Friday, January 4

AM

9:00 **Virginia Sheep Producers Association Board Meeting (open to public)**

10:30 **Virginia Sheep Industry Board Meeting (open to public)**

PM

1:00 **"National Scrapie Eradication Program: Producer Implications"**
Dr. Diane Sutton, DVM, USDA-APHIS Veterinary Services, Washington, DC

2:00 **"Update on Hair Sheep Research at Virginia Tech"**
Dr. Scott Greiner, Department of Animal & Poultry Sciences, Virginia Tech
Dr. Dave Notter, Department of Animal & Poultry Sciences, Virginia Tech

2:30 **Break**

2:45 **"Understanding the Lamb Market"**
Mr. Bill McKinnon, Department of Animal & Poultry Science, Virginia Tech
Mr. Mike Carpenter, Virginia Dept. of Agriculture and Consumer Services

3:15 **"Commercial Production Systems that Make Economic and Marketing Sense"**
Mr. Bill McKinnon, Department of Animal & Poultry Sciences, Virginia Tech
Dr. Scott Greiner, Department of Animal & Poultry Sciences, Virginia Tech

4:15 **Adding Value to My Sheep Operation: Producer Panel**
Wool Marketing: *Rebecca Denhoff, Crescent Moon Fiber Mill, Buchanan, VA*
Direct Marketing: *Martha Mewbourne, Thorn Tree Farm, Nickelsville, VA*
Dairy Sheep: *Pat Elliot, Everona Dairy, Rapidan, VA*

5:00 **"Pasture Management and Renovation"**
Dr. Ray Smith, Department of Crop and Soil Environmental Sciences, Virginia Tech

6:00 **Social Hour and Commercial Exhibits**

7:00 **Lamb Banquet**
Outstanding Producer Recognition
Entertainment- Six Feet Under Band

Saturday, January 5

AM

7:00 **Virginia Sheep Producers Association Annual Breakfast Meeting**
Speaker: Mr. David Greene, ASI Region II Representative, White Hall, MD

9:00 **"Club Lamb Fungus- Prevention and Treatment"**
Dr. Robert Stewart, Department of Animal & Dairy Science, University of Georgia

10:00 **"Current Concepts in Sheep Parasite Control"**
Dr. Dee Whittier, DVM, VA-MD Regional College of Veterinary Medicine

10:45 **Break**

11:00 **"Control of Abortion and Ringwomb in Ewes"**
Dr. Kevin Pelzer, DVM, VA-MD Regional College of Veterinary Medicine

11:30 **"Alternative Feeds for Sheep"**
Dr. Mark Wahlberg, Department of Animal & Poultry Sciences, Virginia Tech

12:00 **Lunch on your own**

PM

1:00 **VIRGINIA TECH LIVESTOCK PAVILION**

"Pregnancy Diagnosis Using Ultrasound"
Dr. Kevin Pelzer, DVM, VA-MD Regional College of Veterinary Medicine

"Shepherd's Supply Inventory"
Dr. Dee Whittier, DVM, VA-MD Regional College of Veterinary Medicine

2:00 **2nd Annual Virginia Bred Commercial Ewe Lamb Sale**

Youth Session- Saturday January 5

AM

10:00 **Sheep Quiz Bowl (team competition)**
Lamb Promotion Presentations (individual competition)

Table of Contents

2002 VA-NC Shepherds' Symposium
Presented By
Virginia Sheep Producers Association

Sponsors

Sheepman Supply – Robert Dinsmore
8102 Liberty Road
Frederick, MD 21701
301-662-4197

King Ag Products – Cecil King
PO Box 148
Pulaski, VA 24301-0148
540-980-5395

Mid-States Wool Growers Coop. – Stanley Strode
9449 Basil-Western Rd., NW
Canal Winchester, OH 43110
614-837-9665

Augusta Cooperative Farm Bureau, Inc. – Dale Smith
1205-B Richmond Rd.
Staunton, VA
540-885-1265

Culpeper Farmers' Cooperative, Inc. – Sam Strahan
Box 2002
Culpeper, VA 22701
540-825-2200

NATIONAL SCRAPIE ERADICATION PROGRAM: PRODUCER IMPLICATIONS

Dr. Diane Sutton, DVM
USDA-APHIS Veterinary Services

Procedures for Identifying Sheep and Goats

The final rule Scrapie in Sheep and Goats; Interstate Movement Restrictions and Indemnity Program was published August 21, 2001. This is a summary of the identification methods and requirements of the final.

When will the ID requirements become mandatory?

November 19, 2001 for most sheep and goats. September 20, 2001 for all scrapie exposed, suspect, high risk, and positive animals. February 19, 2002 for commercial whiteface breeding sheep under 18 months of age.

Which animals will need ID tags?

- All breeding sheep regardless of age
- All sheep over 18 months of age
- All exposed, suspect, test positive and high risk animals
- Breeding goats, except low risk commercial goats
- All sexually intact animals for exhibition

The USDA will provide tags, without charge, to producers. Tags will be available through the APHIS, Veterinary Services Area Office and/or the State Veterinarian's office in each State. Metal tags or plastic tags may be provided when requested. Producers who prefer to use a different type of tag may purchase official tags through specified, approved tag companies, a list of approved tag companies are maintained on the APHIS scrapie web page.

What will the tags look like?

There are two different classes of tags:

1. USDA tags that are provided free to producers. These tags will have the U.S. Shield and either:
   - A premise identification number, and
   - The State postal abbreviation and a six digit alphanumeric serial number or up to a 5 digit production number unique to the farm

   Or
   - The State postal abbreviation and a six digit alphanumeric serial number.

