5



- The sternal fat now extends and covers the sternum and cannot be grasped.

www2.luresext.edu/goats/research/BCS\_factsheet.pdf




---

---

---

---

---

---

---

---

### Small Ruminant Body Condition Scoring Review

Score	Stage of Production	Target Body Condition Score
BCS 1 Emaciated (Very thin)	Maintenance	No less than 2
BCS 2 Thin	Breeding	At least 3
BCS 3 Good Condition	Early Gestation	At least 3
BCS 4 Fat	Late Gestation	More than 3
BCS 5 Obese	Lambing/Kidding	3.5
	Weaning	No less than 2

Note: Goats fatten faster inside than outside where they are being scored, so some people feel that an extra half a score could be added; if dairy, some feel half to one score could be added (half for dairy sheep, one for dairy goats). Example: BCS 3 for a sheep may be a 3.5 for a goat or dairy sheep or a 4 for a dairy goat.




---

---

---

---

---

---

---

---

### References and Additional Resources

- Langston University:
  - www2.luresext.edu/goats/research/BCS\_factsheet.pdf
  - www2.luresext.edu/goats/research/bcshowto.html
- University of Arkansas Pine Bluff:
  - www.uaex.edu/publications/pdf/FSA-9610.pdf
- eXtension.org:
  - www.extension.org/pages/19530/goat-body-condition-score#.VexiOBFVikp
- BCS video (sheep): www.agric.wa.gov.au/management-reproduction/condition-scoring-sheep
- Sheep 101:
  - www.sheep101.info/201/feedingewes.html




---

---

---

---

---

---

---

---

**JOURNEYMAN FARMER**  
CERTIFICATE PROGRAM

This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2015-70017-22861.

**USDA** Beginning Farmer Rancher  
Development Program  
Developing the Next Generation  
of Sustainable Farmers in Georgia Grant



---

---

---

---

---

---

---

---

# Resource Page

**NOTES:**

# JOURNEYMAN FARMER CERTIFICATE PROGRAM

## Small Ruminant Production Pasture Management and Predator Control

### Session Two

## Session 2: Pasture Management; Predator Control

### **Pasture Management (45 min – Dr. Dennis Hancock, University of Georgia)**

- Soil testing
- Dependence of forage species on location (U.S. and within GA)
- Types of forages for goats vs sheep based on eating habits
- Nutritional value of forages
- Fencing

### **Learning Objectives:**

- Identify forage types and basic nutrient content (i.e. grasses, legumes, forbs and browse)
- Recognize the link between forage height/maturity and nutrient content/quality

**Activity (35 min)** – Nutrition and Forages Activity (PowerPoint) and Homework Discussion  
**Optional activity (45+ min)** - Pasture walk or ID of different forages if available and discussion of nutrition homework activity.

### **Learning Exercise:**

This exercise is designed to reinforce the information presented during Session 1 and 2 on nutrition and pasture management and help the participants apply their new knowledge. It is designed to be used as a single class learning tool. It will include asking participants their opinion on which animals pictured have higher overall nutrient requirements and then discussing how different needs might be met. A discussion of the homework from Session 1 should follow.

### **To implement the activity:**

Facilitator notes: Using the PowerPoint activity, read the first slide for the learning activity or summarize the directions. The following provides information you can give them as you discuss the answers (available as bullet points on slides follow each question slide in the PowerPoint).

### **FIRST PART:**

On the first slide:

Which needs more nutrients?

1. Not pregnant (open) yearling doe or a lactating yearling doe  
The lactating yearling doe needs more nutrients because she is not only still growing but is also providing nutrients for her kid. The answer would be the same for sheep. Yearling females have greater needs than mature females in the same production stage (i.e. open yearlings vs open mature ewes).
2. A ewe with triplets or a large adult ram during breeding season  
The answer is a ewe with triplets, but any productive lactating female will have higher nutrient requirements than a healthy adult male.

Second slide:

Which needs more nutrients?

1. A late gestation ewe or late gestation doe?  
All else being the same, the answer is the doe. Goats have higher nutrient requirements than sheep in general. However, if the late gestation ewe was carrying triplets but the doe was only carrying a single, that would likely change things. Or if the ewe was in poor condition and needed to gain weight while the doe was fat, the answer may be different.
2. A Boer kid or a Spanish kid?  
Boer goats have a greater genetic potential for muscling and growth, so all else being the same, they will likely have higher nutrient requirements than Spanish goats.

Third slide:

Which needs more nutrients?

1. Ewes in the spring or ewes in the winter?  
All animals housed outdoors will need more energy in the winter than the summer to help keep warm. Hay digestion creates body heat, so providing a quality hay in the winter along with any other necessary energy supplementation is important.
2. Early pregnant ewes or open (not pregnant) ewes?  
This is a trick question. The nutrient requirements for early pregnant and open animals are really not very different. As long as the female is in good condition, she should not need extra feed/nutrients in early pregnancy, but this is a good time to feed extra to put on condition if she needs to gain weight before giving birth.

## SECOND PART:

How can you provide protein and energy for growth to a young kid or lamb:

1. Using a forage-only feeding system?  
In a good weather/growing season, with excellent forage planning and management, including rotational grazing, fertilization/irrigation (?) as needed and proper parasite management, a good grass/legume mix forage may be able meet the needs of lambs and older kids for optimal (not maximal) growth. Younger, just weaned kids may need extra supplementation, especially if there are high parasite loads on the pastures.
2. Using a forage plus feed supplement feeding system?  
This type of system allows for flexibility when forage resources are limited (not enough land/pastures available, drought, low quality forages, etc.). A feed supplement designed to provide extra protein and energy can be used with pastures or with hay, depending on farm resources. One example is providing a grain-soybean meal based feed supplement once daily at one half to one percent of total animal body weight daily while on pasture with quality hay if forage availability/quality is low. More may be needed for kids than for lambs and for winter than for summer. Supplementation can be changed based on animal body condition.

How can you provide enough energy for weight gain in a very thin doe or ewe just giving birth to triplets:

1. Using a forage-only feeding system?

It is highly unlikely that a forage-only feeding system would be adequate for a very thin doe or ewe just giving birth to triplets unless some of the offspring were removed and raised on a bottle, especially if that female produces a lot of milk.

2. Using a forage plus feed supplement feeding system?

A feed supplement with high energy and appropriate protein for the species (goat or sheep) along with excellent quality forage (pasture) and/or hay would be more likely to support the female in this situation. Milk production takes so much energy from the animal that she will not be able to eat enough pasture or forage to put on weight while producing milk for her offspring. Productive females will always lose weight while nursing. A high fat supplement or addition of a corn oil to the feed would also add energy (calories) to the diet without increasing diet 'bulk' so she can eat more calories than with forage or even a grain-based feed without the oil.

### THIRD PART:

Now that they have even more information, allow participants to discuss some of the ideas they had for their homework assignment which was to evaluate their farm feeding plan and determine if their feeding system would change based on information learned. Encourage discussion of resources they have (or would need) to support their decisions. For example, if they want to feed kids/lambs grain can they separate them from adults (or provide a creep area)? If they want a forage-only system, do they have enough land and pastures? Equipment to plant supplemental annuals?

Facilitator's notes – more information you might be interested in providing participants:

- Diet changes, especially with grain based feeds, should be done gradually over one to two weeks' time and animals should be vaccinated to help protect against overeating/blood scours (*Clostridium perfringens* type C/D).
- Most commercial (or non-show) producers should likely feed more towards optimal than maximal performance/production – this helps profitability. For example, feeding to right at the correct body condition and for health but not for the fastest growth or highest body condition possible.
- Feeding females extra feed/energy 2-6 weeks prior to breeding often increases the chances of the female having multiple births.
- Some producers may not want to feed commodity type feeds. There are some alternative high fat energy supplements like black oil sunflower seeds (BOSS) and flax seed/meal that are popular with some small-scale producers.

***How they can use this at home*** – Identify forages for the farm based on livestock species and nutrient content; conduct a pasture soil test, discuss results with local county extension agent.

BREAK

**Predator Control (40 min, Dr. Jay Daniel, Berry College)**

- Predator types
- Risks for attracting predators
- Methods to control predators

**Learning Objectives:**

- Describe the risks that determine the need for predator control, the types of predator control and the resources needed for each.

**Optional Activity (20 min)** – Discuss and develop a predator control plan based on farm risks and resources.

## PREDATOR CONTROL LEARNING EXERCISE

The learning objective for this Session is to describe the risks that determine the need for predator control, and the types of predator control and resources needed for each.

This exercise is designed to reinforce the information presented during the Predator Control Session and help the participants apply their new knowledge. It can be conducted in small groups, individually or as a single class learning tool. It will include discussion of the knowledge of predators, the strategies used to minimize herd losses considering herd size and the economic feasibility of predator control in individual herd management programs.

Give the participants a set amount of time to begin to develop a predator control plan individually, as a small group or as a single group by doing the following:

**FIRST:** List (and discuss with others) the types of predators you have on your farm or might have on your farm given the environment. Consider:

- a. Those you have seen
- b. Wooded areas on or near your small ruminant pastures/housing
- c. Underground/cave or rock dwellings that could house predators
- d. Attractants for predators (i.e. chicken houses composting dead will attract vultures)

**SECOND:** List/discuss the issues related to minimizing herd losses on your farm, including:

- e. Your herd size
- f. Your resources and how you may be able to change them
  - i. Pastures/location
  - ii. \*Type of fencing you have/need
  - iii. Barns or shelters you have/need
  - iv. \*\*Guardians
- g. Management choices that could reduce predation

\*When the individuals or groups begin to discuss fencing, be sure to clarify that adequate fencing is the first line of defense for all types of predator control.

\*\*When guardians are brought up, guide the discussion to some pros and cons for the use of dogs as well as donkeys and llamas or alpacas. See examples below.

### Guardian dogs:

Pros:

- 1) Guard Dogs have instinctive traits- discuss this as an issue and why this is a positive.

Example: ease of training

- 2) Dogs can both circle the herd in a small group or fight and attack- discuss the situations of each. Example: pasture in close proximity of the owners home-ease of owner to get to the herd when alerted to presence of predator/fighting off the predators in the case of the owner not able to get to herd in a timely manner

Cons:

- 1) Dogs can be predators- discuss how this can be an issue if you purchase a guard dog with minimal training
- 2) Guard Dogs can be expensive. What are some of the barriers involved in the expense of a guard dog- finding a reputable breeder- feed, time involved in making sure feed is available to guard dogs at all times.

### **Donkeys:**

Pros:

- 1) Donkeys have an “built-in” distrust for canines (dogs, coyotes and foxes). Discuss how this is a natural benefit to the small ruminant farmer- training expenses, etc.
- 2) The ratio of donkey to groups of sheep or goats is 1:300. Discuss how this is a benefit economically

Cons:

- 1) It is essential that you use a jenny (female donkey) or a gelded (castrated) jack (male donkey). Discuss the reason behind this (aggressiveness, etc.). Also if a jack has been castrated after he has expressed an aggressive tendency discuss how this can also be an issue in keeping a stress free goat/sheep herd.
- 2) The success of individual donkeys can be highly variable- discuss how this can be an issue when purchasing as a guard animal. Ex. Will the guard animal breeder replace your purchase or refund the purchase cost?
- 3) May not be able to use with dogs (see discussion for this in llama/alpaca section too).
- 4) Have to be careful about feed additives.

### **Llamas/Alpacas:**

Pros

- 1) Feed cost/type similar to sheep/goats; they are browsers/grazers and only require one small square bale per week as food supplementation in the winter. Discuss how that compares the savings versus feed for guard dogs.
- 2) Alpacas can be used as a ratio of 2:250 for ewes due to their capacity to cover large areas. Discuss how savings on animal purchase, management style and feed cost is beneficial using alpacas.

Cons:

- 1) Llamas/Alpacas do not distinguish between herding dogs and predator dogs. Discuss how to use guard dogs along with llamas/alpacas. Once the llama/alpaca regards the herding dogs as an integrative predator control partner, will they then ignore coyotes, foxes, wild dogs like they do the guardian or will they treat them as predators?

### **Others:**

Pros: Cattle can bring in income and help protect small ruminants if they bond with them.

Cons: Cattle don't always bond with small ruminants; mostly useful when have small calves

**THIRD:** For the last part of this activity, list/discuss the economic costs for the types of animal loss management tools you are considering for your farm.

# JOURNEYMAN FARMER CERTIFICATE PROGRAM

## Small Ruminant Production



FORT VALLEY STATE UNIVERSITY  
A State and Land-Grant Institution • University System of Georgia



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## Session 2 Pasture Management



Dr. Dennis Hancock  
Extension Forage Specialist  
Crop & Soil Sciences Dept  
University of Georgia



---

---

---

---

---

---

---

---

## Learning Objectives

- Identify forage types and basic nutrient content (i.e. grasses, legumes, forbs and browse)
- Recognize the link between forage height/maturity and nutrient content/quality as well as parasite management.



---

---

---

---

---

---

---

---

Over the next few minutes...

- Pasture management to meet nutritional needs of various small ruminant production classes
- The necessity for improved pastures
  - Desirable forage species
  - Enabling the instinct to browse for goats (maybe hair sheep)
- Ensuring forage availability
  - Goal: year-round feed supply
  - Emphasizing the use of legumes
- Reducing internal parasite load
  - Novel forages
  - **Rational** grazing

Photo: Susan Schoenian, Baalands Farm



---

---

---

---

---

---

---

---

## Pasture basics

- Soil type/texture (percentage sand, silt and clay; i.e. sandy clay loam, loam)
- Soil Health/Fertility
  - Enough nutrients for healthy plants/good yields
  - Optimal pH (target 6.0 to 6.8, near neutral); need appropriate pH to get the most out of fertilizer
  - Good water storage and drainage
  - Low disease and pest pressure



---

---

---

---

---

---

---

---

## Soil Testing

- Many labs, many different types of tests
- Take a representative sample
  - Soil test handbook available at:  
<http://extension.uga.edu/agriculture/soil/>
- Use test to look at long term trends
- Contact your local county extension office for assistance/more information:  
<http://extension.uga.edu/about/county/index.cfm>



---

---

---

---

---

---

---

---



The least used and least understood element of a good forage management plan.

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

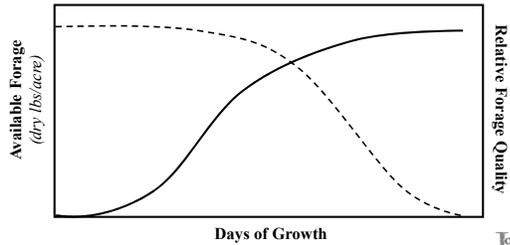
---

---

---

---

### The Paradox of Forage Yield and Quality



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Meat Goat Needs\*

	Protein (CP)	Energy (TDN)
Bucks	11%	60%
Dry doe (110 lb)	9-10%	55%
Late gestation (twins)	13%	66%
Early lactation (twins)	13%	55%
Weanling (30 lb, max ADG)		
Boer	23%	89%
Local	19%	89%
Yearlings (66 lb Boer, avg growth)	14%	67%

\*Based on dry matter intake of around 2% of body weight (NRC, 2007) from Dr. Niki Whitley, Fort Valley State University

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## SHEEP Needs

	Protein (CP)	Energy (TDN)
*Rams (220 lb, maintenance)	7%	53%
*Dry ewe (132 lb)	7.2%	53%
*Late gestation (twins)	10%	66%
*Early lactation (twins)	15%	67%
Weanling (4 mon, 66 lb, max ADG )		
Early maturing	13%	79%
Late maturing	19%	66%
Yearling ewes (88 lb)	8%	66%

\*Based on dry matter intake of around 2% of body weight (NRC, 2007)  
from Dr. Niki Whitley, Fort Valley State University




---

---

---

---

---

---

---

---

---

---

## Grazing Habits



Goats prefer to graze above the shoulder. Sheep usually prefer to graze, though they will also eat forbs.




---

---

---

---

---

---

---

---

---

---

## Approximate Diet Selection of Grazing Animals when Given Choice

Animal Species	Type of Diet		
	Grasses	Legumes	Browse
Cattle	65-75	20-30	5-10
Horses	70-80	15-25	0-5
<u>Sheep</u>	<u>45-55</u>	<u>30-40</u>	<u>10-20</u>
<u>Goats</u>	<u>20-30</u>	<u>10-30</u>	<u>30-50</u>
White-tailed deer	30-60	40-50	10-30




---

---

---

---

---

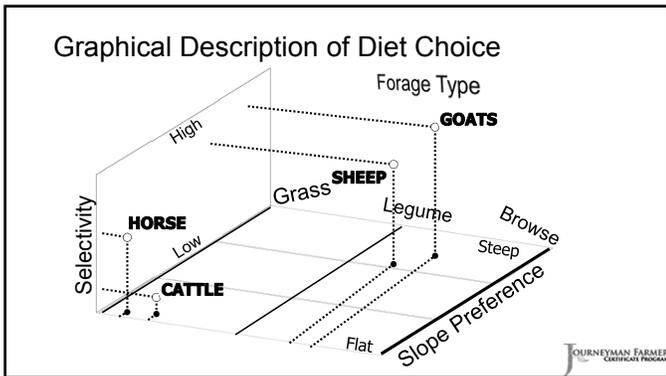
---

---

---

---

---




---

---

---

---

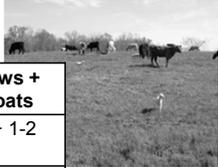
---

---

---

---

### Stocking Rates on 2-2 1/2 Acres



Pasture Type	Cows	Sheep	Goats	Cows + Goats
Excellent Pasture	1	5-6	6-8	1 + 1-2
Brushy Pasture	0.75	6-7	9-11	0.75 + 2-4
Silvopasture	0.5-0.75	4-6	6-8	0.5 + 2-4
*Brush Eradication			9-15	0.5 + 6-8

\*Sheep can also be used for brush clearing though it often takes longer than for goats.

---

---

---

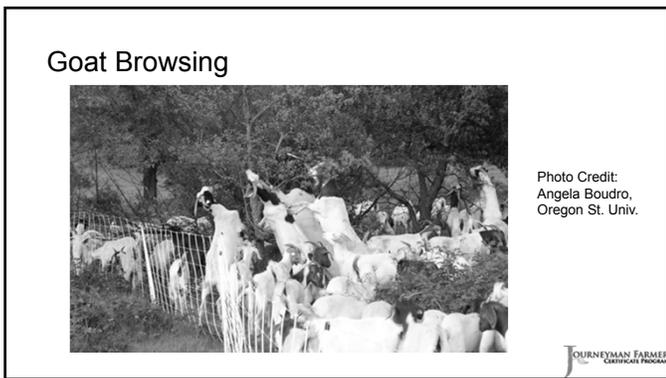
---

---

---

---

---




---

---

---

---

---

---

---

---

# Kudzu



**55-60%  
TDN;  
12-18%  
CP**

Photo credit:  
D. Ditsch and  
B. Sears,  
UKCES



---

---

---

---

---

---

---

---

# Also known to like...

Many browse/weed species:

- Chinese privet
- Pigweeds
- Thistles
- Stinging nettle
- Blackberry/dewberry
- Plantain
- Curly dock
- Multiflora rose
- Sweet gum



Photos: Susan Schoenian, Baalands Farm



---

---

---

---

---

---

---

---

Before, April 6



Photo Credit:  
Angela Boudro,  
Oregon St. Univ.



---

---

---

---

---

---

---

---

After, April 14



Photo Credit:  
Angela Boudro,  
Oregon St. Univ.




---

---

---

---

---

---

---

---

Sustainable Forage System?



Photo credit: D. Ditsch  
and B. Sears, UKCES




---

---

---

---

---

---

---

---

What else do we know about goat grazing behavior?

- Diverse diet
  - But, browse alone may not be sustainable
- Consume undesirable plants
- Co-grazing ability
  - Cattle
  - Horses
  - Sheep
- Preferential consumption of seedling stems
- Resistant to some plant toxins/anti-quality factors





---

---

---

---

---

---

---

---

## How do we get enough energy in the animal?

- The animal eats more forage.
  - What is the physical limit?
  - Can a doe or ewe eat enough straw to meet her energy needs?
- What forage the animal eats must be high in energy.
  - High digestibility -> High energy
- Bottomline: Every bite has to count!
  - Pre-hensile lips make selective grazing/browsing easy!