2. Official tags purchased from approved tag companies by producers. These tags will have the U.S. Shield, the producers assigned premise identification number, and a production number unique to the farm. The tags may also have any other printing, such as the farm name, desired by the producer as long as the required printing remains legible and distinct.

What do the different colors represent?

Yellow metal tags are for use by State and Federal personnel to identify scrapie exposed animals.

Red metal tags are for use by State and Federal personnel to identify scrapie-positive animals.

White and other color plastic or metal tags are for use by sheep and goat producers, markets, dealers, and veterinarians

How does the system work?

It's called premise-based individual identification and here is an example of how it works:

- There will be a state postal abbreviation followed by up to a five-digit alphanumeric code such as:

  NM55675 (New Mexico farm or ranch number 55675)

  And,
- An individual animal production number or serial number such as:

  00157 (a production number) or NMAA0001 (a serial number)

Or,

- In situations where it is not practical to have a premises ID number printed on the tag the postal abbreviation, the US shield, and serial numbers such as TXAA0001 will be used and the tag series assigned to the premises or person in the Scrapie National Generic Database (SNGD).

How are tags ordered?

USDA provided tags - The producer, market, dealer, or veterinarian contacts his local USDA, APHIS, Veterinary Services Area Office or State office and requests a Premises ID number and tags. (1-866-USDA-TAG)

USDA approved tags – The producer contacts his local USDA, APHIS, Veterinary Services Area Office or State office and requests a Premises ID number then the producer purchases tags from an approved tag company.

Tag pliers

Producers that request USDA provided tags during FY 2001 and 2002 will receive one tag pliers with their first order. They may buy additional pliers directly from the company if desired. Markets and persons who identify over 500 animals per year will be provided with a reasonable number of pliers for the number of animals tagged.

Who assigns the premises number?

- Either the State Veterinarian's office or the local APHIS, Veterinary Services Area Office will assign the premises ID number.
- The premises ID number must be the State postal abbreviation followed by numbers and/or letters. Two and 3 digit codes should generally be reserved for owners who tattoo.

NOTE:

1. VSFCP identification is official identification for interstate movement.
2. Premise only identification is allowed for limited uses such as grazing and low risk commercial flocks that used registered brands.
3. Individual registry tattoos issued by breed associations may be used as official identification. Holders of registry assigned tattoo prefixes should have these linked to their premises in the Scrapie National Database through their local APHIS, Veterinary Services Area Office.

Where do I find additional information?

On the internet at http://www.aphis.usda.gov/vs/scrapie/ or by calling your local area Veterinary Services Office. Phone numbers can be found in the government section of your phone book or at http://www.aphis.usda.gov/oa/vsoffice2.html

THE DRAFT SCRAPIE ERADICATION UM&R AND THE FINAL RULE -- WHAT DOES IT MEAN FOR GOAT OWNERS?

This is a summary of the identification methods and program requirements in the Interstate movement Final Rule for goats and that is also discussed in the DRAFT: Scrapie Eradication UM&R that is available on the internet. Because the incidence of scrapie in goats is very low and sampling of goats at slaughter is not considered cost effective at this time, certain specific categories and guidelines are described in the Rule and in the draft UM&R for goats.

Goats in slaughter channels will not be required to carry individual identification numbers when they are moved in interstate commerce unless they are scrapie-positive, high risk, exposed or from an infected or source flock.

Commercial low risk goats may be moved in interstate commerce without identification or a certificate of veterinary inspection. Commercial low-risk goats are goats raised for fiber or meat that are not registered or exhibited and that have not been exposed to sheep and that are not scrapie-positive, high risk, or exposed animals, from an infected or source flock, or from a state that has scrapie in goats that is not related to exposure to sheep.

Sexually intact goats used for exhibitions such as fairs, shows, demonstrations and petting zoos where out of state sheep or goats are exhibited or that move interstate will be required to be officially identified and have health certificates. .(Note: Goats with legible registry tattoos that are registered with a goat registry and that are accompanied by a copy of their registry certificate or a health certificate listing their registration numbers do not require any additional identification.)

Restrictions on interstate movement of goats:

Goats that fall into any of the following categories will need to be officially identified to move interstate or in interstate commerce:

- Sexually intact registered goats and goats used primarily for milk production moving or sold for breeding or exhibition. Note: registration tattoos are acceptable for ID when the goats are accompanied by their registration certificate
- Sexually intact goats that have resided on the same premises as sheep.
- Goats that have been exposed to animals that are affected with scrapie.

Goats that do **not** have to be identified in interstate commerce:

- Castrated goats that have not been exposed to scrapie
- Goats moving in slaughter channels that have not been exposed to scrapie
- low risk commercial goats

When is a health certificate required?

- For any sexually intact goat moving interstate or in interstate commerce for breeding or exhibition that does not meet the definition of a low risk commercial goat.

If I don't use registration tattoos or I am selling a goat without papers, how do I identify my goats?

- Request a premises ID number from your local APHIS, Veterinary Services office or call 1-866-USDA-TAG
- Determine whether eartags or tattoos will work best for you and either purchase eartags from an approved tag company, request USDA eartags free from your local APHIS, Veterinary services office (in Texas contact the Texas Animal Health Commission), or tattoo your APHIS assigned premises ID number and an individual production number in the ear, flank, or tail fold. If you have a registered prefix in most cases your prefix preceded by the state postal abbreviation will be assigned as your premises ID number.

If my goats are exposed to scrapie, what will happen?

- A State or federal veterinarian will do an investigation. Based on the exposure risk of the herd, applicable regulations, and the owners needs the veterinarian will determine what cleanup and monitoring actions that will be taken. This may include depopulation of part or all of the herd with indemnity and/or testing at necropsy of the highest risk goats and those found dead at over 14 months of age. If your flock is determined to be infected or source some or all of your goats will be restricted to the premises except movements to slaughter until the cleanup plan is completed.

If my herd is determined to be an infected or source herd, can I participate in a pilot project?

- No, the live animal test has not been validated in goats and genetic resistance has not been adequately studied in goats so there is no scientific basis for a pilot project for goats.

Where do I find additional information?

- On the internet at http://www.aphis.usda.gov/vs/scrapie/ or by calling your local area Veterinary Services Office. Phone numbers can be found in the government section of your phone book or at http://www.aphis.usda.gov/oa/vsoffice2.html

EVALUATION OF HAIR SHEEP COMPOSITE BREEDS FOR EASY-CARE LAMB PRODUCTION: PROGRESS REPORT

S. P. Greiner, D. R. Notter, and H.-B. Vanimisetti
Department of Animal and Poultry Sciences
Virginia Polytechnic Institute and State University

Materials and Methods

This experiment will compare three types of ewes produced in spring, 2000, 2001, and 2002. Dorset and Dorper crossbred ewes are being produced by mating ewes from the Virginia Tech out-of-season breeding flock (1/2-Dorset, 1/4-Rambouillet, 1/4-Finnsheep) to Dorper and Dorset rams. In addition, Katahdin ewes (20/yr) are being purchased each year at about 60 d of age in early summer. Four to six Katahdin flocks will be sampled in each year. The Dorset crossbreds will serve as controls to which the Dorper crossbred and Katahdin ewes will be compared. Straightbred Katahdin, but crossbred Dorper, ewes are being used because of the limited availability of Dorper ewes. By the fall, 2002 breeding, we expect to have 50 to 60 ewes of each breed type for the experiment.

This report will summarize the performance of the ewe lambs produced or purchased in 2000, and give a few preliminary results for the 2001 lamb crop. For 2001, we have added a group of purchased Katahdin wethers and a set of crossbred hair sheep wethers (St. Croix x Barbados Blackbelly) produced at Blacksburg to the project. These animals are being used to increased expected breed diversity for parasite resistance and will also be used in taste panel studies to evaluate the flavor of hair sheep and hair sheep crosses.

Performance of the 2000 Lamb Crop

Dorper and Dorset crossbred ewe lambs produced from foundation matings in spring of 2000 were weaned at an average of 76 d of age in mid-June and grown out in drylot on a grower diet. Katahdin ewe lambs were delivered at about the time of weaning. All ewe lambs were developed in drylot to aid in minimizing environmental differences among Katahdin ewe lambs and between them and ewe lambs produced on the station.

Dorset and Dorper crossbred lambs produced in 2000 were similar in birth weight (9.7 and 10.3 lb, respectively), but Dorper crossbred lambs were significantly heavier at weaning (61.1 versus 53.6 lb after adjustment for weaning age, lamb sex, age of dam, and type of birth and rearing). Unadjusted mean weights for ewe lambs in the postweaning period (Table 1) indicate that Dorper crossbred ewe lambs remained heavier than Dorset crossbreds and that ewes of both crossbred types were heavier than purchased Katahdin ewes.

During the summer of 2000, ewe lambs were also evaluated in drylot for resistance to internal parasites. Around August 1, animals were dewormed and drenched with a standard dose of infective larvae of *Haemonchus contortus*. Fecal and blood samples were obtained at 3, 4, 5, and 6 weeks after infection to determine fecal egg counts (FEC) and packed cell

volume (PCV), respectively. Means for the three breed groups are shown in Table 2. Difference in FEC were not significant in the first year, although Katahdin ewe lambs consistently had the lowest mean FEC. Dorper crossbred ewe lambs had higher FEC than Dorset crossbreds at three of the four sampling times. Differences in PCV among breed groups were significant. Katahdin ewe lambs had the highest mean PCV, whereas Dorset crossbreds were lowest. Dorper crossbred ewe lambs maintained higher PCV than Dorset crossbreds despite their higher FEC.

The Dorper and Dorset crossbred and Katahdin ewes are being mated to Suffolk rams and will be evaluated for three years, allowing the project to terminate following evaluation of the spring, 2005 lambs. The first lambs from the experimental ewes were born in spring, 2001.

Table 1. Body weights (lb) of 2000 Dorset crossbred, Dorper crossbred, and Katahdin ewe lambs.

Breed group	Mean age, d				
	76	106	140	158	175
Dorset crossbred	42.8	54.2	81.1	88.6	95.2
Dorper crossbred	52.0	63.1	92.4	99.9	107.4
Katahdin	-	53.3	74.7	86.9	91.3

Table 2. Means for fecal egg count (FEC) and packed cell volume (PCV, %) by breed group and time since infection for 2000 ewe lambs.