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

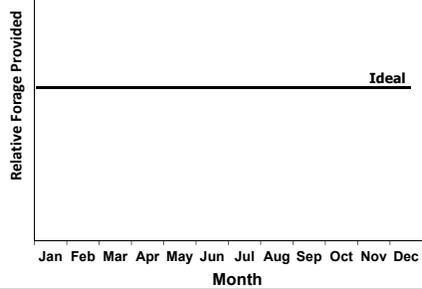
---

---

---

---

## Forage Distribution



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

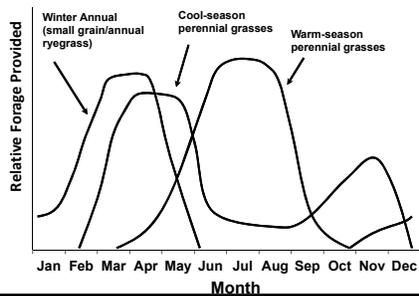
---

---

---

---

## Forage Distribution



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

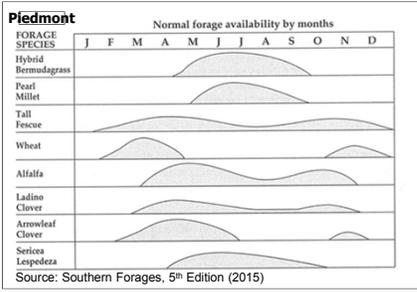
---

---

---

---

## Forage Productivity Differs Throughout the Year



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

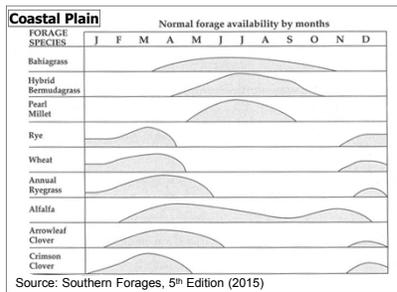
---

---

---

---

## Forage Productivity Differs Throughout the Year



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

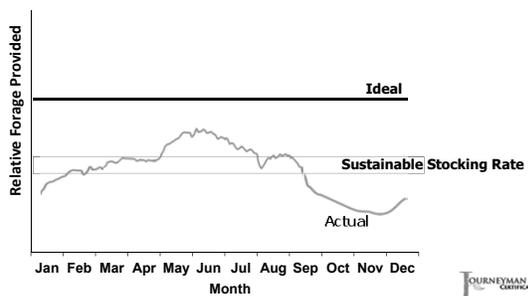
---

---

---

---

## Forage Distribution



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

**Goat Grazing Preference Trial**  
UK Robinson Station  
2006



Photo credit: D. Ditsch and B. Sears, UKCES




---

---

---

---

---

---

---

---

**Goat Grazing Preference Trial**  
UK Robinson Station  
2006

- (Most to least)
- Sorghum Sudan
  - White clover
  - Turnip
  - Red clover
  - Chicory
  - Sericea Lespedeza
  - Tall Catgrass
  - Alfalfa
  - Warm Season Grasses (EGG, Switch, BB, Indian)
  - Reed Canarygrass
  - Orchardgrass
  - Annual Lespedeza
  - Novel Endophyte TF
  - Endophyte Free TF
  - Infected TF
  - Bluegrass
  - Bermudagrass



Photo credit: D. Ditsch and B. Sears, UKCES




---

---

---

---

---

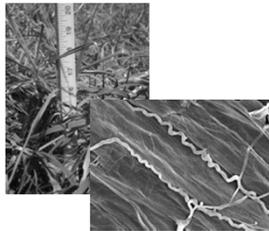
---

---

---

**Cool Season Perennial Grasses - Tall Fescue**

- Most widely used forage grass in the U.S.
  - High yields and persistent.
- Endophytic fungus produces toxic alkaloids
  - Fescue toxicosis
  - Alkaloids aid drought tolerance and persistence
- Novel Endophyte TF gives persistence benefit w/o toxicosis problems.




---

---

---

---

---

---

---

---

## Warm Season Perennial Grasses



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## Summer Annuals

Pearl Millet, Sorghum x Sudan, Sudangrass, Brown Top Millet, Proso Millet, ect.

- All have nitrate toxicity potential
- Sorghums have prussic acid potential
  - Sorghums should NOT be fed to horses
- Late plantings result in low yields



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

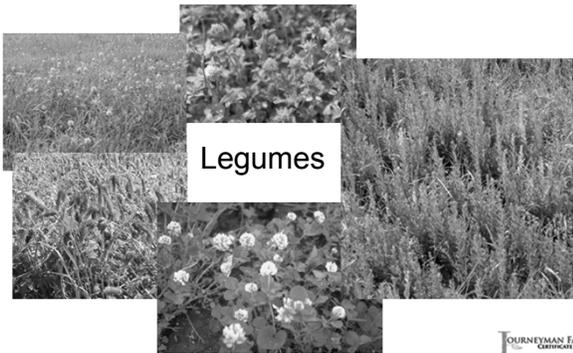
---

---

---

---

## Legumes



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

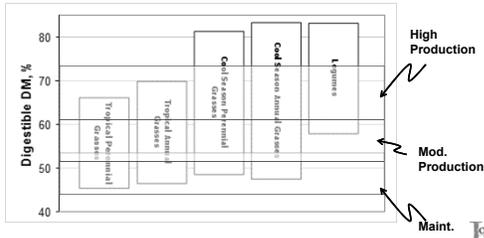
---

---

---

---

### Quality Differences in the Major Forage Species



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Legumes Help to Offset the Negative Effects of Endophyte-Infected Tall Fescue



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

We force goats (and sheep) to graze close to the ground.



Grazing close to the ground increases the opportunity for parasitic larva consumption.

Better to graze over 4-6" in height to avoid parasites, however, over-mature (tall) forage can be less nutritious, so it is a balancing act.

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

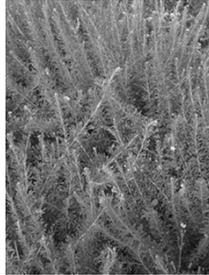
---

---

---

## Serecia lespedeza

- Has been shown to reduce parasite fecal egg counts in goats and sheep
- Thought to work in part through specific types of condensed tannins
  - Tannin- found in many plants
  - Most research with AU grazer serecia lespdeza



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## Rational (aka Rotational) Grazing

Allows one to:

- Rotate out of heavy parasite pressure
- Optimize selection of highest quality forage
- Prevent overgrazing
- Graze multiple forage species
- Integrate woodlands and grass - legume pastures
- Integrate warm and cool season forage species



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## Perimeter Fencing

- Goats need better fencing than sheep (stronger, taller)
- Electric will work with the correct number of hot wires (always hot)
- Smaller openings (4x4, 2x4) best with woven wire due to horns (or offset hot wires - always hot)
- Various fencing for cross-fencing to split pastures (i.e. for rotational grazing)



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

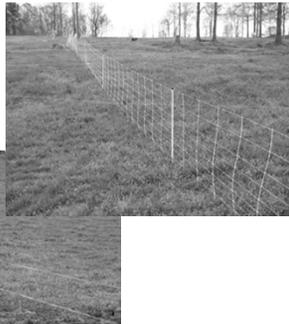
---

---

---

---

# Fencing



3 hot wires: 10, 20, and 36 inches



---

---

---

---

---

---

---

---

[www.georgiaforages.com](http://www.georgiaforages.com)

GeorgiaForages.com Email Updates



---

---

---

---

---

---

---

---

# Questions?



[www.georgiaforages.com](http://www.georgiaforages.com)



---

---

---

---

---

---

---

---

## Additional Resources

Forages and pastures

- [www.georgiaforages.com](http://www.georgiaforages.com)
- [www.sheep101.info/201/pasturemgt.html](http://www.sheep101.info/201/pasturemgt.html)
- [www.sheepandgoat.com/#!webinars/cu81](http://www.sheepandgoat.com/#!webinars/cu81)

Fencing

- [www.sheep101.info/201/fencing.html](http://www.sheep101.info/201/fencing.html)
- [www.premier1supplies.com/instructions.php](http://www.premier1supplies.com/instructions.php)
- [www.staytuff.com/PDF/Stay-Tuff\\_Installation\\_Guide\\_final\\_Oct\\_13.pdf](http://www.staytuff.com/PDF/Stay-Tuff_Installation_Guide_final_Oct_13.pdf)

No products, business, companies or manufacturers are being endorsed.



---

---

---

---

---

---

---

---



This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2015-70017-22861.

 **USDA Beginning Farmer Rancher Development Program**  
 **Developing the Next Generation of Sustainable Farmers in Georgia Grant**



---

---

---

---

---

---

---

---

# JOURNEYMAN FARMER CERTIFICATE PROGRAM

## Small Ruminant Production



## Session 2 Activity Small Ruminant Nutrition

Photos: Susan Schoenian, Baalands Farm and Dr. Niki Whitley



## Learning Activity

For the next slides, indicate which of the pictured animals need more nutrients (have higher nutrient requirements in general).



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

## Learning Activity



Which needs more nutrients?

1. Not pregnant (open) yearling doe or a lactating yearling doe

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

## Learning Activity

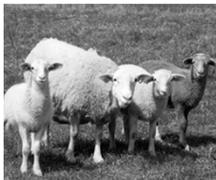


Which needs more nutrients?

1. A lactating yearling doe
  - *Still growing and milking*
  - *Yearlings need more than mature females if same production stage*
  - *Same answer for sheep*

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

## Learning Activity

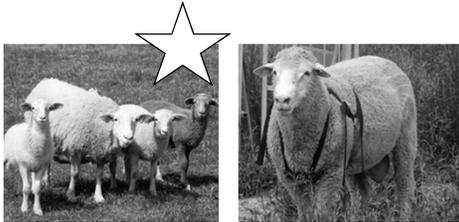


Which needs more nutrients?

1. A ewe with triplets or a large adult ram during breeding season

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

## Learning Activity

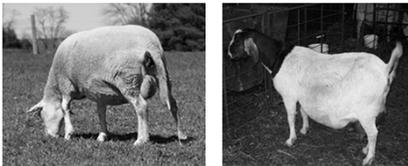


Which needs more nutrients?

2. A ewe with triplets
  - *Lactating/nursing females have higher nutrient requirements than healthy males*
  - *Same answer for goats*

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

## Learning Activity

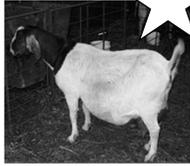


Which needs more nutrients?

1. A late gestation ewe or late gestation doe?

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

## Learning Activity



Which needs more nutrients?

1. A late gestation doe
  - All else the same, goats have higher requirements than sheep
  - If ewe carrying triplets but doe a single, answer would likely change
  - If ewe in poor condition (needed to gain weight) but doe was fat, answer may change

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

## Learning Activity



Which needs more nutrients?

1. A Boer kid or a Spanish kid?

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

## Learning Activity



Which needs more nutrients?

2. A Boer kid

- *Boers greater genetic potential for muscling and growth*
- *All else the same, will have higher requirements than Spanish*

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

## Learning Activity



Which needs more nutrients?

1. Ewes in the spring or ewes in the winter?

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

## Learning Activity



Which needs more nutrients?

1. Ewes in the spring or ewes in the winter?
  - *Goats and sheep housed outdoors need more energy in winter to keep warm*
  - *Hay digestion helps create body heat*
  - *Good quality hay along with other needed energy supplementation important*

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

## Learning Activity



Which needs more nutrients?

1. Early pregnant ewes or open (not pregnant) ewes?

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

## Learning Activity



Which needs more nutrients?

2. Early pregnant ewes and open (not pregnant) ewes are similar
  - *Trick question*
  - *Requirements for early pregnant and open does and ewes are not really that different*
  - *If in good condition, extra feed/nutrients not needed in early pregnancy*
  - *Good time to feed extra if need to gain weight*

**J**OURNEYMAN FARMER  
CERTIFICATE PROGRAM

## Learning Activity

How can you provide protein and energy for growth to a young kid or lamb:

1. Using a forage-only feeding system?

**J**OURNEYMAN FARMER  
CERTIFICATE PROGRAM

## Learning Activity

How can you provide protein and energy for growth to a young kid or lamb:

### 1. Using a forage-only feeding system?

- *Excellent forage planning and management may be able to meet the needs of lambs and older kids for optimal (not maximal) growth*
  - *Good quality grass/legume mix pasture and browse/forbs*
  - *Rotational grazing*
  - *Fertilization/Irrigation (?)*
  - *Plant height management for nutrients and parasite control*
- *Younger just weaned kids and some breed lambs may need extra supplementation, especially if pastures have high parasite loads*



## Learning Activity

How can you provide protein and energy for growth to a young kid or lamb:

### 1. Using a forage plus feed supplement feeding system?



## Learning Activity

How can you provide protein and energy for growth to a young kid or lamb:

### 2. Using a forage plus feed supplement feeding system?

- *Allows for flexibility when forage resources are limited (not enough land/pastures available, drought, etc.)*
- *Feed supplement with pasture or hay, depending on farm resources can provide extra protein and energy*
  - *Ex: When pasture/hay low or low quality, a grain-soybean meal fed at one half to one percent of total animal body weight can help; more may be needed for kids than for lambs and for winter than for summer*
- *Supplementation can vary based on requirements and animal body condition.*



## Learning Activity

How can you provide enough energy for weight gain to a very thin doe or ewe just giving birth to triplets:

### 1. Using a forage-only feeding system?



## Learning Activity

How can you provide enough energy for weight gain to a very thin doe or ewe just giving birth to triplets:

1. Using a forage-only feeding system?
  - *Highly unlikely that forage-only feeding system would be adequate*
  - *Could remove some of the offspring (bottle feed)*



## Learning Activity

How can you provide enough energy for weight gain to a very thin doe or ewe just giving birth to triplets:

1. Using a forage plus feed supplement feeding system?



## Learning Activity

How can you provide enough energy for weight gain to a very thin doe or ewe just giving birth to triplets:

2. Using a forage plus feed supplement feeding system?
  - *Feed supplement with high energy and appropriate protein for the species (goat or sheep) along with excellent quality forage (pasture) and/or hay*
  - *Cannot eat enough forage to meet needs for milk production and to gain weight (productive females lose weight during lactation)*
  - *High fat supplement or adding corn oil to the feed adds energy (calories) without increasing diet 'bulk' so can eat more calories*



This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2015-70017-22861.

**USDA** Beginning Farmer Rancher  
Development Program



Developing the Next Generation  
of Sustainable Farmers in Georgia Grant



  
**JOURNEYMAN FARMER**  
 CERTIFICATE PROGRAM  
  
**Small Ruminant Production**





---

---

---

---

---

---

---

---

Session 2

Predator Control

Dr. Jay Daniel  
Associate Professor of Animal Science  
Berry College





---

---

---

---

---

---

---

---

Learning Objectives

- Risks that determine the need for predator control
- Types of predator control
- Resources needed for each



---

---

---

---

---

---

---

---

### Predators

Photo: Jay Daniel

Photos left: Flickr - Pat Gaines, creative commons license

Photos right: Flickr - Tony Hisgett, commercial license

**JOURNEYMAN FARMER**  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Predators

- Coyote
- Dogs (wild and neighbor's)
- Fox
- Bobcat
- Wolf
- Bear
- Cougar
- Eagle

Photo by Niki Whitley

**JOURNEYMAN FARMER**  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Golden Eagle capturing a deer

<http://www.youtube.com/watch?v=Yz7FFIFy8eM>

**JOURNEYMAN FARMER**  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Predators

- Vultures
  - In addition to eating the dead, they have been known to kill live animals (especially newborn/those lambing or kidding).
- Crows
  - A flock of crows killed 17 sheep in Loerrach, Germany (February 7, 2003).
- Mustangs
  - Running herds have been reported to trample entire flocks.



Photo: George Gallagher




---

---

---

---

---

---

---

---

### Predators

- Some predators are protected by the government.
- Example:
- Louisiana black bear and Grizzly bear are listed as threatened
  - Florida panther and gray wolf is listed as endangered.



Photo: <http://www.aphis.usda.gov/>




---

---

---

---

---

---

---

---

### Rome News Tribune March 8, 2015 (Georgia)

#### Dogs kill vegetation-controlling goats

**AUGUSTA (AP)** — Augusta city officials say dogs have killed several goats that the city uses to control vegetation near drainage areas. Officials told local media the dogs apparently dug under a fence surrounding the area the goats were being held in and attacked them on Thursday or Friday. Interim Deputy City Administrator Steve Cassell says eight goats were killed. Augusta Animal Services Field Supervisor Edward Jefferson says the owner of two of the dogs has been cited for failing to control and vaccinate his animals. The Augusta Commission and Richmond County Health Department started using goats to control vegetation last year as a cost-saving measure.




---

---

---

---

---

---

---

---

### Control Means

- Adjust management
- Fencing
- Repellants and Frightening Devices
- Trapping/Poisoning/Hunting
- Guard Animals
  - Dogs
  - Donkeys
  - Alpacas/Llamas



Photos: Susan Schoenian, Baatlands Farm



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Adjust Management

- Avoid attacks
  - Keep animals healthy (sick and weak animals make easier prey).
  - Pen animals at night.
  - Adjust kidding/lambing season (highest coyote losses from late spring to September).
  - Remove and properly dispose of dead animals.
  - Select safer pastures.

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Adjust Management

- Avoid attacks
  - If high losses are expect, it may be worthwhile to initiate trapping or other control means before turning animals out.
  - Sometimes removing coyote pups will stop attacks.
  - Weaning can sometimes stop attacks.



Photo: Chris Saserbach (https://www.flickr.com/photos/kurusu/5742418582/) via freeforcommercialuse.com

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Fencing

- Must prevent crawling under/jumping over
- Electric fence must be no further than the distance from the tip of the nose to the top of the poll apart.
- Net-wire openings less than 6" high and 4" wide
- Effective deterrent; not 100% preventive



Photo by: Niki Whitley




---

---

---

---

---

---

---

---

### Predator Exclusion Electric Fence

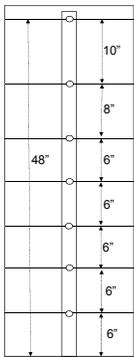
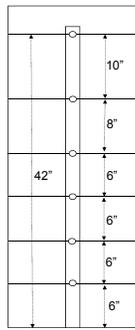


Photo: Susan Schoenian, Baalands Farm




---

---

---

---

---

---

---

---

### Repellants and Frightening Devices

- Lighted corrals or pens
- Vehicles parked near where losses occur
- Change repellants periodically
- Other devices include propane cannons, horns, sirens, bells, radios with amplifiers, flashing strobe lights



Photo: Jeff P  
www.flickr.com/photos/jeffpang/36862676677 via  
freefoto.com/stockuse.com




---

---

---

---

---

---

---

---

### Traps

- Learn/follow regulations
- Limited effectiveness
- Georgia trapping regulations:
  - <http://www.georgiawildlife.com/node/342>



Photo: Jay Daniel

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Poisoning

- Non-selective
- M-44 device ("Coyote Getter")
  - Sodium cyanide the poison.
  - Limited to trained personnel
- Compound 1080 livestock protection collar
  - Not widely used
  - Used carbofuran as the poison; leaking a problem



Photo: Jitze Couperus  
[www.flickr.com/photos/jitze1942/175124102/](http://www.flickr.com/photos/jitze1942/175124102/)  
20 via freedocommercialuse.com

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Hunting

- Learn the regulations and follow them.
  - <http://www.georgiawildlife.com/hunting/regulations>
- Calling should be used sparingly.
- A coyote population can be maintained with annual kill rates up to 70%.
- An annual kill rate of 75% would take 50 years to eradicate coyotes.

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Guard Animals

- 45% sheep operations use guard animals (alpacas, dogs, donkeys or llamas)
- 82% herded/open range flocks use guard animals
- Dogs most common (30% of sheep operations)



Photos: Susan Schoenian, Baalands Farm




---

---

---

---

---

---

---

---

### Guard Dogs



Photo: Jerry Kirkhart  
[www.flickr.com/photos/jkirkhart/35728888965/](http://www.flickr.com/photos/jkirkhart/35728888965/)  
via creativecommons.org



Photo: Schirreagan  
[www.flickr.com/photos/45699481/](http://www.flickr.com/photos/45699481/)  
via creativecommons.org

Photos left and middle: Susan Schoenian




---

---

---

---

---

---

---

---

### Guard Dogs



Photo: Christ vT  
[www.flickr.com/photos/christvt/7665280990/](http://www.flickr.com/photos/christvt/7665280990/)  
via creativecommons.org



Photo: caodegadostramontano.net/machos.html



Photo: [www.sheepmagazine.com/31-2/karakachan\\_livestock\\_guardian\\_dogs/](http://www.sheepmagazine.com/31-2/karakachan_livestock_guardian_dogs/)




---

---

---

---

---

---

---

---

### Guard Animals - Dogs

- Match breed with environment
- Availability
- Adequate number for job
- Adequate fencing
- Proper care (do not let the dog run out of food)



Photo: Susan Schoenian, Baalands Farm

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Guard Animals – Dog Training

- Guarding is instinctive.
- At 7-8 weeks of age, place in a small pen with sheep or goats, preferably lambs or kids.
- At about 16 weeks of age, can release them into larger pasture.
- Correct any undesirable behavior (ear chewing, roaming).
- You should be able to catch and handle the dog, but a good guard dog is not a pet.



Photo: Susan Schoenian, Baalands Farm

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Guard Animals – Dog Behavior

- Scent marking boundaries
- Warning barks occasionally – should not bark constantly
- Circle animals into a small group
- Run at threat, may run into or roll
- Fight/attack threat

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Guard Animals - Donkeys

- Inherent dislike for dogs, coyotes, foxes
- Success highly variable
- Test response to a dog before use
- Respond to dogs/canid predators with braying, bared teeth, running attack, kicking and biting.



Photo: Susan Schoenian, Baslands farm




---

---

---

---

---

---

---

---



Photo: <https://www.youtube.com/watch?v=YrCA-aDYbPA>



Photo: Georgia Outdoor News: <http://www.gon.com/article.php?id=3915>




---

---

---

---

---

---

---

---

### Guard Animals - Donkeys

- Use only a jenny or gelded jack.
- Use only one donkey for each group of sheep or goats (300 head or less).
- Allow 4-6 weeks for the donkey to bond with sheep or goats.
- Remove the donkey during lambing or kidding.
- Use donkeys in small, open pastures.
- Avoid feeds with monensin or lasalocid, which are poisonous to donkeys.



Photo: Jay Daniel




---

---

---

---

---

---

---

---

### Guard Animals – Alpacas/Llamas

- Inherent dislike for dogs, coyotes, foxes
- Use similar to donkeys
- Wool production, but not to mix with sheep wool
- Do not distinguish between predators and herding dogs



Photo: Susan Schoenian, Baalands Farm




---

---

---

---

---

---

---

---

### Guard Animals – Alpacas/Llamas

- Use a gelded male.
- Llamas are browsers and grazers and can be easily managed with sheep or goats; winter supplementation can be one square bale/week.
- Train by exposing to sheep or goats in a small pen for 5-7 days, moving to a larger paddock for 5-7 days, and finally to pasture.



Photo: Jay Daniel




---

---

---

---

---

---

---

---

### Guard Animals – Alpacas/Llamas

- An Australian Capital Territory operation with 1,350 ewes on 430 acres runs 2 alpacas with every 250 ewes.
- The area has a large fox population.
- Following introduction of alpacas, the lambing percentage increased from 98 to 127%.



Photo: David Wild (www.flickr.com/photos/publicenergy/12272373555) via creativecommons.org




---

---

---

---

---

---

---

---



Couple in Livingston, Montana use yaks (4) to guard Icelandic sheep (500) from wolves

Photo: <http://www.wolfridgeicelandics.com/guard-yaks>



---

---

---

---

---

---

---

---

### Heifer kills a coyote



Photo: Trey Gafnea, University of Georgia Cooperative Extension



---

---

---

---

---

---

---

---



From YouTube – series of pictures of a cattle attacking a black bear

Photo: <https://www.youtube.com/watch?v=2KMvNdQY-ro>



---

---

---

---

---

---

---

---



From same YouTube photo series

Photo: <https://www.youtube.com/watch?v=2KMvNgDY-ro>

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---



Running away....

Photo: <https://www.youtube.com/watch?v=2KMvNgDY-ro>

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Additional Resources

- Meat goat production handbook (Langston University): [www2.luresext.edu/goats/extension/handbookorderform.pdf](http://www2.luresext.edu/goats/extension/handbookorderform.pdf)
- eXtension.org - [www.extension.org/pages/27119/goat-predator-control](http://www.extension.org/pages/27119/goat-predator-control)
- Sheep 101 <http://www.sheep101.info/201/predatorcontrol.html>

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

**JOURNEYMAN FARMER**  
CERTIFICATE PROGRAM

This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2015-70017-22861.

**USDA** Beginning Farmer Rancher  
Development Program

**NIFA** Developing the Next Generation  
of Sustainable Farmers in Georgia Grant

**UGA extension** **FORT VALLEY STATE UNIVERSITY** **GEORGIA ORGANICS**

---

---

---

---

---

---

---

---

# Resource Page

**NOTES:**

# JOURNEYMAN FARMER CERTIFICATE PROGRAM

Small Ruminant Production  
Health and Diseases;  
Breeding, Lambing, and Kidding

## Session Three

## Session 3: Health and Diseases; Breeding and Kidding/Lambing

### *Health and Diseases (50 min – Charlotte Clifford-Rathert, Lincoln University)*

- Healthy goats
- Common diseases/prevention
- First aid kit recommendations

#### **Learning Objectives:**

- List some of the most common diseases seen in small ruminants and understand how to prevent or treat them

**Activity (20 min)** – Health and Diseases Learning Exercise

**How they can use this at home** – Evaluate herd health status and biosecurity protocols and determine if changes are needed to help prevent the most common diseases seen in small ruminants.

This exercise is designed to reinforce the information presented during the Session and help the participants apply their new knowledge. It is designed to be used as an individual tool that will be discussed and thus used as a class learning tool. It will include providing the participant the learning activity handout and allowing 10 minutes to complete the activity. Then provide the answers to the class. Assure participants that they will not be assigned a grade or score and that the purpose of the exercise is to stimulate discussion.

1. Which of the following small ruminant diseases are reportable animal diseases in Georgia and/or zoonotic diseases (animal diseases transmittable to man)? Identify reportable diseases with a “R” and zoonotic diseases with a “Z.” Circle the ones that are among the most common diseases in small ruminants.

- a. Caseous Lymphadenitis (CL)
- b. Contagious Ecthyma (Soremouth)
- c. Enterotoxemia (Overeating)
- d. Infectious Footrot
- e. Listeriosis
- f. Cutaneous Fungal Lesions (Ringworm)
- g. Scrapie

Answers:      R: a,b,g (CL, Soremouth, Scrapie)  
                    Z: a,b,e,f (CL, Soremouth, Listeriosis, Ringworm)

Among the most common: a, b, c, d – CL, Soremouth, Overeating and Footrot are really common; it seems that the show industry sees f, Ringworm a lot; e, Listeriosis is not uncommon (but may be misdiagnosed if it is the intestinal or reproductive form instead of neurological); scrapie is extremely rare

2. True or False (circle one). If the animal and herd it came from looks healthy, it is not necessary to quarantine for a period of time prior to introduction into your herd.

Answer: False – Animals could be sick or carriers of a disease and not be showing any symptoms. Quarantine (without fence line contact) is important. Animals in the quarantined animals should be cared for 'last' in the schedule and you should never wear clothes/shoes exposed to quarantine area

BREAK

***Breeding, Lambing and Kidding (50 min, Dr. Kevin Pelzer, Virginia Polytechnic University)***

- Reproduction and breeding
- Normal lambing and kidding
- Problems that may occur during lambing and kidding

***Learning Objective:***

- Understand best management practices for breeding and for lambing or kidding  
***What they can do at home*** – Search the internet and view birthing videos online; determine what resources are already available and those that may still be needed for lambing or kidding.

**JOURNEYMAN FARMER**  
CERTIFICATE PROGRAM

**Small Ruminant Production**




FORT VALLEY STATE UNIVERSITY  
A State and Land-Grant Institution • University System of Georgia




---

---

---

---

---

---

---

---

**Session 3**  
**Health and Diseases**



Charlotte Clifford-Rathert, DVM  
State Extension Specialist - Small Ruminants  
Lincoln University

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

**Learning Objective**

- List some of the most common diseases of goats and sheep and understand how to prevent or treat them

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Know What 'healthy' Looks Like

- Runs to feed
- Bouncy, springy step
- Bright eyes
- Carries head upright
- Flashy tail
- Healthy coat
- Playful
- Round solid pellets (stool)



Photos: Susan Schoenian, Baalands Farm




---

---

---

---

---

---

---

---

### Signs of Problems

- Depressed, not getting up and moving around
- Standing hunched with head and tail down
- Coughing, wheezing, and/or breathing hard
- Not interested in others and playing
- Off feed/not eating
- Grinding teeth
- Dull eyes
- Diarrhea
- Runny nose
- Lameness
- Poor body condition



Photos: Susan Schoenian, Baalands Farm




---

---

---

---

---

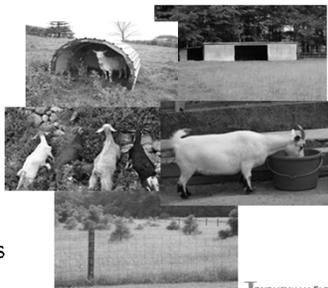
---

---

---

### Good Management = Good Health

- Adequate Facilities
- Quarantine / Isolate
  - Prevent introduction of disease and parasites to animals on farm
- **KEEP RECORDS!**
- Adequate forage & water (1-4 gallons head/day; warm in winter, cool summer)
- Good NUTRITION supports the immune system; BCS




---

---

---

---

---

---

---

---

### Basic Vaccination Program

- Vary from farm to farm, vaccinate production animals annually
- Lambs and kids: 5-6 weeks of age, booster at 8-9 weeks
- CD&T vaccine, prevent "over-eating disease"/bloody scours; especially important when:
  - Feeding high concentrate diets
  - Dehorning and castrating, to prevent tetanus
- 7 or 8-way (contains 7-8 Clostridium serovars - (Blackleg, Malignant edema, Red Water); if not an existing problem, may be added expense



Photo: Susan Schoenian, Baalands Farm




---

---

---

---

---

---

---

---

### Watch for Signs of Parasites\*

- Pale gums and eyelids
- Poor weight gain
- Weight loss
- Bottle Jaw
- Diarrhea
- Decreased milk production
- Poor hair coat
- Parasite are worse when it is hot and humid



\*More information will be provided in another session on parasite control.




---

---

---

---

---

---

---

---

### Some Common Diseases (Bacterial or Viral)

- Pinkeye
- Soremouth (Orf) (Contagious Ecthyma)
- Footrot and Foot scald
- Caseous lymphadenitis (CLA)
- Mastitis
- Listeriosis
- Ovine Progressive Pneumonia (OPP)
- Caprine Arthritis Encephalitis Virus (CAE)
- Johnes Disease (Paratuberculosis)




---

---

---

---

---

---

---

---

### Pinkeye (a.k.a. Infectious Keratoconjunctivitis)



- Highly contagious
- Many different infective agents: Chlamydia, certain viruses, and mycoplasma (different from cattle)
- Usually completes its course in three weeks
- Eye medications containing antibiotics may be helpful
- No effective vaccines available



Photos: C. Clifford-Rathert

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Soremouth (a.k.a. Orf or Contagious Ecthyma)

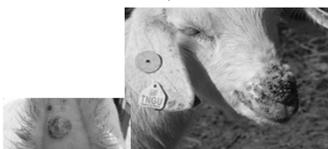


Photo above: C. Clifford-Rathert  
Photo below: N. Whitley

- A **contagious** disease - **other animals and humans can get; reportable in GA**
- Isolate animals to prevent contamination
- Clean all feed and water buckets thoroughly (CHLOROX)
- If you remove the scabs; **wear gloves** and scrape off the sore until it's raw and treat with 7% iodine to control it.
- A vaccine is available for prevention if it is a problem on the farm.

Photo: Susan Schoenian, Baalands Farm

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Footrot and Foot Scald

- From standing in muddy/wet areas
- Bacteria:
  - *Fusobacteria necrophorum* (common in soil)
  - *Dichelobacter nodosa* (found on skin; survives 2 weeks if not in hoof)
- Starts with lameness
- May affect one foot or more, and may be periodic, the foot maybe swollen and red with a bad odor and painful to the touch
- Successful treatment requires early diagnosis



Photos above: Susan Schoenian, Baalands Farm



Foot scald photo: www.county-vets.co.uk/

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Treatment

- Isolate infected animals
- Penicillin (Rx)
- Tetracycline (Rx)
  - Intradigital (LA-200)
- 10% copper sulfate foot bath
- 10% zinc sulfate foot bath
- Hydrated Lime / drylot
- Therapeutic foot trimming



Photos: Susan Schoenian, Baalands Farm

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Caseous lymphadenitis (a.k.a. CL, CLA)

(boils, abscesses, cheesy gland disorder)

- *Corynebacterium pseudotuberculosis*
- Pale green then cream colored "cheesy" pus
- Bacteria get in through a wound or breathing/eating it
- External or internal abscesses
- Treatment - isolate infected animals and:
  - Lance, drain and flush + antibiotics (Vet Rx)
  - Infuse with saline flush + antibiotics (Vet Rx)
  - **NOT FORMALIN**
- Prevent/control: do not buy, disinfect areas where abscesses have drained and all equipment, prevent spread at shearing time, vaccine (not goats), blood test, CULL
- **Reportable in GA**



Photos: Alabama CES  
Publication UNP-85

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

#### External Abscesses

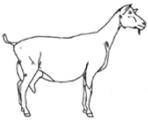
More common in goats

- One or more abscesses
  - Sheep – shoulder (near the neck), thigh (near the flank)
  - Goats – under the jaw or on the neck
- Easily spreads to other animals if it bursts
- Decreases pelt value
- **Transmissible to humans**

#### Internal Abscesses

More common in sheep

- Involves the lymph nodes and other organs (kidney and liver)
- Causes weight loss, poor health, reduced wool and milk production
  - "Thin ewe/doe syndrome"
- Third most important cause of carcass condemnation



Goat Medicine by Dr. Mary Smith and David Sherman

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Mastitis

- Inflammation/swelling of the mammary gland or udder
- Udder is painful, hot, and hard; will not allow lambs/kids to nurse
- Can lose milking ability in the udder (or part of the udder completely)
- Control with good management practices (clean, dry areas for lactating animals; start drying up does/ewes before weaning)
- Isolate infected animals
- Peppermint oil helps with swelling
- Antibiotics/pain meds (Vet Rx)



JOURNEYMAN FARMER CERTIFICATION PROGRAM

---

---

---

---

---

---

---

---

### Listeriosis

- Caused most commonly by *Listeria monocytogenes*
- Three main forms:
  - Neurological (encephalitis/brain) – off feed, depressed, excessive salivation, leaning to one side, circling, stumbling, standing against wall, death within 24-48 hr (treated early 30% recover); usually <2% flock/herd infected
  - Abortive – usually last trimester and with no signs
  - Septicemic/visceral – chronic diarrhea; not common but increasing in small ruminants (has been found in US)
- Treatment (with vet) – very high doses penicillin or other effective antibiotic
- Bad silage can host it; dogs, cats, wild rabbits and other small mammals can transmit it; soil contaminant



Photos: www.nadis.org.uk



JOURNEYMAN FARMER CERTIFICATION PROGRAM

---

---

---

---

---

---

---

---

### Ovine Progressive Pneumonia (OPP)

- Chronic progressive pneumonia of sheep; long incubation (2-4 years)
- Clinical signs in older animals but can affect lambs
- Mastitis (“hard bag”), pneumonia, arthritis, encephalitis, and rarely hind limb paralysis
- Chronic wasting despite good appetite
- Death within 1 year of symptoms
- Can test for it
- Reportable disease



Photo: Susan Schoenian, Baalands Farm

JOURNEYMAN FARMER CERTIFICATION PROGRAM

---

---

---

---

---

---

---

---

### Caprine Arthritis Encephalitis Virus (CAE)

- Common dairy goat problem
- Lifelong infection
- Several forms:
  - Neurological (young kids 2-6 mo)
  - Decreased/no milk (young does)
  - Arthritis (2 yrs & older) – front legs
  - Respiratory disease (adults any age)
  - Weight loss
- Passed on through milk/colostrum not heat treated; can test animals for it; avoid getting it, if have it, work with vet to get rid of it



Dairy goat, photo by: Susan Schoenian, Baalands Farm




---

---

---

---

---

---

---

---

### Johnes Disease (Paratuberculosis)

Mycobacterium avium paratuberculosis

- Chronic wasting disease
- Goats do not get diarrhea like cattle
- Transmission is fecal-oral
- Clinical signs: progressive weight loss without diarrhea, appetite remains intact initially but decreases later on, leading to severe emaciation
- Goats 2-3 years of age
- No known treatment
- More prevalent in dairy goats




---

---

---

---

---

---

---

---

### Other Diseases

- Overeating (Enterotoxemia, Acidosis or Grain Overload)
- Pregnancy Disease (Ketosis)
- Abortions
  - Chlamydia (Chlamydo-phola abortus) Enzootic Abortion
  - Campylobacter- Vibrio
  - Toxoplasmosis
- Scrapie




---

---

---

---

---

---

---

---

### Overeating (a.k.a Enterotoxemia, Acidosis, Grain Overload)

- Caused sudden change in diet – i.e. grain eaten by animals not used to it or a lot eaten by very hungry animals
- Can occur 6-12 hours after ingestion
- “Feed-bunk Disease”
- Signs: off-feed, dull, irritable, swollen belly, severe diarrhea, dehydration, sunken eyes, staggering, collapse, coma and death.



Photo: Susan Schoenian, Baalands Farm




---

---

---

---

---

---

---

---

### Treatment

- Best to **PREVENT!**
  - Remove cause (feed properly)
  - Do not feed grain free choice to animals not used to it or starving animals
  - Vaccinate properly with C,D & T (combination enterotoxemia and tetanus toxoid)
  - If putting in feedlot, changing diets or stressing them, give a booster 3-4 weeks beforehand
  - Give one injection as soon as they are brought in (at weaning) and then booster 3-4 weeks later



Photo: Susan Schoenian, Baalands Farm




---

---

---

---

---

---

---

---

### Pregnancy Disease (Ketosis)

- A nutritionally based disease
- Common in overweight does/ewes carrying twins or triplets; also seen in poor condition animals
- Brought on by stress including storms, transport, fasting, excessive heat, and poor nutrition
- Causes low blood sugar leading to ketosis and death
- Signs: stumbling, no energy, no appetite, wandering, leaning on things, twitching ears, eyes, tail; teeth grinding, urine ketones, blindness, loss of reflexes, paralysis, lying on chest, coma, death




---

---

---

---

---

---

---

---

## Treatment

- Need a vet!
- Not always successful
- Treat with glucose-producing substances such as propylene glycol, maple syrup
- Give intravenous (i.v.) fluids with dextrose (Vet)
- Removal of kids/lambs by c-section or by inducing labor
- Give steroids per veterinary recommendation
- Best to prevent: proper weight/body condition during pregnancy; feed adequate energy in late pregnancy; reduce stress



Photo: Susan Schoenian, Baalands Farm

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## Abortions

### Most common are caused by:

- Chlamydia
- Campylobacter
- Toxoplasmosis



Photo: Susan Schoenian, Baalands Farm

### Others that can cause abortions:

- Akbane
- Blue Tongue
- Border Disease
- BVD
- Cache Valley Fever
- Q Fever
- Listeriosis
- Several more....