Trait	Breed group	Week Postinfection			
		3	4	5	6
FEC	Dorset crossbred	830	954	1007	882
	Dorper crossbred	675	1215	1285	956
	Katahdin	438	752	848	787
PCV	Dorset crossbred	30.2	26.2	27.4	27.7
	Dorper crossbred	31.9	27.9	28.9	29.4
	Katahdin	32.8	29.8	30.6	29.9

Results from the 2001 Lamb Crop

In 2001, parasite resistance was evaluated on both ewe and wether lambs. Protocol for evaluation of parasite resistance in ewe lambs was the same in 2001 as 2000. Animals were dewormed and drenched with a standard dose of infective larvae of *Haemonchus contortus*. Fecal and blood samples were obtained at 3, 4, 5, and 6 weeks after infection to determine fecal egg counts (FEC) and packed cell volume (PCV), respectively. Means for body weight, FEC, and PCV for the three breed groups are shown in Table 3. Total weight gain over the eight week period was similar for the three breed groups (~.5 lb/d). Consistent with results from 2000, Katahdin ewe lambs had the lowest mean FECs, and Dorper crossbred ewe lambs had higher FEC than Dorset crossbreds at all sampling times. Based on the first two years data, there was no indication of parasite resistance in Dorper crossbreds based on FEC. Katahdin ewe lambs had the highest mean PCV, whereas Dorset crossbreds were lowest. Again consistent with results from 2000, Dorper crossbred ewe lambs maintained higher PCV than Dorset crossbreds despite their higher FEC.

Table 3. Means for body weight (WT, lb), fecal egg count (FEC), and packed cell volume (PCV, %) by breed group and time since infection for 2001 ewe lambs.

		Week Postinfection					
Trait	Breed group	-2	0	3	4	5	6
WT	Dorset crossbred	65.0		80.9	89.8	94.6	92.6
	Dorper crossbred	60.0		77.0	85.3	89.4	86.6
	Katahdin	65.2		78.8	90.4	92.7	90.7
FEC	Dorset crossbred			2408	3769	3634	3084
	Dorper crossbred			2556	5904	6397	4186
	Katahdin			771	2697	2571	2613
PCV	Dorset crossbred		29.4	23.4	24.5	25.5	27.1
	Dorper crossbred		30.3	25.0	25.6	26.9	27.6
	Katahdin		31.7	28.1	29.9	28.6	29.4

Wether lambs were evaluated for parasite resistance on pasture under natural infection. Wether lambs were evaluated for packed cell volume and dewormed on August 23 and the first evaluation of fecal egg counts and packed cell volume was conducted on September 14. Results, shown in Table 4, indicate that Katahdin and hair sheep crossbred wethers had higher PCV at deworming than Dorset or Dorper crossbred wethers. At 3 weeks after deworming, PCVs had recovered and differed by only a small amount among the breed groups. As seen in the ewe lambs, FECs for Katahdin wethers were lower than those of Dorper and Dorset crosses at all sampling times. Hair sheep crossbred wethers shed far fewer eggs than any of the other types. Similarly, PCVs were higher for hair crossbred and Katahdin wethers compared to Dorset and Dorper crossbred wethers. Under the natural infestation conditions, 15 Dorset and Dorper crossbred wethers were removed from the study

after week 5 due to very low PCVs (clinical anemia). These results would indicate increased parasite resistance for hair breed types (particularly St. Croix x Barbados Blackbelly crossbred) compared to Dorset or Dorper crossbreds.

Table 4. Means for body weight (WT, lb), fecal egg count (FEC), and packed cell volume (PCV, %) by breed group and time since infection for 2001 wether lambs.

		Week Postinfection				
Trait	Breed Group	0	3	4	5	6*
WT	Dorset crossbred		68.3	69.0	73.3	76.1
	Dorper crossbred		65.0	63.1	67.5	70.7
	Katahdin		52.8	57.6	59.7	60.2
	Hair crossbred		50.4	53.9	55.1	55.9
FEC	Dorset crossbred		874	941	2748	3200
	Dorper crossbred		808	1146	3674	2759
	Katahdin		282	533	2427	2554
	Hair crossbred		81	127	1130	1164
PCV	Dorset crossbred	22.1	29.1	26.0	21.7	21.9
	Dorper crossbred	24.1	30.4	27.6	21.8	23.5
	Katahdin	29.3	30.9	28.2	24.4	24.7
	Hair crossbred	29.4	29.9	28.0	26.1	25.8

*15 low PCV Dorset and Dorper wethers removed prior to week 6

Dorper and Dorset crossbred wethers were weaned at about 90 days of age (early July) and remained on pasture during the summer. Purchased Katahdin wethers and hair crossbred wethers from Blacksburg were delivered shortly after weaning of the Dorper and Dorset crossbreds born at Glade Spring. Wether lambs received approximately 1 lb/head/d of supplemental grain during summer to ensure reasonable expression of growth potential. Lambs were adapted to ad libitum consumption of a high energy ration in October, and fed to market weight. Forty-eight wether lambs were slaughtered on December 10, and carcass data collected 72 hours later.

Means for live and carcass traits for the four breed types are presented in Table 5. Since the outsourced Kathdin and hair crossbred wethers were essentially the same age as the Dorper and Dorset crossbreds, and all lambs were managed together post-weaning, the carcass data presented is reflective of both age-constant and time on feed-constant endpoints across breed groups. The heavier slaughter and carcass weights of the Dorset and Dorper crossbred wethers compared to the Katahdin and hair crossbred wethers are reflective of the differences in growth potential of the breed types. Associated with their lighter carcass weights, the Katahdin and hair crossbred wethers were leaner (both rib fat thickness and body wall), had smaller longissimus muscle areas, and improved cutability compared to the Dorset and Dorper crossbred wethers. The Katahdin and hair crossbred lambs were similar

in composition, with the exception of the hair crossbred wethers having more internal fat (KPH %) than all other breed types. The Dorset and Dorper crossbred wethers were also similar in composition. However, the Dorper crossbreds had higher numerical leg scores than the Dorset crossbreds. Advantages in quality grade for the Dorset and Dorper crossbreds compared to the hair breed types were a result of superior conformation (leg score) and flank streaking. Only 3 of the 23 Katahdin and hair crossbred lambs attained the industry standard low Choice quality grade. To express differences in muscling between the breed types, one leg from each carcass was fabricated and separated into lean, fat, and bone. Katahdin wethers had the lowest leg lean:bone ratio compared to other breed types, and Dorper crossbreds the highest ratio.