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## Chlamydia (*Chlamydophila abortus*) Enzootic Abortion

- Most common cause in North America
- **Zoonotic** potential- placenta, uterine fluids, feces and lungs
- Usually late term abortions; recovered females are immune
- Diagnosis: placenta cotyledons are gray-brown and leathery
- Isolate affected ewes/does
- Can prevent future/additional abortions with antibiotics (usually tetracyclines; consult vet)



Photo: Susan Schoenian, Baalands Farm

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## Campylobacter- Vibrio

- *Campylobacter fetus* and *jejuni*\*
- Not sexually transmitted in sheep
- Ingestion of organisms
  - Can have carrier state 20-70%
- Abort late gestation, last 6-8 weeks
- Lambs born weak or dead
- Ewes are sick and can die, but will recover and be immune next year but become carriers
- Diagnosis – need placenta and fetus (for stomach fluid and liver)
  - Fetus is edematous ("Water belly babies")
- **Zoonotic potential**



Photo: Susan Schoenian, Baalands Farm




---

---

---

---

---

---

---

---

## Toxoplasmosis

- Cats shed oocysts in feces
  - Oocysts survive a long time in the environment
- **Zoonotic potential**
- Placenta is infected 14 days after ingestion
  - Infection: <50 d gestation = fetal death/ reabs.
  - 60-100 d gestation = fetal death
  - 120 d gestation= no affect on fetus
- Abortion late pregnancy = 15-20%
- Diagnosis - need placenta and fetus
- Feeding monensin in mineral suppresses infection (Vet Rx)
- Prevent: control cat population, store feed in container



Photo: Susan Schoenian, Baalands Farm




---

---

---

---

---

---

---

---

## Scrapie

- A fatal degenerative disease (TSE) that affects the central nervous system of goats and sheep. Incubation period is 2-5 years
- Clinical Signs develop slowly: behavioral changes, tremors, scratching and rubbing against objects, incoordination (high stepping, hopping like a rabbit, swaying in the back end)
- An infected animal may appear normal if left undisturbed at rest. However, when stimulated by a sudden noise, excessive movement, or the stress of handling, the animal may tremble or fall down in a convulsive like state
- Reportable Disease in all states
- Tag and keep records of all goat and sheep sales and purchases. Save and maintain records for five years.
- All goats or sheep leaving farm premises should be tagged
- Prevention: testing and genetic selection, maintain closed herds/flocks




---

---

---

---

---

---

---

---

### State ID Requirements: Georgia

- In addition to Federal requirements, Georgia requires official individual identification of all high-risk goats (those in contact with sheep) as well as official ear tags on all sheep going to a livestock market.

Complete information is available by contacting:

- Dr. Robert Cobb Jr, SV  
Ph: 404-656-3671  
E-mail: [robert.cobb@agr.georgia.gov](mailto:robert.cobb@agr.georgia.gov)
- Dr. Stan Crane  
Designated Scrapie Epidemiologist  
Ph: 404-656-3667  
Email: [stan.crane@agr.georgia.gov](mailto:stan.crane@agr.georgia.gov)

For more information:  
<http://www.eradicatescrapie.org>  
<http://www.aphis.usda.gov/vs/scrapie>  
[http://www.sheepusa.org/ResearchEducation\\_OnlineEducation\\_Scrapie](http://www.sheepusa.org/ResearchEducation_OnlineEducation_Scrapie)

- Scrapie Tags are **FREE** and available by contacting the USDA at 1-866-USDA-TAG (1-866-873-2824)




---

---

---

---

---

---

---

---

### Basic Rules to Remember

- **Don't buy sick animals.**
- Select for healthy genetic lines
- Don't believe everything you hear from someone trying to sell you an animal
- BEWARE of livestock market risks
- Keep in mind...there is as much bad info as there is good info...be selective learners
- KEEP GOOD RECORDS!
- Practice good biosecurity on the Farm!!!!




---

---

---

---

---

---

---

---

### Normal Vital Signs

Vital Sign	Sheep	Goats
Rectal Temperature	101.5-104°F	102-104°F
Heart Beat	70-80 beats per minute	70-90 beats per minute
Respirations (breaths)	12-20 breaths per min.	15-30 breaths per min
Rumen movement	1-3 per minute	1-3 per minute
Ideal Body condition (1-5)	2-4	2-4

[www.sheepandgoat.com](http://www.sheepandgoat.com)




---

---

---

---

---

---

---

---

### First Aid Kit

- Rectal thermometer
- Sterile syringes and needles
- Exam gloves
- 7% tincture of iodine
- Probiotics, anti-stress drench
- Hoof trimmers
- Hoof treatment product
- **Phone number of your veterinarian!**
- **Note pad and pen**



Photo: Susan Schoenian, Baalands Farm




---

---

---

---

---

---

---

---

### Additional Resources and References

- Goat Medicine, Dr. Mary Smith & Dr. David Sherman
- Sheep and Goat Medicine, Dr. David Pugh
- Dr. Margaret Masterson, Ohio State University, College of Veterinary Medicine
- [www.extension.org/goat](http://www.extension.org/goat)
- [www.extension.org/sheep](http://www.extension.org/sheep)
- [www.sheepandgoat.com](http://www.sheepandgoat.com)




---

---

---

---

---

---

---

---



This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2015-70017-22861.

**USDA** Beginning Farmer Rancher Development Program



Developing the Next Generation of Sustainable Farmers in Georgia Grant




---

---

---

---

---

---

---

---

  
**JOURNEYMAN FARMER**  
 CERTIFICATE PROGRAM  
  
**Small Ruminant Production**





---

---

---

---

---

---

---

---

**Session 3**  
**Sheep and Goat Breeding**  
**Lambing and Kidding Management**



Kevin Pelzer, DVM  
 Professor, Production Management Medicine/Epidemiology  
 Virginia-Maryland College of Veterinary Medicine




---

---

---

---

---

---

---

---

**Learning Objective**

- Understand best management practices for breeding and for lambing or kidding



---

---

---

---

---

---

---

---

## Estrous Cycle

### Reproductive Characteristics

Characteristics	Sheep	Goat
Age at puberty	5-7 months	5-7 months
Type	Seasonally Polyestrus	Seasonally Polyestrus
Length of estrus cycle	17 days	21 days
Duration of estrus	36 hrs	30 – 40 hrs
Gestation length	144-151 days	147-155 days




---

---

---

---

---

---

---

---

## Puberty

- Puberty is reached at 50% of their expected adult weight; breed related
- If born late in the spring may not enter puberty until the following fall
- Females: Breed first time at 75% of mature body weight around 8-10 months of age
- Males: Usually at 8-10 months of age




---

---

---

---

---

---

---

---

## Estrous Behavior

### Ewe

- Seeks ram
- Swollen vulva



Photos: Susan Schoenian, Baalands Farm

### Doe

- Wags tail
- Bleats
- Buck jar
- Swollen vulva
- Clear-cloudy-milky white mucus




---

---

---

---

---

---

---

---

### Estrous Cycle

Short day breeders

OVULATORY

ANOVULATORY

TRANSITION

- Breed dependent
- Breeding Season
- Anovulatory Season
- Transition Period

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Breeding Management

- Females will come into heat at the same time when initially exposed to the male
- Can use hormones to get the does (or ewes) into heat at the same time for birthing at same time (so can schedule labor) and for marketing
  - Prostaglandins, i.m., two shots, 9-11days apart or single shot (60-70%)
  - CIDRs (use as directed; approved/sold for sheep)
  - May be able to induce breeding out of season with CIDRs

Photos: www.zoetis.com

No products, companies or manufacturers are being endorsed

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Breeding Management

- Fewer females per male if synchronized to be in heat at the same time
  - 1 mature, proven male per 30-40 females not synchronized
  - 1 mature, proven male per 10 -15 females synchronized
  - Depends on age, breed and time of year
  - Large groups: 3-5 males/100 females

Photo: Susan Schoenlin, Daalands Farm

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## Breeding Management

### Two weeks prior to breeding

- Flush ewe/does to increase ovulation rate
  - Flush 2 weeks prior to introducing breeding males
  - Feed ½ lb of grain per head per day
  - Place on lush/new pasture
- Trim feet if needed
- FAMACHA score
- Vaccinate for Chlamydia and Campylobacter if needed
- Breeding Soundness exam for males if possible
- Check udders




---

---

---

---

---

---

---

---

## Breeding Season

- Sheep 28 days, Goats 32 days
- Watch for weight loss in males
- Marking harness can help determine if females are bred (mounted) and when



Photo: Susan Schoenian, Baalands Farm



Photo: Nik Whitley




---

---

---

---

---

---

---

---

## Pregnancy Diagnosis

### Ultrasonography:

- Trans-rectal/Transabdominal
- From 24 days onwards
- Earlier - Multiple fluid pockets, embryo
- 40 days – Fetus and Placentomes




---

---

---

---

---

---

---

---

### Expected Results

Conception rate in season	60-70%
Pregnancy rate (3-4 cycles) in season	95-100%
Pregnancy rate for synchronized cycles in season	60-70%
Pregnancy rate for synchronized cycles during off season	40-60%



**Gestation**

- Sheep - 145- 150 days
- Doe - 147 -155 days




---

---

---

---

---

---

---

---

### Prepartum Activities

**Four weeks prior to lambing and kidding**

- Vaccinate for Clostridium CD and T
- Vaccinate for E. coli ?
- Deworm (if needed)
- Supplement ½ to 1 lb of grain per head per day above what already getting




---

---

---

---

---

---

---

---

### Be Prepared

- Have clean environment ready
- Have a “delivery kit”
- Umbilicus supplies
- Colostrum supplies
  - 16 fr urinary catheter
  - Can buy a kit for ‘tubing’ lambs and kids, syringe and tube

**Delivery kit**

- Tool box
- Obstetrical sleeves
- Soap
- Lubricant – KY jelly, OB lube
- Iodine
- Feeding tube – urinary catheter (or ‘tubing’ kit)
- Paper or cloth towels




---

---

---

---

---

---

---

---




---

---

---

---

---

---

---

---

### Impending Parturition

- Bagging up
- Softening of tail head
- Enlargement of the vulva
- Mucus discharge



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Stages of Parturition

<p><b>First Stage</b></p> <ul style="list-style-type: none"> <li>• dilation of the cervix</li> <li>• takes 2 to 12 hours</li> <li>• don't observe much             <ul style="list-style-type: none"> <li>- separate themselves</li> <li>- paw at the ground</li> <li>- up and down, appear uncomfortable</li> <li>- have a far off stare</li> </ul> </li> </ul>	<p><b>Second Stage</b></p> <ul style="list-style-type: none"> <li>• Expulsion of the fetus             <ul style="list-style-type: none"> <li>- 2 hours once ewe starts straining</li> <li>- 30 - 45 minutes for twin</li> </ul> </li> </ul>
--	--

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---



---

---

---

---

---

---

---

---



---

---

---

---

---

---

---

---



---

---

---

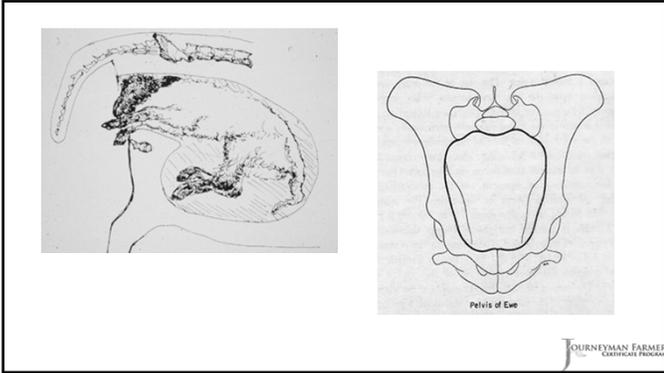
---

---

---

---

---



---

---

---

---

---

---

---

---



---

---

---

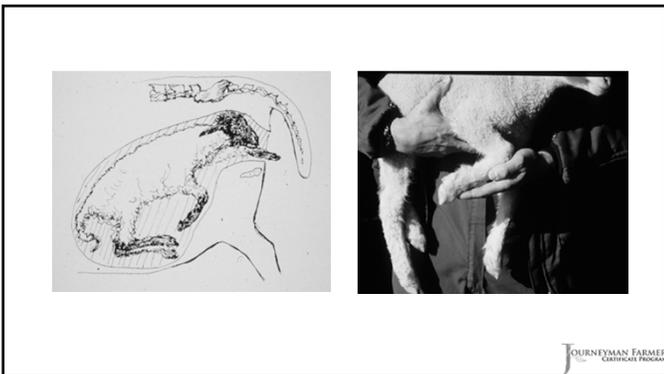
---

---

---

---

---



---

---

---

---

---

---

---

---



---

---

---

---

---

---

---

---



---

---

---

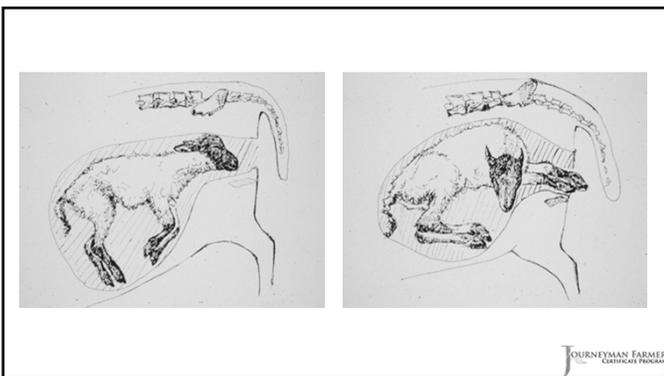
---

---

---

---

---



---

---

---

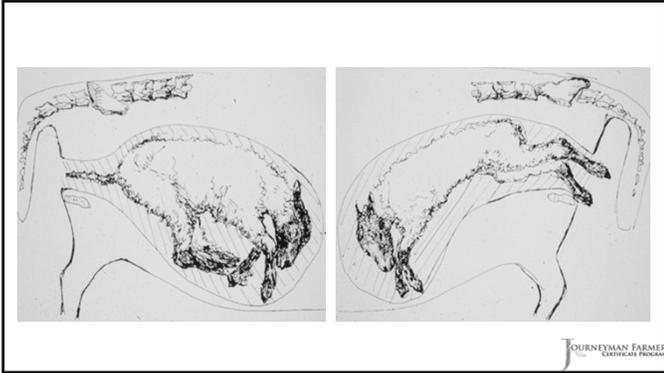
---

---

---

---

---



---

---

---

---

---

---

---

---



---

---

---

---

---

---

---

---



---

---

---

---

---

---

---

---

### At Birth

- Remove excess mucus from mouth and nose
- Stick a piece of hay or straw up nose
- Rub vigorously with towel and dry off
- Do not hang upside down
- Dip navel
- Evaluate vigor, look for defects



---

---

---

---

---

---

---

---

### Third Stage

- Expulsion of the fetal membranes
  - usually expelled in 30 min. to 2 hours
  - retained if still attached 12 hours after lambing or kidding
- When to worry?
  - If ewe/doe goes off feed
  - If ewe/doe develops a fever ( $T > 103.3$ )
- Treatment
  - Penicillin 3cc/100lbs twice a day for 4 days, withdraw 28 days
  - Gentle pull



---

---

---

---

---

---

---

---



---

---

---

---

---

---

---

---



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Colostrum Management

Nurse

- Should nurse within an hour
- Clean and milk teats to ensure colostrum is present
- Watch to ensure lambs/kids can nurse the teats



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Kid/Lamb Care

- Milk out teat
- Make sure baby nurses within 2 hours
- Colostrum
  - 20ml/lb or 3/4 oz/lb first 2 hours
  - 100 -125 ml/lb or 3.5 oz/lb 24 hours



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Colostrum Management

- Colostrum banking
  - Should be collected from dams within 12 hours of lambing/kidding
  - Specific gravity 1.029 or greater
  - Cool down and freeze
  - Thaw by placing in warm water
- Colostrum alternatives
  - Bovine
  - Colostrum substitutes



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Supplements



“Delivers high energy, vitamins, minerals, amino acids, electrolytes and antioxidants in minutes.”

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Feeding Milk

- Milk replacer
- Feed 1 liter/day by 1 week and 1.5 - 2 by 3 weeks of age
- 20% body weight into 3 feedings for 1st 2 weeks
- Self feeder
- Feed warm or cold

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### 20% Body Weight into 3 Feedings for 1st 2 weeks

8 lb kid * 0.20 = 1.6 lbs	10 lb lamb * 0.20 = 2 lbs
1.6 lbs * 16 oz = 25.6 oz	2 lbs * 16 = 32 oz
25.6 oz / 3 feedings = 8.5 oz	32 oz / 3 feedings = 10.8 oz
25.6 oz / 4 feedings = 6.4 oz	32 oz / 4 feedings = 8 oz



---

---

---

---

---

---

---

---

### Additional Resources

- [www.slideshare.net/schoenian/getting-ready-for-lambing-and-kidding](http://www.slideshare.net/schoenian/getting-ready-for-lambing-and-kidding)
- [www.infovets.com/books/smrm/C/C460.htm](http://www.infovets.com/books/smrm/C/C460.htm)
- <http://articles.extension.org/pages/27126/kidding-management>
- [www.sheepandgoat.com](http://www.sheepandgoat.com) (articles)
- [www.sheep101.info/2011/lambingprocess.html](http://www.sheep101.info/2011/lambingprocess.html)



---

---

---

---

---

---

---

---



This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2015-70017-22861.

**USDA** Beginning Farmer Rancher  
Development Program



Developing the Next Generation  
of Sustainable Farmers in Georgia Grant



---

---

---

---

---

---

---

---

# Resource Page

**NOTES:**



**JOURNEYMAN FARMER  
CERTIFICATE PROGRAM**

**Small Ruminant Production  
Integrated Parasite Management**

**Session Four**

## Session 4: Integrated Parasite Management

### ***Integrated Parasite Management I (50 min – Susan Schoenian, University of Maryland Extension)***

- Anthelmintic (dewormer) resistance issues
- Refugia
- Anthelmintics (dewormers)
- Parasites of small ruminants

#### ***Learning Objectives:***

- Understand dewormer resistance (immunity) issues
- Identify small ruminant anthelmintics and common parasites of small ruminants

BREAK

### ***Integrated Parasite Management II (50 min – Susan Schoenian, University of Maryland Extension)***

- Detailed parasite management tools
  - Host immunity
  - Animal management
  - Grazing/forage management
  - Breeding and selection
  - Targeted Select Treatment (FAMACHA, Five Point Check)
  - Fecal egg counting (FEC)

#### ***Learning Objectives:***

- List best management practices to avoid parasite infection

***Activity (20 min)*** – Evaluation to reinforce information learned in Integrated Parasite Management I and II. If they attend both parts of this Session and complete the activity, with participation in the hands-on FAMACHA© scoring section of animals during Session 6, FAMACHA© certification can be obtained. You will need to make sure that the trainer for the Session 6, FAMACHA© hands-on portion is a certified trainer (contact [famacha@uga.edu](mailto:famacha@uga.edu) for possible trainers).

See end of this agenda for the evaluation/learning exercise facilitators guide to go with this session.

***How they can use this at home*** – Design an integrated, flexible parasite management plan for the farm.

## Session 4: Integrated Parasite Management Learning Exercise

Let the participants know that the purpose of the exercise is to stimulate discussion to reinforce the information that they obtained during the session and that they will not be assigned a grade or score.

Hand out the participant learning exercise and give participants 10-15 minutes to complete it. Then ask the group for answers to the questions, and facilitate discussion of the answers as noted below.

1. True or **False** (Circle one) Small ruminant gastrointestinal nematodes (worms) have developed resistance to only one of the classes of anthelmintics (deworming drugs) available in the U.S.

False. Although resistance varies by geography and farm, resistance to all of the available deworming drugs has been found in the U.S.

2. How many approved classes/families of dewormers are available for use in sheep and/or goats in the U.S. (Circle one)
  - a. One
  - b. Two
  - c. Three**
  - d. Four
  - e. Five

There are three classes/families available for us in the U.S., the:

- Benzimidazoles (albendazole, fenbendazole, oxbendazole; Safeguard, Panacur, Valbazen, Synanthic)
- Macrocyclic lactones (end in 'ectin', ivermectin, eprinomectin, doramectin, moxidectin; Ivomec, Eprinex, Cydectin)
- Nicotinics (levamisole, pyrantel, morantel; Prohibit, Strongid, Postiive Pellet).

3. Which dewormers are least likely to be effective in small ruminants when administered at the appropriate single dose for the species?
  - a. Moxidectin
  - b. Albendazole, fenbendazole, oxbendazole**
  - c. Ivermectin, Eprinomectin, Doramectin**
  - d. Levamisole, Pyrantel, Morantel

B (or B and C) - According to research, the white drenches (drugs that end in '-dazole', trade names such as Safeguard, Panacur, Valbazen, Synanthic, etc.) are least likely to be effective in small ruminants at appropriate single dose levels. However, there is also widespread resistance to ivermectin, eprinomectin and doramectin (the '-ectin' drugs other than moxidectin), so it can be considered correct to have answered both b and c.

4. What is refugia and what are some methods to help maintain it?

Refugia are worms that have not been exposed to dewormers; you can improve refugia in the following ways:

- Decrease frequency of anthelmintic treatments. Overuse of dewormers has caused resistance. **Decreasing the number of times you use dewormers can allow more worms to go without exposure to the drugs.**
- Do not treat everyone; leave some animals untreated (use targeted selective treatment) **so there are worms not exposed to dewormers at that time still left in some animals.**
- Do not move treated animals to a clean pasture **because they will only spread (and re-infect themselves) with the worms that were 'dewormed' but did not die**
- Do not deworm when there is a low level of pasture contamination or infection in animals **because there will not be enough worms left in untreated animals to spread refugia.**
- Leave animals in dry lot after treatment for 24-48 hours **so they don't spread worms exposed to dewormers.**

The overall goal is to breed dewormer susceptibility into the worms on your farm.

5. Worm resistance on a farm can be directly measured through (circle all that apply):

- a. Sending fecal samples in for a DrenchRite test**
- b. Checking to see if FAMACHA scores improve after deworming or not
- c. Checking to see if animals gain weight after deworming
- d. Conducting a fecal egg count reduction test (FECRT)**

A and D - Although unimproved FAMACHA scores or lack of weight gain after deworming may indirectly indicate that dewormers may not be working, there could be other causes of these conditions. A DrenchRite or fecal egg count reduction test (with correctly administered dewormers) will directly test if there is dewormer resistance in the farm worm population.

6. **True** or False (Circle one). The best use for alternative/natural parasite treatments may be to complement integrated parasite management methods and chemical dewormer use.

True. There are alternative or natural treatments that have been proven by research to reduce fecal egg counts or have other dewormer-like activity such as copper oxide wire particles (COWP), sericia lespedeza and pine bark. However, any natural or alternative treatments are likely best used in conjunction with or to complement other integrated parasite management methods, including targeted deworming with an effective anthelmintic (dewormer) drug.

7. Note if the following parasites are primary or secondary worms for small ruminants (put P for primary and S for secondary next to the name of the parasite). Which is the worst?

Parasite/Worm Name	P or S
a. Oesaphagostomum/nodule worm	S
b. Haemonchus contortus/ Barber pole worm	P
c. Cooperia/small intestinal	S
d. Teladorsagia (Ostertagia) circumcincta/brown stomach	P
e. Trichostrongylus spp./black scour/stomach/hair	P
f. Bunostomum/hookworm	S

The primary worms are barber pole worm, brown stomach worm and trichostrongylus (trick-o-stron-ju-lus) species like black scour, stomach and hair worm. All the worms in this list (and some others) have eggs that look alike in a fecal egg exam/count. They cannot be speciated (you can't tell them apart) without incubating/hatching the eggs and looking at the larvae under the microscope. Haemonchus contortus/Barberpole worm is the worst – it sucks blood, is very fertile, can last a long time on pasture and can go dormant in the animal (can overwinter), and is very adaptable genetically.

8. Which are the animals most susceptible to (most likely to get) worms/internal parasites?
- Mature males
  - Dry (non-lactating) females
  - Weanlings**
  - Pets
  - Lactating, high producing females**
  - Really old animals**

Animals that are under physical stress and/or with a compromised immune system are most likely to get worms, including young, growing animals (especially those just weaned), lactating females, especially if they milk a lot/have multiple offspring nursing, and those that are geriatric.

9. List at least 3 integrated parasite management methods you can use on your farm.

Refer to the slides for more detail, but using the following can all help to manage parasites:

- Host immunity – manage animals that are more susceptible much more carefully
- Birthing and weaning management – time breeding (and thus birthing and weaning) when worms are not as bad; house animals indoors during these times; consider increasing weaning age
- Nutritional management – animals fed properly and in good body condition are more likely to be able to fight off worms (and other issues), extra protein has been shown to help in some cases; in many cases, pastures are deficient in energy
- Pasture and grazing management – use 'safer'/cleaner animals for more susceptible animals, use evasive, strip, short-duration, rotational, delayed or management intensive

grazing; multi-species grazing; browsing, alternative forages, manage grazing height (over 4-6 inches), night penning, or zero grazing (house indoors, be careful with cocci if do this)

- Genetic selection – chose animals that do not need to be dewormed often or that have low FEC compared to all the other animals in their contemporary group (when there are high infection levels so you will be able to see differences)
- Proper use of anthelmintics, including Targeted Selective Treatment (TST)
  - FAMACHA©
  - Five Point Check©
- Testing for anthelmintic resistance – so you can use effective dewormers; do not rotate wormers, use the same (at least moderately) effective one until it no longer works but save the most effective for 'life-saving' purposes

10. Circle all of the following that should be considered when deciding if/when to deworm individual animals:

- a. **FAMACHA eyelid score**
- b. Time of the year
- c. **Dag score (if have diarrhea/scours, soft stool or normal)**
- d. **If have bottle jaw or not**
- e. Last deworming time/schedule
- f. **Nose – Clear or snotty**
- g. **Hair coat condition - rough looking or not**
- h. If you have time
- i. **Body condition (level of fatness)**
- j. If it is lambing or kidding season
- k. What type of forage is being grazed

A, C, D, F, G and I. The 5-Point Check (which includes FAMACHA) should be used to decide when individual animals need to be dewormed. Time of the year, last deworming time, your resources (time/labor), production level of the animals and other farm plans can help you decide how often to perform the checks (and perhaps if FAMACHA “3s” are dewormed).

# JOURNEYMAN FARMER CERTIFICATE PROGRAM

## Small Ruminant Production



FORT VALLEY STATE UNIVERSITY  
A State and Land-Grant Institution • University System of Georgia



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## Session 4 Integrated Parasite Management I



Susan Schoenian (Shāy nē ūn)  
Sheep & Goat Specialist  
University of Maryland Extension



No products, business, companies or manufacturers are endorsed.

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

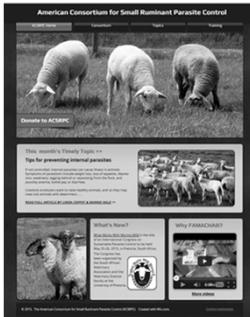
---

---

---

---

---



### American Consortium for Small Ruminant Parasite Control (ACSPRC)

[www.acsrpc.org](http://www.acsrpc.org)  
[www.wormx.info](http://www.wormx.info)



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Anthelmintic (dewormer) resistance

• Resistance is inevitable; no treatment will kill 100 percent of worms.

• Worms have developed resistance to all dewormers and all dewormer classes.

• Resistance varies by geographic region and individual farm and is the result of past deworming practices.

Anthelmintic = Dewormer



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

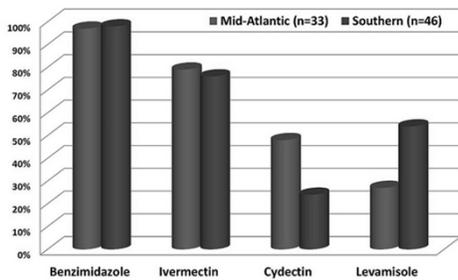
---

---

---

---

### Percent farms with anthelmintic resistance



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Anthelmintic (dewormer) resistance



• Resistant worms pass their resistant genes onto their offspring; resistance is permanent!

• You cannot prevent resistance, but you can affect the rate by which it develops.

• On most farms, resistance is probably at a level where there is still time to slow it down and enable the continued use of some anthelmintics.

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

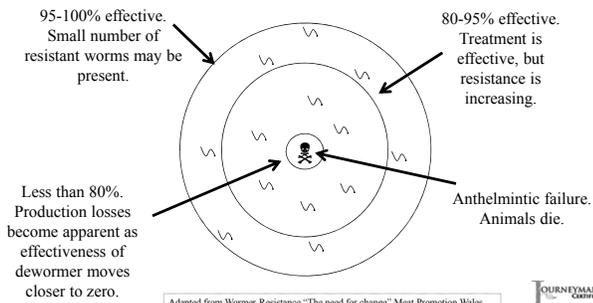
---

---

---

---

## Understanding anthelmintic resistance




---

---

---

---

---

---

---

---

## You can slow drug resistance by increasing refugia.

- Decrease frequency of anthelmintic treatments.
- Do not treat everyone; leave some animals untreated.
- Do not move treated animals to a clean pasture.
- Do not deworm when there is a low level of pasture contamination or infection in animals.
- Leave animals in dry lot after treatment for 24-48 hours.
- Re-introduce susceptible worms (?) to your farm.

Refugia are worms that have not been exposed to drug(s): "in refuge".



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## Don't make it easier for worms to develop resistance to the drugs.

- By exposing them to sub-therapeutic levels of drug(s); so DO NOT:

- 1) Underdose
- 2) Inject dewormers
- 3) Pour dewormer on back
- 4) Administer drugs improperly
  - Do not squirt injectable into mouth
  - Do not drench with pour-on
- 5) Deposit drug into mouth instead of esophagus
- 6) Use persistent activity dewormer
- 7) Rotate dewormers



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## Do not bring resistant worms to your farm

- **Quarantine drenching:** to prevent the introduction of resistant worms to your farm, deworm all newly acquired animals with anthelmintics from 2-3 anthelmintic classes.
  1. Moxidectin + levamisole
  2. Albendazole + moxidectin + levamisole
- In Western Maryland Pasture-Based Meat Goat Performance Test, deworming with albendazole, moxidectin, and levamisole at same time (but one at a time) usually reduces fecal egg counts by more than 95 percent (in 6-12 days).



**For sale**  
 Ram - \$1,000  
 Resistant worms - free

JOURNEYMAN FARMER  
 CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## Anthelmintics 101

There are only 3 families of drugs.



1. Fenbendazole  
Safeguard®  
Panacur®
2. Albendazole  
Valbazen®
3. Oxybendazole  
Synanthic®

BENZIMIDAZOLES

1

1. Avermectins
  - a) Ivermectin  
Ivomec®  
Privermectin®  
Privermectin®
  - b) Eprinomectin  
Eprinex®
  - c) Doramectin  
Dectomax®
2. Milbimycins
  - a) Moxidectin  
Cydectin®  
Quest®

MACROCYCLIC  
LACTONES

2

1. Imidazothiazoles
  - a) Levamisole  
Prohibit®
2. Tetrahydropyrimidines
  - a) Morantel  
Rumatel®  
Positive Goat Pellet  
Goat dewormer
  - b) Pyrantel  
Strongid®

NICOTINIC  
AGONISTS

3

JOURNEYMAN FARMER  
 CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## FDA-approved anthelmintics for sheep

	(1) Benzimidazoles	(2) Macrocylic lactones		(3) Nicotinic
		Avermectins	Milbimycins	
Adult worms	✓	✓	✓	✓
Immature worms (L4)	✓	✓	✓	✓
Hypobiotic larvae	✓	✓	✓	✓?
Lung worms	✓	✓	✓	✓+
Tapeworms	✓			
Adult liver flukes	✓			
Coccidia				
External parasites		✓	✓	
Persistent activity			✓	
Safety	Restricted use during early pregnancy	++++	++++	++
Resistance	++++	+++	++	+
<b>FDA-approved</b>	<b>Valbazen®</b>	<b>Ivomec®</b>	<b>Cydectin®</b>	<b>Levamisole®</b>
Labeled dosage	3 ml/100 lbs.	3 ml/26 lbs.	1 ml/11 lbs.	2 ml/50 lbs.
Meat withdrawal	7 days	11 days	7 days	3 days

JOURNEYMAN FARMER  
 CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### FDA-approved anthelmintics for goats

	(1) Benzimidazoles		(3) Nicotinic
	SafeGuard®	Valbazen®	Rumatel®
Adult worms	✓	✓	✓
Immature worms (L4)	✓	✓	
Hypobiotic larvae	✓	✓	
Lung worms	✓	✓	
Tape worms	Not labeled		
Adult liver flukes		✓	
Coccidia			
External parasites			
Safety	++++	Restricted use during early pregnancy	+++
Resistance	++++	na	?
Labeled dosage per 100 lbs.	2.3 ml	4 ml	0.44 g
Meat withdrawal	6 days	7 days	30 days
Milk withdrawal	NA	NA	0 days

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

---

---

### Extra-label anthelmintics for goats (Rx)

	(1) Benzimidazoles		(2) Macrocylic lactones		(3) Nicotinic
	SafeGuard®	Valbazen®	Ivomec®	Cyductin®	Prohibit®
Adult worms	✓	✓	✓	✓	✓
Immature worms (L4)	✓	✓	✓	✓	✓
Hypobiotic larvae	✓	✓	✓	✓	✓?
Lung worms	✓	✓	✓	✓	✓+
Tape worms	✓	✓			
Adult liver flukes		✓			
Coccidia					
External parasites			✓	✓	
Persistent activity				?	
Safety	++++	Restricted use during early pregnancy	++++	++++	++
Resistance	++++	++++	+++	++	+
Dosage per 25 lbs.	1.1 ml	2 ml	6 ml	4.5 ml	2.7 ml
Meat withdrawal	16 days	9 days	14 days	17 days	4 days
Milk withdrawal	4 days	7 days	9 days	8 days	3 days

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

---

---

### Zolvix® (monepantel): a new anthelmintic

- New drug class: amino-acetonitrile derivative.
- Unique mode of action.
- First new anthelmintic in 25 years.
- Kills worms that are resistant to other drugs.
- Resistance already reported in Australia (in goats).
- Not yet available in US.
- Will be available by prescription (Rx) only. ELDU for goats.
- Will be expensive (?).



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

---

---

### “Alternative” (non-chemical) dewormers

- Many natural compounds are said to have “anthelmintic-like” properties; the list is overwhelming!
- Studies are lacking, inconsistent, and/or not repeatable.
- Some natural anthelmintics are potentially toxic to the animal, e.g. copper sulfate, nicotine sulfate.
- Considerable research is being done on alternative or natural “dewormers.”




---

---

---

---

---

---

---

---

### 2014 Western Maryland Pasture-Based Meat Goat Performance Test Anthelmintic effect of copper oxide wire particles (COWPs)

- Mid-way through the test, at day 42, which was the end of the “parasite challenge phase” of test, test bucks (n=77) were given a gel cap containing ~0.5 g of copper oxide wire particles (COWPs).
- On day 42, nine (9/77) bucks required deworming (based on FAMACHA© and 5 Point ✓©) and were also dewormed with a commercial dewormer (levamisole or moxidectin).
- Fifteen (15) bucks from our pen vs. pasture study (pasture group) served as controls: they did not receive any treatment.



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

Treatment		# goats	July 17 Avg. FEC	July 31 Avg. FEC	Avg. FECR
Dewormer	Effective	8	8735	103	98.6
	Ineffective	1	500	275	45.0
COWP	Effective	53	2768	388	81.7
	Ineffective	8	723	2000	< 0
No treatment (Control)	Pasture	15	2164	2371	< 0
	Pen	12	1216	758	37.7

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

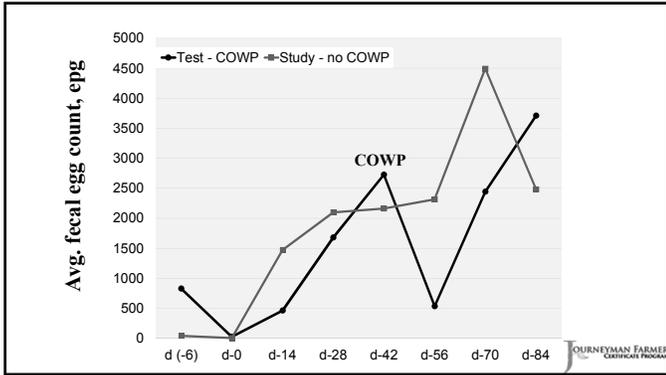
---

---

---

---

---




---

---

---

---

---

---

---

---

### My perspective and recommendation on alternative "dewormers"

- Alternative dewormers are not likely to replace commercial anthelmintics.
- Alternative dewormers may complement commercial dewormers by:
  - + Disrupting the free-living stage of the parasite (e.g. inhibit egg hatching or larvae development)
  - + Improving natural immunity of animal
  - + Improving overall management of the herd

= Reducing the number of animals that require treatment with a commercial dewormer.

It's okay to use alternative dewormers with regular monitoring of animals for signs of parasitism and deworming as needed with an effective drug.




---

---

---

---

---

---

---

---

### Determining anthelmintic resistance

- It is recommended that you test for anthelmintic resistance every 2-3 years.
- FAMACHA© and the Five Point Check© don't work if you don't have an effective treatment(s) for clinically-parasitized animals.
- Clinically-parasitized animals will almost always die without an effective anthelmintic treatment (deworming).
- There are two ways to test for anthelmintic resistance:
  - 1) Fecal egg count reduction test (FECRT)
  - 2) DrenchRite® Assay




---

---

---

---

---

---

---

---

### 1) Fecal egg count reduction test (FECRT)



- Determines if the dewormer given works
- Best time to do is when *Haemonchus* (barber pole worm) is most active
- Collect fecal samples (FECs  $\geq 250$  epg) from animals at and after treatment (ideally,  $n \geq 15$ ) for each dewormer you want to test; one group same size untreated controls
- Favor animals with higher FAMACHA<sup>®</sup> and dag scores and lower BCSs
- Doing a fecal egg count reduction test on one or a few animals may suggest resistance or effectiveness, but it does not prove it.

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Fecal egg count reduction test (FECRT)

- Compare pre- and post-treatment fecal egg counts
  - a) 8-10 days for benzimidazoles (SafeGuard<sup>®</sup>, Valbazen<sup>®</sup>)
  - b) 14-17 days for macrocyclic lactones (Ivomec<sup>®</sup>, Cydectin<sup>®</sup>)
  - c) 5-7 days for levamisole (Prohibit<sup>®</sup>)
  - d) 10-14 days for all dewormers



[http://www.uaex.edu/Other\\_Areas/publications/PDF/FSA-9608.pdf](http://www.uaex.edu/Other_Areas/publications/PDF/FSA-9608.pdf)

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Fecal egg count reduction test

2012 Western Maryland Pasture-Based Meat Goat Performance Test  
**[Pre-test Tx: albendazole + moxidectin + levamisole]**

- 49 animals; Most had 100% reduction; one had only 68.8% and another 88.9%. Others (10) that were not 100% were above 90%.

	2-Jun	14-Jun	14-Jun
TEST ID	FEC-0	FEC-1	FECRT
AVERAGE	2532	29	97.7%
MEDIAN	1266	0	100.0%
STDEV	3373	76	5.77%



- FEC ranged from 0 to 15150 epg

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

**Fecal egg count reduction test**  
 Sheep farm (Katahdins) in West Virginia (2013)

TREATMENT	# OF SHEEP	FEC BEFORE	FEC AFTER	REDUCTION %
Control	7	16300	21600	-4.8
Cydectin	4	3531.3	1031.25	0.67
Ivermectin	8	3371.88	1462.5	0.29
Levamisole	8	4915.63	409	0.75
Valbazen	9	3703.89	1772.1	-0.71




---

---

---

---

---

---

---

---

---

---

**2) DrenchRite® or larval development assay**

- Determines resistance for all drug classes at the same time using a pooled fecal sample.
- Determines which parasites your animals have.
- Collect a fresh pooled fecal sample from at least 10 animals with FECs  $\geq 350$ -500 epg.
- Follow instructions for collecting, handling, and shipping sample to Dr. Ray Kaplan's lab at the University of Georgia.




---

---

---

---

---

---

---

---

---

---

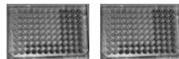
**A comparison of tests**

**FECRT**

- Takes 7-14 days to get results, longer if someone else does FECs.
- Cost for 75 samples (15 samples x 4 drugs + control group)  
 $75 \times \text{Labor} = ?$   
 $75 \times \$5 = \$375$   
 $75 \times \$10 = \$750$
- Need more animals
- Results: % efficacy
- Results can vary by animal, so need to do enough animals for results to be valid.