Table 5. Means for carcass traits by breed group for 2001 wether lambs.

	Breed group			
Trait	Dorset crossbred	Dorper crossbred	Katahdin	Hair crossbred
n	14	11	11	12
Slaughter wt, lb	97.3	95.7	68.5	66.2
Hot carcass wt, lb	56.0	54.1	37.3	36.8
Dressing %	57.5	56.4	54.5	55.7
Fat thickness, in	.22	.24	.11	.09
Body wall thickness, in	.80	.91	.58	.63
KPH, %	3.7	3.4	3.2	4.6
LMA, in^2	2.01	2.02	1.61	1.58
Leg score[a]	10.8	11.2	9.3	8.8
Boneless retail cuts, %	46.3	46.1	48.2	48.1
Quality grade[a]	10.6	11.4	9.2	8.9
Leg lean:bone	3.69	3.80	3.45	3.64

[a]8 = low Good, 9 = high Good, 10 = low Choice, 11 = average Choice

Loins from each carcass were vacuum-packed, aged, and frozen for future sensory panel evaluation. This work is being done in cooperation with Dr. Susan Duckett at the University of Georgia. Fatty acid profiles, as well as palatability attributes (tenderness, juiciness, flavor) using a trained taste panel will be evaluated for each breed group.

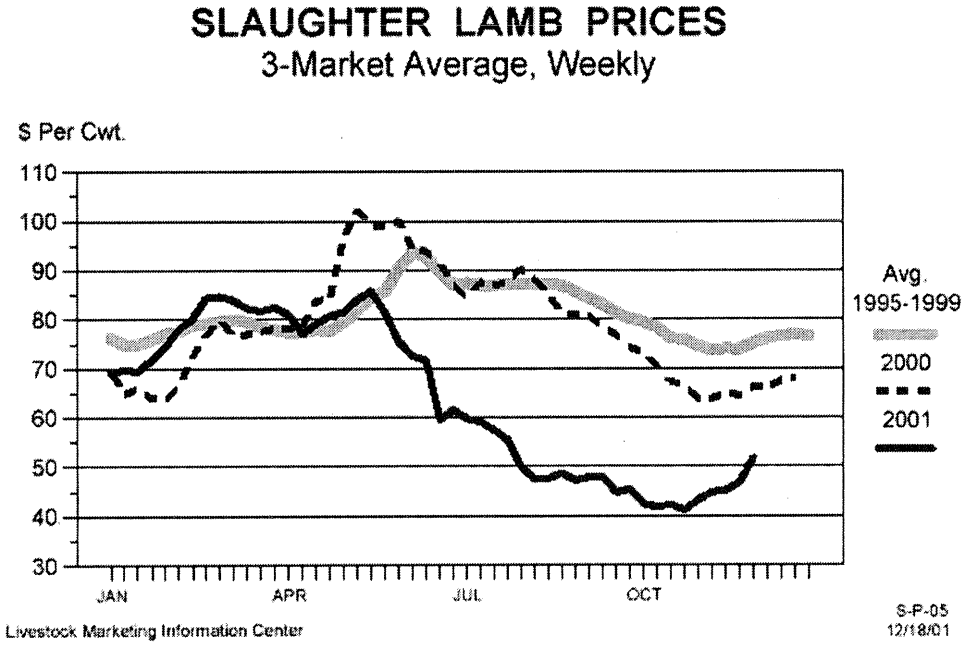
UNDERSTANDING THE LAMB MARKET – THE NATIONAL PERSPECTIVE

Bill R. McKinnon
Extension Animal Scientist, Livestock Marketing

To say that the lamb market in 2001 was a disappointment would be a gross understatement. To provide a reference point, since June, 2001, the Virginia lamb market averaged 17.6% lower than average price received during the preceding five years. For much of the year, the Virginia market was at a premium to the national market, but was still held hostage by several issues that kept a lid on lamb prices nationally. The three most prominent issues with which the industry dealt in 2001 were excessive overfeeding of lambs, poor market information with the implementation of Mandatory Price Reporting rules, and increased lamb imports.

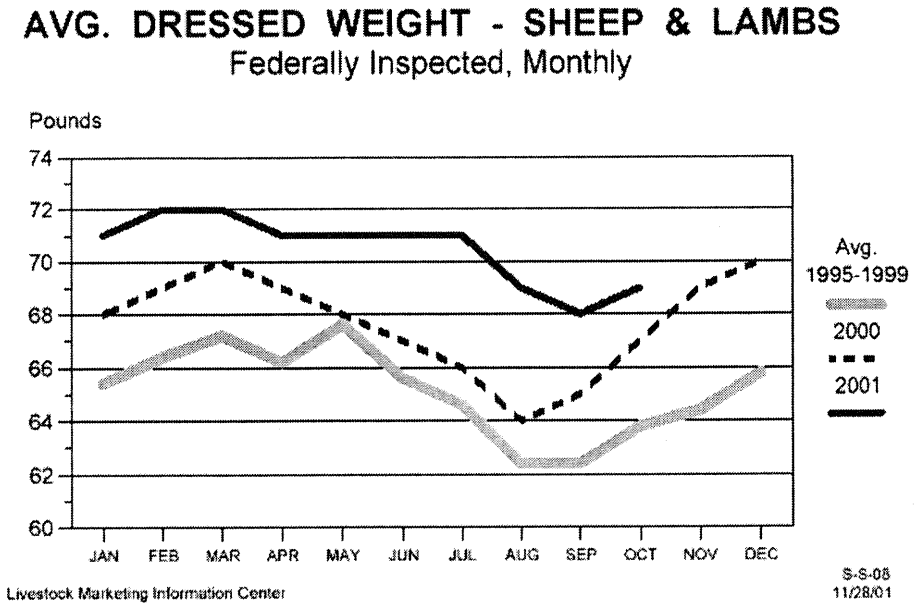
Lamb Overfeeding

Since 1994, during only one year have slaughter lamb prices not peaked during the May to August period. Many lamb feeders responded to this trend and planned for lamb marketing in the late spring and summer. As the graph below illustrates, the 2001 market was significantly lower from May into the summer months.



As the season developed into May and June, lamb feeders were still waiting on a stronger market to develop. While waiting for the market to improve, feeders held their lambs and the lambs and the feeders' costs continued to grow. Holding lambs on feed beyond their optimal slaughter endpoint creates additional problems. Heavier lambs exacerbate the problem of excess production, because each lamb now generates more pounds of lamb per head

slaughtered. The following table illustrates the extent of the increase in average lamb weights as the lamb feedlot became increasingly uncurrent.



The impact of lamb overfeeding was quite significant given the fact that commercial lamb and sheep slaughter during the second and third quarters of 2001 was down 17% and 14%, respectively when compared to the average of the previous five years. The total pounds of lamb produced during the first and second quarters of 2001 was down only 13% and 5% from the previous five year average. An additional issue encountered with the heavier lambs marketed was the increased percentage of overly fat lamb carcasses generated. Even when the external fat is trimmed off excessively fat retail cuts; the increased amount of seam fat present creates negative perceptions among consumers. The table below illustrates the extent of the fat lamb problem in 2001.

Comparisons of Carcass Yield Grades in the Lamb Slaughter Mix

	Normal Jan. – July	**2001** Jan. – July
Yield Grade 1 & 2	47 – 55%	40%
Yield Grade 3	38 – 41%	43%
Yield Grade 4+	8 – 12%	17%

As the number of market-ready and overfed lambs began to back up in the feed yards, the feeders simply lost bargaining position with the packers. The same plight affects the cattle feeding industry every two to three years. The pens become full of harvest ready and overly fat animals while the feeders wait for the market price to improve. Both the feeders and packers are typically aware of the degree of uncurrentness. Both parties know that the feeder

and all his neighbors need to sell animals and the buyer gains the higher ground in price haggling.

Questionable Market Information

Beginning in April of 2001, the Mandatory Price Reporting rules of USDA's Agricultural Marketing Service were instituted. Several issues of concern pertaining to the availability and accuracy of several price data sets quickly surfaced.

Our national lamb production and pricing infrastructure may be viewed as an hour glassed shaped arrangement. Many producers and feeders must market their lambs through the bottleneck of an increasingly smaller set of packers. This small number of packers then markets their production to a larger set of processors and retailers. For much of the spring and summer of 2001, market information was hampered by the "3/60 provision" of the mandatory price reporting rules. The "3/60" rule requires that price information must come from at least three packers and no more than 60% of the transactions can be controlled by one packer. The intent of the provision was to provide that confidentiality would be maintained. Through much of 2001 the "3/60" provision could not be met and so price data availability was limited. Beginning in late August, the "3/60" rule was modified to permit more price data to be published.

Another issue encountered with the advent of MPR was the change in format of price series reported. Before April, USDA reported a lamb carcass cutout value which was based upon composite prices of the various lamb cuts that would equate back to a lamb carcass value. After April only a listing of boxed lamb cut prices was published which made direct comparisons to previous reports difficult. Additionally there were changes in the definitions of lamb carcass and weighted average lamb prices. Some of the newer price series were not directly comparable to previous data sets.

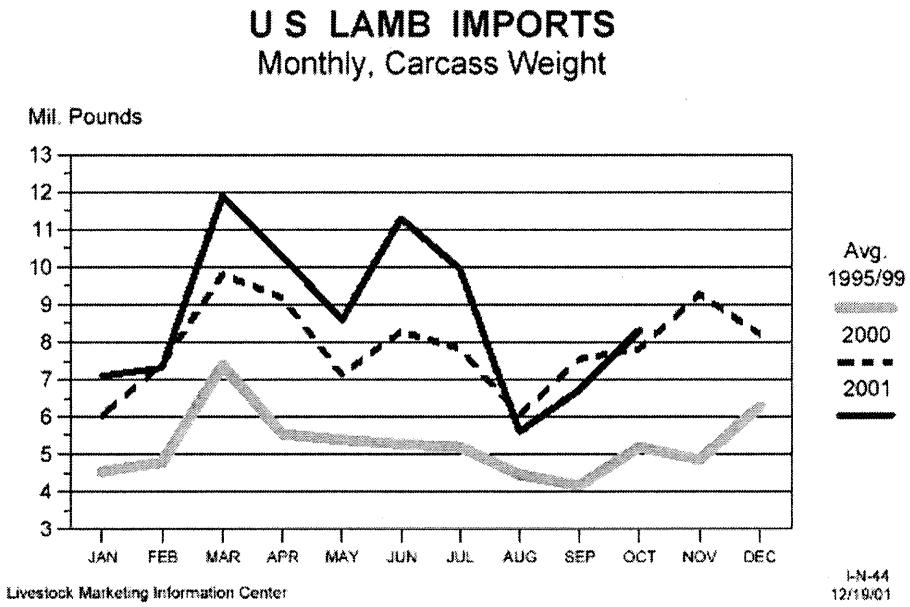
Again, the hourglass shape of the lamb industry infrastructure magnified the implications of the changes in price data. While not trying to bash packers, it is apparent that both the sellers of lambs and buyers of lamb product were dependent upon data derived at the packer/processor level. The scarcity and changes in price information made it difficult for lamb sellers to directly compare lamb prices and to be informed about the status of the meat market so they could effectively negotiate prices. At the same time, the limited and adjusted meat pricing reports made it more difficult for retailers to make informed decision regarding purchases and lamb featuring. The uncertainty of available price data led to historically wide live-to-wholesale margins during much of 2001.