**DrenchRite® Assay**

- Labor-intensive lab test
- Only one lab in US does DrenchRite® Test (UGA)
- Takes 3-4 weeks to get results
- Results: S, SR, R
- Cost \$450 per sample




---

---

---

---

---

---

---

---

---

---

Small ruminants are affected by many internal parasites, but only a few are usually important.

**Multi-cellular (helminths)**

- a) Nematodes  
Roundworms
- b) Cestodes  
Tapeworms
- c) Trematodes  
Flukes



Single-cell (protozoa) like coccidia

---

---

---

---

---

---

---

---

**Roundworms - nematodes – strongyle-type**

**Primary**

1. *Haemonchus contortus*  
Barber pole worm
2. *Teladorsagia circumcincta*  
(*Ostertagia*)  
brown stomach
3. *Trichostrongylus* spp.  
black scour/stomach/ hair

**Secondary**

- *Cooperia* (small intestinal)
- *Nematodirus* (thread/thin necked intestinal)
- *Oesophagostomum* (nodule worm)
- *Bunostomum* (Hookworm)
- *Trichuris ovis* (Whipworm)
- Strongyloides
- Lungworms
- *Parelaphostrongylus tenuis*  
Meningeal, deer, brain worm

---

---

---

---

---

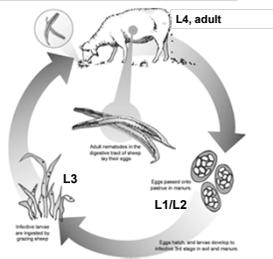
---

---

---

***Haemonchus – Trichostrongylus – Teladorsagia***

- Short, direct life cycles (avg. 3-4 weeks) that are weather-dependent.
- Can overwinter on pasture.
- Ability to go into hypobiotic (arrested) state (in host) when environmental conditions are not conducive to their development (hot, dry or cold, dry).
- Vary in their egg laying ability.
- Eggs look same under microscope.




---

---

---

---

---

---

---

---

**Haemonchus contortus - Barber pole worm**

- Primary parasite in warm, moist climates and/or during summer grazing season (in more northern climates).
- One of the most pathogenic parasites
- Prolific egg layer
- Blood sucker/feeder
- Causes anemia and bottle jaw.
- Other symptoms: weight loss, loss of body condition, poor stamina, anorexia -- but not usually diarrhea.
- Death can also be sudden (acute haemonchosis).



Image from University of Georgia

---

---

---

---

---

---

---

---

**Other strongyle-type**  
*Teladorsagia* and *Trichostrongylus*

- Usually of secondary importance.
- Usually part of mixed infections with barber pole worm.
- Cause production loss, weight loss, dagginess (scours) - only occasional death.
- May be more problematic in cooler, wet climates, e.g. Pacific Northwest, UK, and Canada.




---

---

---

---

---

---

---

---

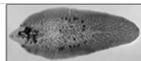
**Lungworms**

- Direct or indirect life cycle
- Larvae visible in feces (microscope)
- High loads – respiratory symptoms: coughing, fluid on lungs, pneumonia
- Difficult to diagnose in live animal; usually diagnosed at necropsy.
- Drugs which control GI parasites will also control lungworms.



**Liver flukes**  
*Fasciola hepatica*

- Regional problem: mostly Pacific Northwest and Gulf States.
- Require open water and aquatic snails as intermediate host.
- Similar symptoms as barber pole worm (anemia, bottle jaw).
- Treat adult liver flukes with albendazole (Valbazen®) or Ivomec® Plus (clorsulon).




---

---

---

---

---

---

---

---

### Tapeworms (*Moniezia expansa*)

- Only worm visible in feces
- Indirect life cycle; pasture mite intermediate host.
- Usually non-pathogenic (so no benefit to treatment) but high loads rarely cause blockages or occasionally affect gut motility.
- Treat with SafeGuard® (2x dose, Rx), Valbazen® [Rx], or praziquantel\* [Rx] (Quest Plus®, Equimax®, or Zimecterin Gold®).
- Sheep and goats are intermediate host for tapeworms that infect dogs.



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Meningeal worm (*Parelaphostrongylus tenuis*)

- Parasite of white tail deer; sheep, goats, and camelids are abnormal (and dead end) hosts.
- Has indirect life cycle: snail or slug required is intermediate host.
- Causes neurological symptoms that vary in severity; no definitive diagnosis in live animal.
- Treatment protocols involve high doses of anthelmintics and anti-inflammatory drugs.
- Fenbendazole (SafeGuard®) and ivermectin (Ivomec®) are drugs of choice for meningeal worm [Rx].
- Cornell University is working on vaccine and treatment protocols.



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

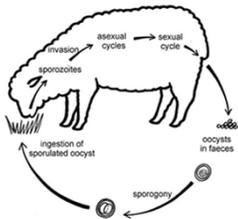
---

---

---

### Coccidia (*Eimeria* spp.)

- Single-cell protozoa
- Species-specific
- Not all species pathogenic
- More complicated life cycle than roundworms.
- Damages lining of small intestines, affecting nutrient absorption; damage can be permanent.
- Causes diarrhea (not always), ill thrift, and death.



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Coccidia (*Eimeria* spp.)

- Prevent mostly with good management and sanitation.
- Prevent with coccidiostats in water, mineral, feed, and/or milk replacer.
  - Lasalocid (Bovatec®) [Rx]
  - Monensin (Rumensin®) ⚠
  - Decoquinat (Decoxx®)
  - Amprolium (Corid) [Rx]
- Treat with Corid [Rx] or sulfa antibiotics [Rx]\*.
- Sericea lespedeza pellets may provide "natural" control of coccidiosis.



<http://www.wormx.info/Resources/Topics/SL-SS.html>

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## End - Integrated Parasite Management First Presentation, Part 1 Continued in Part 2

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## JOURNEYMAN FARMER CERTIFICATE PROGRAM

This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2015-70017-22861.

 **USDA Beginning Farmer Rancher  
Development Program**



Developing the Next Generation  
of Sustainable Farmers in Georgia Grant



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

# JOURNEYMAN FARMER CERTIFICATE PROGRAM

## Small Ruminant Production



FORT VALLEY STATE UNIVERSITY  
A State and Land-Grant Institution • University System of Georgia



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## Session 4 Integrated Parasite Management II



Susan Schoenian (Shāy nē ūn)  
Sheep & Goat Specialist  
University of Maryland Extension



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Integrated parasite management (IPM) Using chemical and non-chemical means to control parasites

#### Non-chemical

- Host immunity
- Kidding and weaning management
- Nutritional management
- Pasture and grazing management
- Genetic selection

#### Chemical

- Proper use of anthelmintics, including Targeted Selected Treatment (TST)
  - FAMACHA©
  - Five Point Check©
- Testing for anthelmintic resistance

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Host immunity Animals vary in their susceptibility to parasites

#### Most susceptible

- Lambs and kids
  - Weanlings
  - Early weaned
  - Spring born
  - Late-born
  - Artificially reared
- Periparturient females
  - High producing
  - Yearlings
- Geriatric animals

#### Less (but still) susceptible

- Mature males
- Dry females
- Pets



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Birthing and weaning management

- Can manage lambing/kidding to lessen parasite problems
- Optimal time to lamb/kid will vary (climate, other factors)
- Some producers who lamb/kid in fall/winter report less parasite problems
- Housing indoors during late gestation/early lactation to minimize effect of periparturient egg rise
- Weaning age affects susceptibility
- Pros and cons to different weaning ages



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Nutritional management

- Sheep/goats in better body condition and higher plane of nutrition are more resilient
- Extra protein (by-pass, above NRC) in late pregnancy reduced fecal egg counts in periparturient ewes
- Many pastures are usually deficient in energy



Bucks in 2014 test were supplemented with soy hulls during second half of test.

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## Pasture and grazing management

- Safe (clean) pastures
- Low risk pastures
- Evasive grazing
- Strip grazing
- Short-duration grazing
- Rotational grazing
- Management-intensive grazing (MIG)
- Multi-species grazing
- Composting manure before spreading on fields.
- Browsing
- Alternative forages
  - Tanniferous forages
  - Annuals
  - Legumes, forbs, herbs
- Minimum grazing height
- Delayed grazing
- Night penning
- Zero grazing (dry lot feeding)




---

---

---

---

---

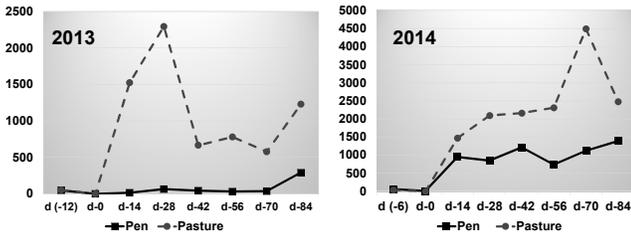
---

---

---

## Western Maryland Research & Education Center Pen vs. pasture studies

Avg. fecal egg counts, epg



No pen goats required deworming. Pasture goats received 28 and 5 treatments, respectively, in 2013 and 2014.




---

---

---

---

---

---

---

---

## Genetic selection

- There are documented differences in breeds with regards to parasite resistance.
- There is as much genetic variation within a breed as between breeds.
- Fecal egg counts are not evenly dispersed in a herd.

Approximately 20-30% of the herd is responsible for 70-80% of the pasture contamination.



One of the more resistant bucks in the 2014 test.




---

---

---

---

---

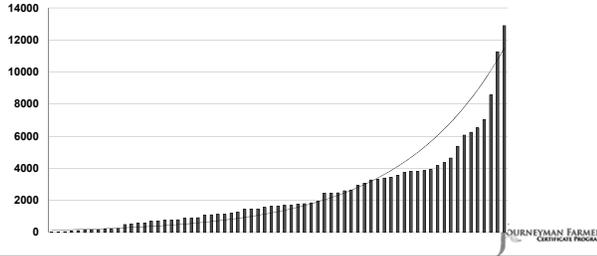
---

---

---

### FECs are not evenly dispersed

2014 Western Maryland Pasture-Based Meat Goat Performance Test  
Fecal egg counts (EPG) on August 14 (d-70)



---

---

---

---

---

---

---

---

### Genetic selection: two traits

#### RESISTANCE

- Ability of the host to reduce number of parasites that establish, reproduce, or survive in its body.
- Quantified by fecal egg counts (# worm eggs per gram of feces), which are an indirect measure of the worm burden in the animal.

#### RESILIENCE

- Ability of host to tolerate parasitic infection, i.e. maintain health, thrive, grow, and reproduce.
- Quantified by observation or measurement of clinical signs: packed cell volume (PCV), weight gain/loss, body condition, dag score.
- FAMACHA© scores are an estimate of PCV.

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Genetic selection

- Significant (but variable) correlations between FEC and PCV and FEC and FAMACHA© scores.
- Parasite resistance moderately heritable trait in sheep, variable estimates for FEC heritability in goats - no estimates for the US goat population.
- Lincoln University (in Missouri) has embarked on a long term selection study on parasite resistance in meat goats (research herd is ¼ Kiko x ¼ Boer).



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## Targeted Selective Treatment (TST)

### What is it?

- Only treating animals that require treatment or only treating animals that would benefit from treatment.

### What does it do?

1. Slows drug resistance, b/c
  - Reduces # of treatments
  - Increases refugia
2. Identifies resistant and susceptible animals for selection purposes.



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## Decision-making tools for TST

- TST requires practical decision-making tools that farmers/ producers can use.
- The first tool developed was the FAMACHA© system.
- The Five Point Check© is an extension of the FAMACHA© system.



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## FAMACHA© System

- FAMACHA© system - developed for small-scale sheep farmers in South Africa in response to growing anthelmintic resistance
  - System validated for goats
  - System validated in US for sheep and goats
- System to assess anemia (primary symptom of barber pole worm infection) in sheep/goats and to determine need for deworming individuals
- Named for its originator:  
Dr. Francois "Faffa" Malan  
**Faffa Malan Chart**



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

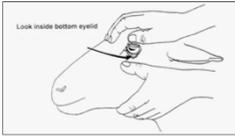
---

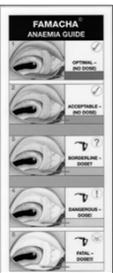
---

---

---

### FAMACHA® System





Clinical Category	Eye Lid Color	Packed Cell Volume/PCV	Treatment recommendation
1	Red	≥ 28	No
2	Red-Pink	23-27	No
3	Pink	18-22	?
4	Pink-White	13-17	Yes
5	White	≤ 12	Yes

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

---

---

### Decision-making: FAMACHA® score 3

Deworm	Don't deworm
Goats	Sheep
Kids and lambs	Mature animals
Periparturient females	Non periparturient females
Lactating females	Dry females
High parasite challenge	Low parasite challenge
Infrequent monitoring (> 3 weeks)	Frequent monitoring (1-3 weeks)
≥ 5-10% FAMACHA® 4s and 5s	< 5% FAMACHA® 4s and 5s
Downward trend in 1s and reciprocal increase in 2s and 3s	No downward trend in scores
Flock/herd not in good body condition and overall health	Flock/herd in good body condition and overall health
To increase sensitivity of system (probability of identifying anemic animals)	To increase specificity of system (probability of identifying non-anemic animals)

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

---

---

### Tips for using FAMACHA®

- Check at appropriate intervals; varies by season, animals, and risk of infection/reinfection.
- No half scores, use the paler score.
- Be consistent.
- Learn your animals.
- Don't ignore other symptoms and factors.
- Test for anthelmintic resistance.
- Replace card, as necessary.



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

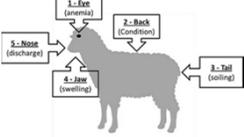
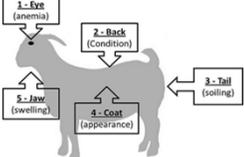
---

---

**Five Point Check©**

**5.✓©**

- Addresses FAMACHA© limitation - only effective for blood feeding parasites
- Extension of TST - determine need for deworming for all small ruminant internal parasites
- Especially useful for FAMACHA© score 3 deworming decisions
- 5 check points: eye, back, tail, jaw, nose
- Developed for sheep.
  - For goats, can replace nose checkpoint with coat condition.



---

---

---

---

---

---

---

---

Check Point	Observation	Possibilities
<b>1. EYE</b>	Anemia 1-5 (FAMACHA© card)	Barber pole worm ( <i>Haemonchus</i> ) Liver fluke Hook worms Other worms and causes
<b>2. BACK</b>	Body condition score 1-5 (BCS card)	Brown stomach worm ( <i>Teladorsagia</i> ) Bankrupt worm ( <i>Trichostrongylus</i> ) Nodular worm Other worms and causes
<b>3. TAIL</b>	Fecal soiling (1-5) Dag score card	Brown stomach worm ( <i>Teladorsagia</i> ) Bankrupt worm ( <i>Trichostrongylus</i> ) Coccidia ( <i>Eimeria</i> ) Nodular worm ( <i>Oesophagostomum</i> ) Other worms and causes
<b>4. JAW</b>	Soft swelling "Bottle jaw" 1-5	Barber pole worm ( <i>Haemonchus</i> ) Coccidia ( <i>Eimeria</i> ) Liver fluke Hook worms Other worms and causes
<b>5. NOSE</b>	Discharge 1-5	Nasal botfly Lungworms Pneumonia Other causes
<b>5. COAT</b>	Coat condition 1-3	Barber pole worm ( <i>Haemonchus</i> ) Brown stomach worm ( <i>Teladorsagia</i> ) Bankrupt worm ( <i>Trichostrongylus</i> ) Coccidia ( <i>Eimeria</i> ) External parasites Other causes

---

---

---

---

---

---

---

---

### #2 - Back - Body condition score (BCS)

- Many parasites can cause a loss of body condition.
- Poor or declining body condition can also be a sign of age, poor nutrition, or other diseases.
- Animals also vary in their ability to carry and hold body condition.





---

---

---

---

---

---

---

---

### Body condition scoring (BCS)

- Is used to determine how fat or thin an animal is.
- Cannot be determined by simply looking at an animal.
- Is accomplished by feeling for the amount of fat and muscle over the back, ribs, and loin.
- Is one of the most useful management practices.



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Body Condition Scoring

Score	Spineous process	Rib cage	Loin eye
1	Very thin Easy to see and feel, sharp	Easy to feel and can feel under	No fat covering
2	Thin Easy to feel, but smooth	Smooth, slightly rounded, need to use slight pressure to feel	Smooth, even fat cover
3	Good condition Smooth and rounded	Smooth, even feel	Smooth, even fat cover
4	Fat Can feel with firm pressure, no points can be felt	Individual ribs cannot be felt, but can still feel indent between ribs	Thick fat
5	Obese Smooth, no individual vertebra can be felt	Individual ribs cannot be felt. No separation of ribs felt.	Thick fat covering, may be lumpy and "jiggly"

Source: www.smallstock.info

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

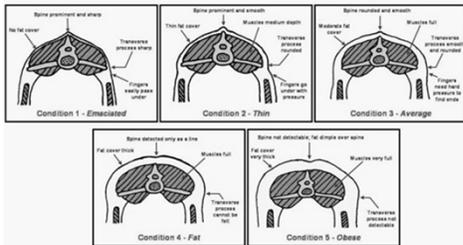
---

---

---

---

### Body Condition Scores – Sheep/Goats



Adapted from "Body Condition Scoring of Sheep" by J.M. Thompson and H. Meyer (Oregon State University)



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### #3 - Tail - dag score

- The hindquarters of the animal are assessed to determine dag score or degree of fecal soiling.
- Many parasites can cause scours (diarrhea).
- Stress and diet are other causes of diarrhea.



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### What are dags?

- Dried feces left dangling on the wool on a sheep's rear end.



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### Dag scoring

Score	Description	Action
0	No fecal soiling at all. No indication for treatment/action.	None
1	Very slight soiling on edge of tail/on each side	None
2	Slight soiling on edge of tail/on each side	Usually none
3	Moderate soiling, dag formation	Consider treatment/action
4	Severe soiling, severe dag formation	Treatment recommended
5	Very severe, watering diarrhea extending to hocks.	Treatment essential

Source: University of Pretoria, South Africa

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---



### Other factors to consider

...especially when deciding whether to deworm FAMACHA 3's



- Fecal consistency
- Fecal egg count
- Weight gain
- Scores of other animals
- Risk of reinfection
- Frequency of FAMACHA© scoring and Five Point Check©

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### What do to when deworming is not enough or only marginally effective.

- Dose with another class of anthelmintic.
- Give supportive therapy
  - Vitamin B complex
  - Iron or Red cell
  - Nutri-drench
  - Probiotics
  - Electrolytes
  - Proteinaceous feeds
- Remove parasitized animal from pasture (source of reinfection).



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

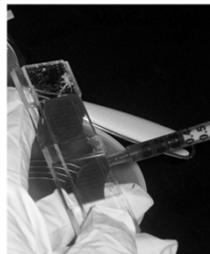
---

---

---

### Fecal Egg counts (FECs)

- A quantitative measurement that is expressed as eggs per gram of feces (EPG, epg) vs. "positive" or "negative" or +, ++, +++ from a simple fecal flotation (which is not very useful!)
- Uses a measured amount of feces and flotation solution.
- An approximation of the worm load an animal is carrying.
- A "snapshot" in time.



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

### FEC data from the Western Maryland Pasture-Based Meat Goat Performance Test

Test ID	FEC d-28	FAMACHA®
303	1650	3
304	1000	3
305	275	3
310	2040	2
334	125	3
335	3000	4
337	1900	3
338	3167	3
355	4650	2
356	6725	2
357	6000	3
358	4900	4
339	120	4
340	4240	3
351	14680	3
352	2125	5
353	33	4
359	867	3
360	200	2
361	1240	3
362	2225	2
363	525	2
367	200	2

Year	Genetic correlation (-1 to 1) between FECs and FAMACHA® scores	
2007	0.29	Intermediate
2008	0.42	Intermediate
2009	0.18	Weak
2010	0.23	Weak
2011	0.14	Weak
Avg. 5 years	0.25	Weak to intermediate



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

---

---

---

---

### Limitations of fecal egg counts

- Not a highly accurate test, especially at low numbers.
- Parasites vary in their egg producing capacity.
- Immature worms (L4s) suck blood, but do not lay eggs.
- Inhibited larvae do not lay eggs.
- There is a day-to-day variability in counts, even in stable worm populations.
- Eggs are not always evenly distributed in manure.
- Loose stools (diarrhea) may underestimate egg counts.
- Some eggs look the same and cannot be differentiated at the egg stage (e.g. *Haemonchus* vs. *Trichostrongylus*)
- Not all parasites (or strains) are pathogenic.
- There are different procedures for doing fecal egg counts.
- The possibility of human error.