Increased Lamb Imports

Fueled by the strong U.S. dollar as compared to other foreign currencies, lamb imports surged during much of 2001. During the March-July, 2001 period, lamb imports ran roughly 24-25% ahead of the same time frame in 2000. During the second quarter of 2001, U.S. lamb production was down approximately 7% from 2000. The increased volume of 2001 imports during the second quarter had the effect of increasing total available lamb supplies by 4%. The higher volume of lamb imports continued into mid-summer with July imports running

25% ahead of July, 2000. The strong volume of imports during the spring and early summer largely explains why the price improvement expected by lamb feeders never materialized.

Until November 15, 2001, the U.S. placed a tariff rate of 3% on imports up to 74 million pounds and a rate of 24% on all pounds above that level. A ruling by the World Trade Organization in late summer lifted the tariffs charged on lamb imports into the U.S. Given the strong currency exchange rate, the tariffs probably had little impact upon lamb imports.



The September 11 Effect

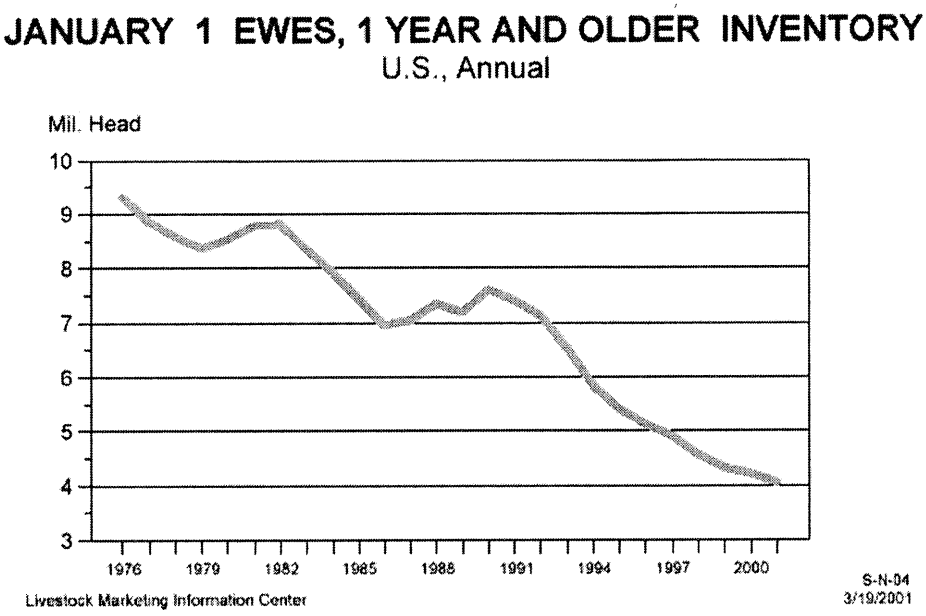
Though at this time much of the information regarding impacts of the terrorist attacks on lamb demand is anecdotal, there were certainly some temporary disruptions. The attacks in the New York area clearly impacted both restaurant dining and lamb distribution in the nation's highest lamb consumption area. Much of lamb is consumed away from home and it was clearly evident that upscale restaurant dining took a serious hit during the weeks immediately following the attacks.

Long Term Issues

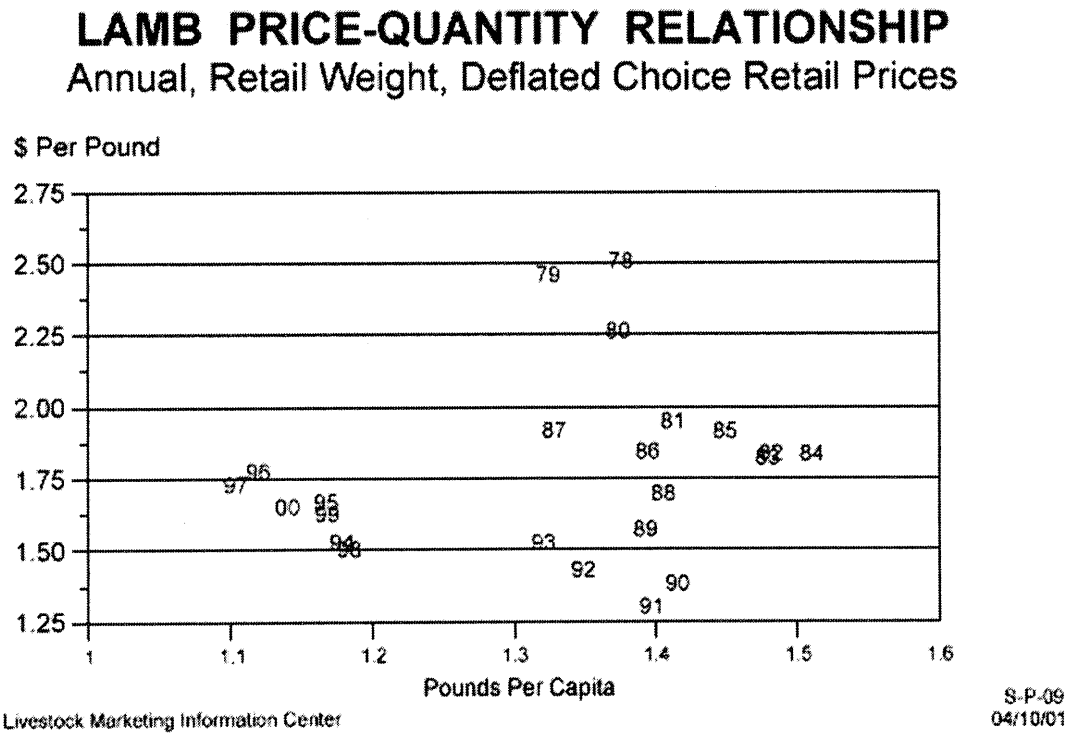
The American lamb industry will continue to face two very serious issues in the next several years. The dramatic shrinking of the U.S. sheep industry and the apparent loss of demand for lamb will continue to be serious obstacles to overcome.