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

---

---

---

---

### Three main uses of fecal egg counts

- 1) Determine anthelmintic (drug) resistance.
- 2) Monitor pasture contamination.
- 3) Select animals for their genetic ability to resist worms.



Not a reliable way to diagnose parasitic disease in an individual animal.

What do fecal worm egg counts tell us? <http://ohioline.osu.edu/vme-fact/pdf/0027.pdf>

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

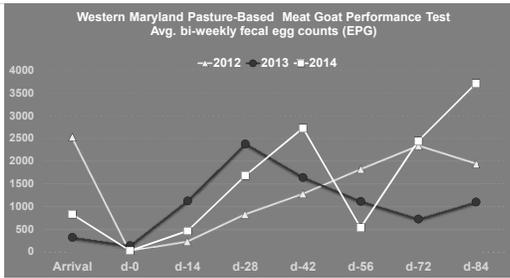
---

---

---

---

**Use fecal egg counts to monitor pasture contamination**



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

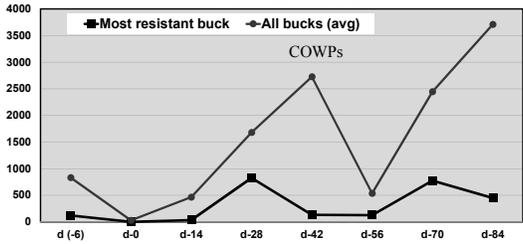
---

---

---

**Use fecal egg counts to select goats (especially bucks) that are more resistant to internal parasites.**

2014 Western Maryland Pasture-Based Meat Goat Performance Test  
Bi-weekly fecal egg counts, egg



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

---

---

**Hands-on fecal egg counting**

**What you need**

- Microscope (10 x 10 = 100x)
- McMaster slide
- Flotation solution
- Gram scale (optional)
- Cups or vials
- Craft stick or tongue depressors
- Cheese cloth or tea strainer
- Pipettes or syringes



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

---

---



Additional Resources

- [www.wormx.info](http://www.wormx.info)
- [www.sheepandgoat.com/#!/webinars/cu81](http://www.sheepandgoat.com/#!/webinars/cu81)
- <http://web.uri.edu/sheepngoat/parasite-control/>



---

---

---

---

---

---

---

---



This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2015-70017-22861.

**USDA** Beginning Farmer Rancher  
**NIFA** Development Program  
Developing the Next Generation  
of Sustainable Farmers in Georgia Grant



---

---

---

---

---

---

---

---

**NOTES:**



**JOURNEYMAN FARMER  
CERTIFICATE PROGRAM**

**Small Ruminant Production  
Meat Production and Marketing**

**Session Five**

## Session 5: Meat Production and Marketing

### **Meat Production (55 min – Dr. Alex Stelzleni)**

- Animal grading and selection
- Carcass quality and measurements
- Yield determination

#### **Learning Objectives:**

- Understand the difference between live weight, hanging weight and retail yield
- Describe how animal age, sex, and management practices affect meat quality  
**How they can use this at home** – Determine if they would make any changes on the farm given the information they have learned.

BREAK

### **Marketing (40 min – Dr. Alex Stelzleni)**

- Market opportunities
  - Live animals
  - Meat/animal products
- Methods and guidelines for marketing red meat products

#### **Learning Objectives:**

- List opportunities available for marketing live animals and meat  
**Activity (25 min)** – Meat and Marketing Activity

### **Learning Exercise:**

The learning objectives for this activity are to be able to estimate hot carcass weight and to understand marketing avenues and break-even prices.

For this activity, participants may need a calculator to answer some of the following questions. Assure them that no score or grade will be assigned since the activities are all designed to facilitate discussion.

1. Given that small ruminants dress out with a hot carcass weight that is 45-55% of their live weight (on the lower end of that range if there are more non-meat/bone components like a lot of wool or gut fill), estimate the hot carcass weight of a 120 lb lamb with average wool (use 50% as the dressing percentage).

Using 50% as the dressing percentage, the hot carcass weight would be 60 lb. If there were more wool on the live animal, the animal had a lot of mud/dirt on them or they were full of hay/grain/water, when all that was removed with the hide and guts, the hot carcass weight (hanging weight) would be less.

2. If farm's does or ewes average 1.7 marketable kids or lambs per year and the total cost of production and marketing per female is \$115, for marketing live animals:
- What is the breakeven price (\$/offspring) \$67.65 each
  - If the producer usually sells offspring weighing around 50 pounds what is the breakeven price per pound? (\$/lb) \$1.35/lb (\$1.35 x 50 = \$67.65)

First, divide the total cost of production by number of offspring to market ( $\$115/1.7 = \$67.65$  each; if you market those at 50 lb, you have to divide the breakeven price by the weight to get the cost per lb ( $\$67.65/50 \text{ lb} = \$1.35$ ).

3. What are three places/ways to market live animals? Rank them in order of most likely (1) to least likely (3) to be used on your farm. Discuss the reasoning behind your ranking.

There are several of these, they can choose from many listed on the slides. Overall, sale barns/auctions/stockyards is the big one many know about, then there are middlemen (including abattoirs, brokers, other producers and others) and direct to consumers (a.k.a. farm gate, direct marketing, off-farm).

Reasoning discussions can include pros and cons of different types of marketing (see below):

## Sale barn Pros/Cons

### PROS

- Place of price discovery
- Price competition (usually)
- Prompt, guaranteed payment (P&S Act)
- Unbiased grading (usually)
- Animals are weighed and weights are certified.
- Easy
- Convenient
- Low labor

### CONS

- You are a price taker
- Prices not known ahead of time
- Price volatility
- Selling fees can be substantial (commission, insurance, yardage, feed), especially for lighter lambs.
- Stressful to livestock
- Transportation costs
- Shrink

## Abattoir/middlemen Pros/Cons

### PROS

- Opportunity to negotiate
  - Price
  - Shrink
  - Delivery
  - Contract
- Price known ahead of time
- Low cost method
  - No selling fees
  - No processing costs
- Low labor

### CONS

- Payment risk  
[sell to bonded/licensed dealers; require cash payment]
- May not always be the highest price offered; middleman needs to make a profit, too.
- May not always be buying.

## Farm Gate Pros/Cons

### PROS

- Set your own price
- No selling fees
  - Commission
  - Yardage
  - Insurance
  - Feed
- No processing or transportation costs
- Less stress to animal (?)
- Low labor

### CONS

- Payment risk
- Someone has to be on the farm to sell, risk of no-shows
- Language and cultural barriers
- Buyer may lack suitable transportation
- You may not know where and how animal is slaughtered

#### On-farm slaughter

- Legality [not legal in most states]
- Need a place to slaughter
- Offal disposal
- Comfort (not for everyone)

***How they can use this at home*** – Look up closest livestock sale barns, abattoirs/processing facilities and retail sale sites (farmer's markets for example). Develop a marketing plan for the farm, including more than one market opportunity and determine possible profitability for those markets.



# Small Ruminant Production



FORT VALLEY STATE UNIVERSITY  
A State and Land-Grant Institution • University System of Georgia



---

---

---

---

---

---

---

---

## Session 5 Meats



Alex Stelzleni, PhD  
University of Georgia  
Meat Science Technology Center



---

---

---

---

---

---

---

---

### Learning Objectives

- Understand the difference between live weight, hanging weight (hot carcass weight) and retail yield
- Describe how animal age, sex, and management practices affect meat quality



---

---

---

---

---

---

---

---

## Why is Small Ruminant Production Important?

- Growing US minority populations that consume lamb/goat on a regular basis
  - US = 34% minority population
  - 44% of population for individuals under 18 yrs
  - 47% of population for individuals under 5 yrs
- As long as traditional dietary habits continue consumption should increase
  - May be restricted to certain times of the year



Photo: Susan Schoenian, Baalands Farm

Runge, AU, US Census




---

---

---

---

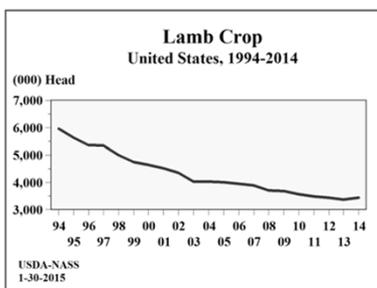
---

---

---

---

## Lamb




---

---

---

---

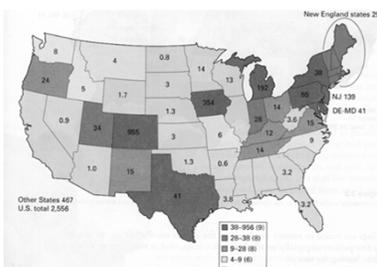
---

---

---

---

## Lamb




---

---

---

---

---

---

---

---

## Lamb




---

---

---

---

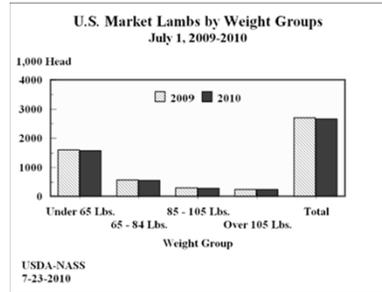
---

---

---

---

## Lamb




---

---

---

---

---

---

---

---

## Consumption/Imports

- With per capita lamb and mutton consumption fairly stable, imports have offset the decline in domestic production. Lamb and mutton imports, which currently account for nearly half of U.S. consumption, are mainly from Australia (about 68-70 percent) and New Zealand (about 30-32 percent).

— [nrs.usda.edu](http://nrs.usda.edu) (2015)




---

---

---

---

---

---

---

---

## Meat Goats in the US




---

---

---

---

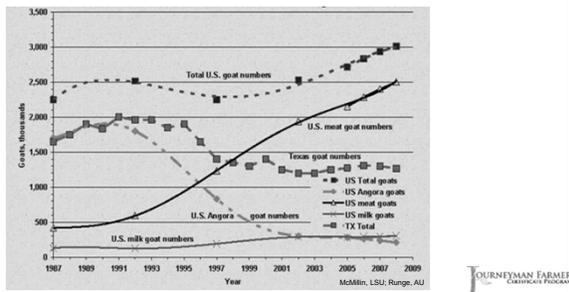
---

---

---

---

## Goat Inventory




---

---

---

---

---

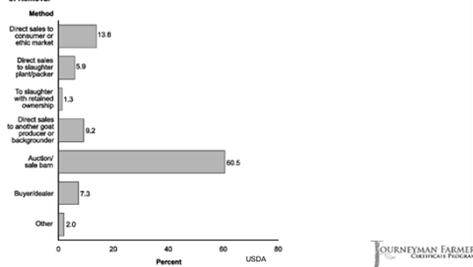
---

---

---

## So how are all these goats sold?

Figure 10. For Meat Goat Operations that had Permanently Removed Kids During the Previous 12 Months, Percentage of Kids Removed, by Method of Removal




---

---

---

---

---

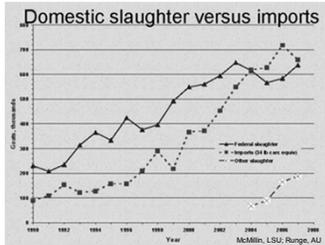
---

---

---

## What about Slaughter?

- 2.4 million meat goats in US inventory... So where are they from a slaughter POV?
- Personal Consumption
- Custom Exempt
- Hobby-never slaughter
- "Off the Radar" sales
- US meat goat production could possibly fill demand



JOURNEYMAN FARMER  
CERTIFICATION PROGRAM

---

---

---

---

---

---

---

---

## Who's got their Goat?

- Majority from Australia (97.6% for U.S., 87% for Canada), 2.3% from NZ, <1% Mexico in 2007)
- Mostly imported frozen carcasses, 6 piece for cubes
- Feral harvest in Australia so supply depends on forage and drought conditions
- 34 lb average carcass weight (imports)



Photo: Susan Schoenian, Baalands Farm

McMillin, LSU; Range, AU

JOURNEYMAN FARMER  
CERTIFICATION PROGRAM

---

---

---

---

---

---

---

---

## The Meat of the Matter

JOURNEYMAN FARMER  
CERTIFICATION PROGRAM

---

---

---

---

---

---

---

---

## Important Considerations

- Hot Carcass Weight (HCW) and Dressing Percentage (DP)
  - HCW gives starting weight for sale value
  - $DP = (HCW/LW) \times 100$ 
    - How much carcass (meat) was in the live animal
    - Considerations – gut fill, age, amount of hair/wool
- Retail vs. Total Yield
  - If selling cuts important to know along with production cost to figure break even (BE) and % profit
  - $RY = (Retail\ cut\ wt/carcass\ wt) \times 100$
  - $TY = (Retail\ cut\ wt/Live\ wt) \times 100$
- Typical Carcass Characteristics/Considerations




---

---

---

---

---

---

---

---

## Carcass Characteristics

- Dressing %
  - Lamb and goats, 45-55%
- Fat Cover
  - Minimal - lambs have more
  - 0.1-0.3"
- Carcass wt
  - <50#, depends on time
  - Can loose 5-8% wt overnight
- Loin eye area
  - Goat 1-3 inches<sup>2</sup>
  - Lamb 2-4.5 inches<sup>2</sup>



Photos: Susan Schoenian, Basalands Farm  
Goat top, Lamb bottom




---

---

---

---

---

---

---

---

## So once we slaughter them, what?

Specie	Yield Grade	Quality Grade
Beef	1,2,3,4,5	Prime, Choice, Select, Standard
Lamb	1,2,3,4,5	Prime, Choice, Good, Utility, Cull
Pork	US 1,2,3,4	Utility
Goat	None	None

But, Dr. McMillin at LSU has been working to help out with a grading standard for goats

Loveby, UT




---

---

---

---

---

---

---

---

## Lambs

- Yield Grade
  - $0.4 + (10 \times 12^{\text{th}} \text{ rib fat}) \% \text{BCTRC}$

Yield Grade	Expected Yield
Yield Grade 1	47.4 % or more
Yield Grade 2	47.2 – 45.6%
Yield Grade 3	45.4 – 43.8%
Yield Grade 4	43.6 – 42.0%
Yield Grade 5	41.8 % and less



Bottom photo: Susan Schoenian, Balllands Farm

JOURNEYMAN FARMER  
CULINARY PROGRAM

---

---

---

---

---

---

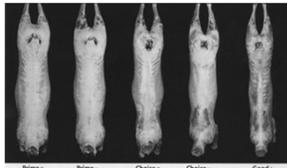
---

---

## Lamb Quality Grade

- *To segregate lamb carcasses into palatability groups based on the expected eating quality of the cooked retail cuts from the lamb carcass*

- What to look for
  - Carcass conformation
  - Maturity
  - Fat deposition (Flank)
  - Fat and lean firmness



JOURNEYMAN FARMER  
CULINARY PROGRAM

---

---

---

---

---

---

---

---

## Maturity

- Determine Break or Spool Joint
  - A maturity – at least 1 break joint, moderately red, moist and porous “Young Lamb”
  - B – at least 1 break joint, slightly red, dry, hard (<12 mon) “Old Lamb”
  - Yearling Mutton – may have break or spool joints, need to look at other indicators
  - Mutton – two spool joints + other indicators



JOURNEYMAN FARMER  
CULINARY PROGRAM

---

---

---

---

---

---

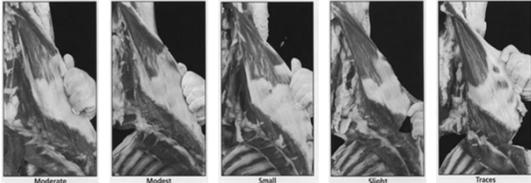
---

---

## Fat Deposition / Flank Streaking

### Firmness

Prime Moderately Firm  
 Choice Slightly Firm  
 Good Slightly Soft



JOURNEYMAN FARMER  
 CERTIFICATION PROGRAM

---

---

---

---

---

---

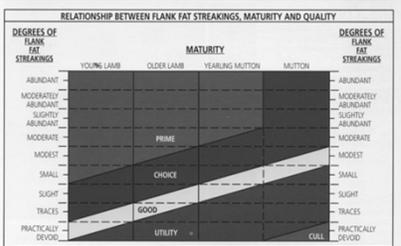
---

---

---

---

## Putting it all Together



JOURNEYMAN FARMER  
 CERTIFICATION PROGRAM

---

---

---

---

---

---

---

---

---

---

## Goat Suggested Grades

JOURNEYMAN FARMER  
 CERTIFICATION PROGRAM

---

---

---

---

---

---

---

---

---

---

### Selection 1 Market Kids

- Live goats have a superior meat type conformation; Thickly muscled throughout the body as indicated by a
  - Bulging outside legs
  - Full (rounded) back strip
  - Moderately thick outside shoulder



Lovejoy, UT



---

---

---

---

---

---

---

---

### Selection 2 Market Kids

- Live goats have an average meat type conformation; Moderately muscled throughout the body as indicated by a
  - Slightly thick outside legs
  - Slightly full (rounded) back strip
  - Slightly thick to slightly thin outside shoulder



Lovejoy, UT



---

---

---

---

---

---

---

---

### Selection 3 Market Kids

- Live goats have an inferior meat type conformation; Thinly muscled throughout the body as indicated by a
  - Legs, back and shoulders are narrow
  - Body has angular, sunken appearance



Lovejoy, UT



---

---

---

---

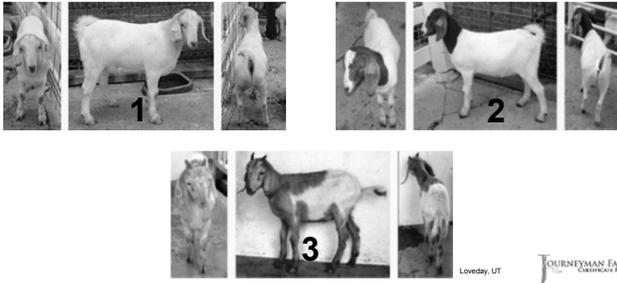
---

---

---

---

### Comparison of Live Goat Selection



JOURNEYMAN FARMER  
COURTESY PROGRAM  
Loveland, UT

---

---

---

---

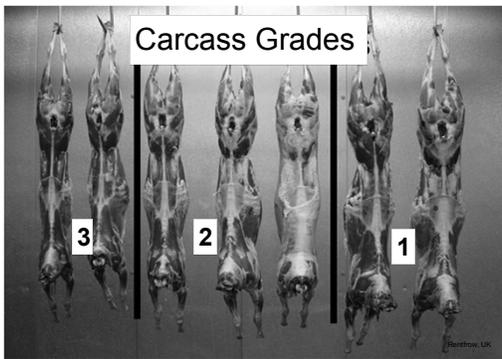
---

---

---

---

### Carcass Grades



JOURNEYMAN FARMER  
COURTESY PROGRAM  
Rendfrew, UK

---

---

---

---

---

---

---

---

### Fabrication guide to IMPS cuts

IMPS Style	Carcass Weight Range	Recommended Skeletal Cuts	Recommended Muscular Cuts
Platter	15 lb. or less		
Roasting	15-30 lb.		
Barbeque	20-40 lb.		
Food Service	30-40 lb.		
Hotel	40 lb. or more		

JOURNEYMAN FARMER  
COURTESY PROGRAM

---

---

---

---

---

---

---

---



## General impacts on meat quality

- Age
  - Increases yield (muscle) to a point, then fat increases (as long as + nutrition)
  - Meat tenderness decreases with age
- Sex
  - Intact males are leaner (have less fat) and can have tougher meat but may have more muscling/meat than castrated males or females
  - Goat males have a very strong musky smell than can impact meat taste; some consumers are turned off by this (especially Americans)
- Management
  - Animals raised primarily on grass usually have less fat than those fed grain-based feeds (at the same age)
  - Stress can decrease meat tenderness, impact flavor, color, and WHC



---

---

---

---

---

---

---

---

## Additional Resources

### Goats

- [www2.ca.uky.edu/agc/pubs/asc/asc179/asc179.pdf](http://www2.ca.uky.edu/agc/pubs/asc/asc179/asc179.pdf)
- [www.sheepandgoat.com/#!meat-goat-carcass-evaluation/ce9c](http://www.sheepandgoat.com/#!meat-goat-carcass-evaluation/ce9c)

### Sheep

- [www.sheep101.info/201/lambmarketing.html](http://www.sheep101.info/201/lambmarketing.html)
- [www.sustainagga.org/documents/didthelockerstealmymeat.pdf](http://www.sustainagga.org/documents/didthelockerstealmymeat.pdf)

### Both

- [sheepgoatmarketing.info/education/dressingpercentages.php](http://sheepgoatmarketing.info/education/dressingpercentages.php)



---

---

---

---

---

---

---

---



This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2015-70017-22861.

**USDA** Beginning Farmer Rancher  
Development Program



Developing the Next Generation  
of Sustainable Farmers in Georgia Grant



---

---

---

---

---

---

---

---

# JOURNEYMAN FARMER CERTIFICATE PROGRAM

## Small Ruminant Production



FORT VALLEY STATE UNIVERSITY  
A State and Land-Grant Institution • University System of Georgia



---

---

---

---

---

---

---

---

## Session 5 Marketing



Alex Stelzleni, PhD  
University of Georgia  
Meat Science Technology Center

Most photos/some slides: Susan Schoenian, University of Maryland and Baalands Farm



---

---

---

---

---

---

---

---

## Lamb (mutton) / Goat Meat Consumption

- Purchasers are usually ethnic
  - ~60% Muslim, Latino/Hispanic, Asian, Caribbean, Italian, Greek, Eastern European
- Different ethnic groups have preference for different types of meat
  - Age, Sex, Cut, Preparation
- May desire Halal or Kosher slaughter



Runge, AU

Photos: Susan Schoenian, Baalands Farm



---

---

---

---

---

---

---

---

## Major Goat Consumption Holidays

Table 1. Various Holidays and Celebrations Where Goat is Typically Served.

Holiday	Date	Size of Kid	Comments
Easter (Western)	Late March/Early April	20 to 50 pounds	Date varies
Easter (Eastern and Greek)	Mid to Late April	20 to 50 pounds	Date varies
Cinco de Mayo (Hispanic)	May 5	20 to 35 pounds	
Independence Day	July 4	20 to 35 pounds	Older kids accepted
Caribbean Holidays	August	60 pounds	Bucks only
Start of Ramadan (Muslim)	Late August/mid-September	45 to 120 pounds	Less than 12 months old; Date varies
Eid al Fitr (Muslim)	Late September/mid-October	45 to 120 pounds	60 pounds optimum
Eid al Adha (Muslim)	Late November/Early December		Yearlings, blemish free; Date varies
Dassai (Hindu)	Late September/Mid-October		Male goats only; Date varies; Size varies

Jones and Raper, OSU

Many ethnicities traditionally consumed goat, but have switched to lamb due to availability, price, assimilation, and other factors




---

---

---

---

---

---

---

---

---

---

## Consumption

• Consumers of goat (chevon/cabrito) or lamb also purchase it for many other celebrations:

- Christmas
- Thanksgiving
- Birthdays
- Weddings
- Family reunions
- Others
  - Superbowl/Game day parties
  - Coming of age parties
  - More




---

---

---

---

---

---

---

---

---

---

## Marketing opportunities

• Can take advantage of these times of high consumer demand through marketing:

- Sales at livestock auction/sale barns
- Sales to a harvest/processing facility or other middlemen
- Farm gate (on-farm) sales of live animals directly to consumers
- Sales of meat or value added products




---

---

---

---

---

---

---

---

---

---

**Marketing animals through a sale barn (also called auction or stockyard)**

• Not all auctions are equal - consider ones who are experienced with goats/sheep; graded sales usually better.

- Local
- Terminal
- Weekly
- Special
- Graded
- Sponsored



JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

**Sale barn Pros/Cons**

**PROS**

- Place of price discovery
- Price competition (usually)
- Prompt, guaranteed payment (P&S Act)
- Unbiased grading (usually)
- Animals are weighed and weights are certified.
- Easy
- Convenient
- Low labor

**CONS**

- You are a price taker
- Prices not known ahead of time
- Price volatility
- Selling fees can be substantial (commission, insurance, yardage, feed), especially for lighter lambs.
- Stressful to livestock
- Transportation costs
- Shrink

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

**Tips sale barn (ethnic) marketing**

- Sell livestock prior to major ethnic holidays, at least one week ahead of time.
- Do not castrate males, unless necessary.
- Do not dock lamb tails, unless necessary.
- Do not sell dirty animals with soiled hocks and hindquarters.
- Consider shearing animals that are neither too fat nor too thin.
- When selling suckling lambs/kids, sell them directly off their dams.
- Mark your animals according to how you want them sold.
- Do not bring your animals to the sale barn at the last minute.
- Make sure your animals have feed and water.
- Call the market manager ahead of time. Get to know manager(s).
- Sit through auctions. Get to know buyers.
- Consider selling when reported prices are low.
- Consider breeding out-of-season.
- Pay attention to body condition. Don't sell culls that are too fat or too thin.
- Sell to the auction that offers you the most profit – not necessarily the highest price.

JOURNEYMAN FARMER CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## Abattoir/processor or other middlemen

- Abattoir/processor
- Order buyer/brokers
- Ethnic Stores
- Cooperatives
- Other producers
  - Breeding stock, records needed, pedigrees?



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## Abattoir/middlemen Pros/Cons

### PROS

- Opportunity to negotiate
  - Price
  - Shrink
  - Delivery
  - Contract
- Price known ahead of time
- Low cost method
  - No selling fees
  - No processing costs
- Low labor

### CONS

- Payment risk  
[sell to bonded/licensed dealers; require cash payment]
- May not always be the highest price offered; middleman needs to make a profit, too.
- May not always be buying.



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## Farm Gate (direct marketing live animals)

- Different options
  1. Cash-and-carry
  2. Custom slaughter  
Mobile slaughter
  3. On-farm slaughter (where legal)



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## Farm Gate Pros/Cons

### PROS

- Set your own price
- No selling fees
  - Commission
  - Yardage
  - Insurance
  - Feed
- No processing or transportation costs
- Less stress to animal (?)
- Low labor

### CONS

- Payment risk
- Someone has to be on the farm to sell, risk of no-shows
- Language and cultural barriers
- Buyer may lack suitable transportation
- You may not know where and how animal is slaughtered
- On-farm slaughter
  - Legality [not legal in most states]
  - Need a place to slaughter
  - Offal disposal
  - Comfort (not for everyone)




---

---

---

---

---

---

---

---

## Sales of Meat/Products

- Direct to consumer
  - Farmers markets
    - Fees
    - Waiting list?
    - Insurance
  - Farm store/off farm
- Retail stores
  - Grocery stores
    - Require liability insurance; may require certifications (i.e. Whole Foods)
    - Want consistent quality and high quantity year round
  - Butchers
- Restaurants
  - Want consistent quality and quantity year round




---

---

---

---

---

---

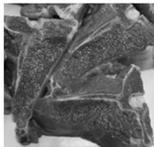
---

---

## Sales of Meat/Products

### PROS

- Set your own prices; opportunity for higher net price/animal
- No live animal/sale barn type fees
- Can tell your farm story/interact directly with consumers



### CONS

- Finding abattoir/processor who will process small ruminants in the manner/cuts desired
- Cost of processing
- Transportation costs for animals and products
- High labor
- Requires a marketing personality to interact directly with consumers
- Costs may be associated with sales:
  - Farmer's market fees
  - Storage locker fees
  - Labeling costs
  - Audit fees for some certifications/labels
  - Sales tax collection (?)
  - Fees to take credit cards (?)




---

---

---

---

---

---

---

---

## General Marketing Tips

- Keep or sell for breeding stock the best (top 10%) and sell the rest for consumption
- Sell animals/products for a profit – know your cost of production
  - If cost of production (and marketing) is \$125/female/year and your females provide only 1 marketable offspring per year, your break-even price, the minimum price you need to get, is \$125 for that kid or lamb.
  - Divide that price by two if they provide you with 2 marketable offspring per year (\$75 per kid or lamb).
- Sell for highest “net” price; consider all marketing costs (i.e. fees, transportation) when choosing best option(s)



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## General Marketing Tips

- Have a plan for marketing your animals (more than one market?) and schedule breeding for marketing opportunities
- Follow Scrapie Program requirements (free tags/tagger; keep purchase/sales records); [www.eradicatescrapie.org](http://www.eradicatescrapie.org)
- For sheep, follow rules for the Lamb Checkoff (mandatory fees assessed to seller and first handler); <http://lambresourcecenter.com/lamb-checkoff/who-we-are>
- **If marketing meat/products, follow state rules and regulations**



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## Rules and Regulations for Selling Red Meat in GA

---

---

---

---

---

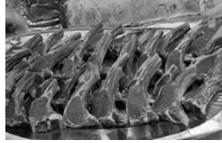
---

---

---

## Can I Sell Meat from My Animals?

- It Depends
  - Farmers Exemption, Custom Processing, Inspected, Retail Exempt – Mobile vs Fixed
- Part of Federal MIA
  - Enforced by USDA and GDA (local municipality)
- Laws as we understand them and told to us as a Processing Plant and discussions with inspectors
  - Before doing anything questionable be sure to ask GDA!!!



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

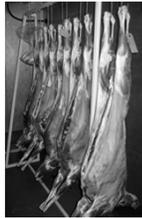
---

---

---

## Types of Plants

- Custom Processor – “Cut and Wrap”
  - Kill, cut, wrap for individual use
  - MUST be marked NOT FOR SALE on each package
  - Meat CAN NOT be sold, donated, traded, bartered
  - Animal owner (end user) pays for kill, processing, storage
  - Oversight from GDA and USDA for records and sanitation
  - Keeps legal records (names, addresses, pounds)



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## Types of Plants

- State Inspected – GDA, Meat can be sold within state lines
- Federally Inspected (TA) – By USDA or GDA on behalf of USDA, Meat can be sold in US
  - But, need other permits, licenses, approvals to sell
  - Under continuous inspection
  - Owner pays for services and takes meat back for sale (see permits etc. above)
  - Meat must be inspected for direct sale!!!!
  - Plant has high risk potential



agr.georgia.gov

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## Farmer's Exemption

- Part of Custom Exemption (Curtis Amendment)
- For the farmer, family, non-paying guests ONLY
- Farmer may kill and haul to Custom plant for processing
  - can do alone if know how (not recommended)
  - Must declare animal was ambulatory (Scrapie, TSE, BSE)
- May take live animal to Custom and have killed, processed
- Must be for personal use only
- Plant must keep records, who, how much, how often, animal age

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## Custom Exempt

- Producer sells LIVE animal to someone else
  - May deliver to slaughter for new owner (no charge)
- New owner contacts plant
  - Fills cut sheet, pays for kill, processing, picks up
  - Old owner can deliver product as a favor, no charging
- Can't kill then sell sides, quarters ...  
Must sell live animal. Separate transaction for animal, kill + Processing



JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---

## Custom Exempt

- Others
  - Producer can sell portions of LIVE ANIMAL, issues with cuts and plant abilities, 2 vs 10 owners
  - Plant keeps records of old owner, new owner(s)
    - If 1 person brings and takes 1 animal/week that is way above personal consumption levels
  - Producer cannot sell animal, then kill and cut for another person...operating as processor
    - Ga State Law 26.2.209 prohibits letting others (new owner) from killing and cutting on your land!!!

JOURNEYMAN FARMER  
CERTIFICATE PROGRAM

---

---

---

---

---

---

---

---



## Labeling

- Custom
  - No Claims, Generic plant label, Not For Sale
- Inspected
  - Must work with Plant, may not be willing to put special label on product
  - Must be approved by USDA/GDA
  - Must follow Federal Labeling Guidelines
  - All claims must be verified process controlled
  - Label still has Plant address and Inspection Number (why some are iffy about doing this)
  - Label belongs to Plant not You



www.tenderloinmeats.co.uk

For labeling guidelines - [www.fsis.usda.gov](http://www.fsis.usda.gov)



---

---

---

---

---

---

---

---

## How to sell cuts?

- Mobile License (Delivery to end user)
  - Farmers Markets, Parking lots, delivery to HRI
  - GDA annual basis, \$100 Ga 40-7-5
- Fixed Location
  - Georgia Food Safety Divisions Licensing Ga 40-7-1-19
- Further Processing – cutting, bacon, sausage
  - If fixed location, inspected product, end user only
    - \$ Volume and % of total sales (cure/cook MUST be inspected if for use other than household consumer no matter what)
      - 75% end user, 25% or less wholesale &/or less than \$76,900
  - If mobile – must be made at inspected facility



---

---

---

---

---

---

---

---

## Straight from USDA via our GDA Inspector

- FSIS' policy regarding whether the preparation of meat products for sale to other than household consumers by a retail store is exempt from inspection is based on what operation is employed in preparing the product, and where that operation falls under 9 CFR 303.1 (d) (2) (iii) (f). If the retail store engages in the operations of cutting up, slicing, and trimming of carcasses, halves, quarters, or wholesale cuts into retail cuts such as steaks, chops, and roasts, and freezing such cuts; grinding and freezing products made from meat; breaking bulk shipments of products; or wrapping or rewrapping such products in the preparation of retail products for sale to other household consumers, it would be exempt from inspection. 9 CFR 303.1 (d) (2) (iii) (f). The retail store would also have to make no more than 25% of its sales to other than household consumers, and its sales to other than household consumers could not exceed the dollar limits on such sales that FSIS establishes. 9 CFR 303.1 (d) (2) (iii) (b).
- If a retail store cures, cooks, renders, refines livestock fat, or engages in other operations to prepare products for other than household consumers, then those operations are subject to inspection, regardless of the percent of its sales that are to other than household consumers or of the dollar amount of those sales. 9 CFR 303.1 (d) (2) (iii) (f).



---

---

---

---

---

---

---

---

## Final Considerations

- These are the laws as we understand them
- There are a ton of 'grey areas'
- Be sure to follow Due Diligence before starting
- Contact GDA – Inspection and Food Safety with any questions BEFORE doing anything
- Keep and handle as though your young child was eating it, consumer comes first; it only takes one outbreak to shut the system down
- Follow the laws at all times, the consequences are real
- Strongly consider liability insurance!



---

---

---

---

---

---

---

---

## Additional Resources

- GDA – [www.agr.georgia.gov](http://www.agr.georgia.gov)
- USDA – [www.fsis.usda.gov](http://www.fsis.usda.gov)
- Inspection Law GDA – [www.agr.georgia.gov/meat-inspection.aspx](http://www.agr.georgia.gov/meat-inspection.aspx)
- Food Safety (Licenses and laws for sales) GDA
  - [www.agr.georgia.gov/foodsafety.aspx](http://www.agr.georgia.gov/foodsafety.aspx)
- Marketing webinars:
  - [www.sheepandgoat.com/#!webinars/cu81](http://www.sheepandgoat.com/#!webinars/cu81)



---

---

---

---

---

---

---

---



This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2015-70017-22861.

**USDA** Beginning Farmer Rancher  
Development Program



Developing the Next Generation  
of Sustainable Farmers in Georgia Grant



---

---

---

---

---

---

---

---

**NOTES:**

# JOURNEYMAN FARMER CERTIFICATE PROGRAM

Small Ruminant Production  
Hands On: Body Scoring, FAMACHA®,  
Foot Trimming, Castrating,  
Giving Shots

**Session Six**

## Session 6: Hands-on Demonstration: Body Condition Scoring, FAMACHA®, Foot Trimming, Castrating and Giving Shots

### **Body Condition Scoring (45 min)**

- Practice body condition scoring with live animals

Facilitator's note: you could combine body condition scoring with the FAMACHA®/Five Point Check® session below

### **\*\*FAMACHA®/ Five Point Check® (45 min – Trained instructor)**

- Always use card
- Conduct in sunlight
- Score both eyes; score quickly to avoid eye irritation; use highest score
- Store card out of sun to avoid fading colors
- Five point check:
  - FAMACHA®,
  - Body condition score,
  - Dag score/soiling on rear
  - Bottle jaw/swelling under chin
  - Replace nose score with coat condition
- \*\*They can get a FAMACHA® certificate and card if attended/participated in FAMACHA® and “Integrated Parasite Management I and II” and a trained instructor teaches the FAMACHA® hands on section to sign certificates
- **You will either need to buy/order FAMACHA® cards well ahead of time or tell participants they can buy the card after the certification session (see below).**

**FAMACHA® video available at: [web.uri.edu/sheepngoat/video/](http://web.uri.edu/sheepngoat/video/)**

If FAMACHA® certification is given and the trainer does not tell them, please let participants know that it is advised to have two cards so they can keep one in a drawer to compare to the one they use and they know to buy a new one when the color starts to fade. **You or the trainer will need to send a list of certified participants with their contact information to [famacha@uga.edu](mailto:famacha@uga.edu) with the certifier name (Susan Schoenian and the hands-on trainer) and date so they can buy additional/new cards as needed.**

Reminders for FAMACHA® -

- Other things cause anemia (including some species of coccidia), so if eye score does not start to improve in a couple of weeks and the dewormer used is known to be effective (work), then work with your vet to determine possible other causes.
- It is recommended that FAMACHA® be conducted every 2 weeks during the season of heavy worm loads with animals that are highly susceptible.
- See more helpful hints in the information package obtained with the FAMACHA® certification

**Foot Trimming, Castrating and Giving Shots (90 min)**

- Trim parallel to hair line
- Trim regularly to avoid foot scald and perhaps hoof rot
- Castrate if market/resource needs (if not room to separate male offspring)
- Surgical castration vs banding
  - Make sure covered for tetanus prior to castration
- Shots: intramuscular and subcutaneous
  - How to give
  - Sites to use

The foot trimmers recommended for most producers are this type:

Videos online:

- [www.youtube.com/watch?v=Ya17lujktZM](http://www.youtube.com/watch?v=Ya17lujktZM)
- [www.youtube.com/watch?v=6ffU\\_cBjlsk](http://www.youtube.com/watch?v=6ffU_cBjlsk)



Castration notes:

- When/if males are castrated depends upon type of operation, market and resources
  - Breeding stock operation may not castrate until later (after they can get a good evaluation of post-weaning gain/parasite resistance for example)
  - Some ethnic markets want intact males for meat, not castrated
  - If you cannot separate young males and females by 3-4 months of age (especially if coming of age during breeding season), may need to castrate to avoid unplanned pregnancies and inbreeding
  - Make sure tetanus (i.e. CDT) vaccination is up-to-date and/or a tetanus antitoxin is given when castration is done.

Injection notes:

- Keep vaccines and medicines stored at labeled temperature even when using them to give shots (i.e. use a cooler with ice pack to keep refrigerated items cool when hot outside; avoid freezing)
- Maintain good sanitation protocols; for example: do not inject through dirty hair/wool; avoid re-using needles; do not draw up vaccines or medicines with a 'used' needle

**Learning Objectives:**

- Demonstrate use of FAMACHA® and the Five Point Check® to select animals for deworming
- List the two most common castration methods

### Wrap Up (20 min)

- Hands-On Training – Take the next step  
Please remind participants that if they have taken a Small Farm Business Planning training, and successfully pass the knowledge evaluation, they are eligible to apply for a paid internship or have a Farmer Mentor assigned to consult with them on their farm to improve their operation. Pass out the Hands-On Program materials and application form.
- Online knowledge evaluation  
Please pass out the link to the Online knowledge evaluation. Remind the participants that they have one week to complete the knowledge evaluation and may take it more than once. If they want to retake the knowledge evaluation, **ask them to PLEASE type in their first and last name each time they begin the evaluation so we can track the final score.**
- Training evaluation  
Please ask participants to fill out the evaluation of the training. Let them know this is important feedback for us to improve the training.

**NOTES:**