The reduction of the U.S. sheep flock down to roughly 4 million ewes has created a myriad of problems. Today it is somewhat hard to imagine the flock of over 30 million ewes that existed during the 1940's. Within just the last two decades, the industry has been cut in half. The loss of industry volume has led to the loss of infrastructure such as packing and processing capacity, reduced availability of specific animal health products, limited market price information, intermittent availability of lamb at the retail level, limited consumer exposure to lamb, and reduced capital with which to make industry investments. It would

seem improbable that circumstances would change to encourage a significant resurgence in the U.S. sheep industry.



Of additional concern to the sheep industry should be the apparent loss of consumer demand for lamb at the retail level. The Lamb Price-Quantity Relationship graph below should paint a very clear picture regarding the lost of demand for lamb since the late 1980's. The graph plots the annual per capita consumption of lamb against the average retail price per pound of lamb for that year. The two digits representing each year identify the intersection of the two factors for each year.



During the period of 1978-1986, the data points define a fairly normal demand curve. In years of higher per capita supplies, such as 1982, 1983, and 1984, the average price was lower to move product off the shelves. Conversely, during 1978-1980 more limited supplies of lamb resulted in higher retail prices.

Signs of deteriorating demand for lamb began to appear in 1987 when lower supplies of lamb did not result in higher prices. During 1988 through 1991, essentially identical supplies of lamb were sold at increasingly lower prices in each successive year. It appears that until 1994 demand continued to erode with smaller supplies of lamb bringing only static prices per pound. Since 1984 it would appear that lamb demand has stabilized, creating a new demand curve though at a significantly reduced level. Both lamb supplies and retail price seemed to have settled into a very narrow range.

It is unclear whether the erosion in lamb demand is the result of lack of promotion, a limited line of convenience oriented or value added products, lack of consumer confidence in lamb preparation, or other factors. Given both the shrinking size of the industry and the absence of a national producer checkoff program, it is doubtful that financial investments will be made to either identify demand issues or address those concerns.

UNDERSTANDING THE LAMB MARKET

Mike Carpenter
Virginia Department of Agriculture and Consumer Services

To understand the lamb market, I thought it might be helpful to provide the dictionary definitions of some words I feel describe the lamb market and lamb buyers.

INTRICATE - 1. Having many complexly arranged elements; elaborate. 2. Solvable or comprehensible only with painstaking effort.

FINICKY - Extremely fastidious in tastes or standards; difficult to please.

FASTIDIOUS - Difficult to please, exacting. Excessively scrupulous or sensitive, especially in matters of taste or propriety.

SENSITIVE - Responsive to external conditions. Easily irritated. Readily altered by the action of an agent. Fluctuating or tending to fluctuate.

What causes the lamb market to fluctuate?

I. Supply and Demand

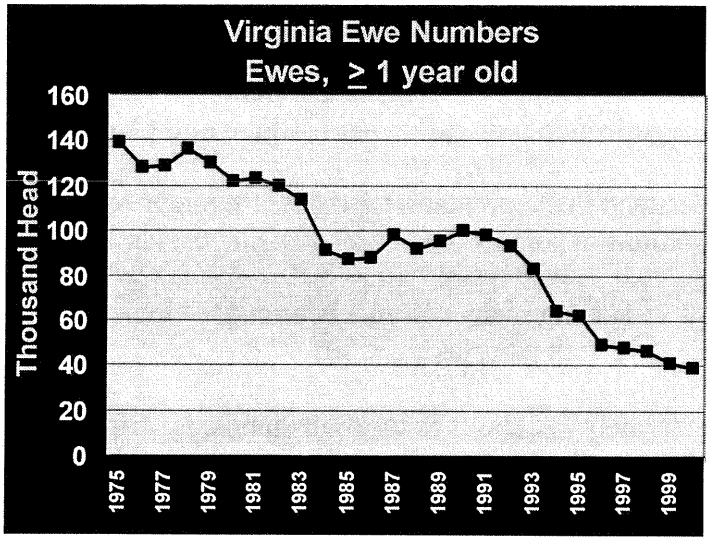
Ethnic Holidays

Muslim - causes a short-lived spurt in demand and increase in price – Timing is critical!

Eid al-Adha -	2-22-02 (most significant)
Ramadan	11-06-02/12-05-02
Eid al-Fitr	12-05-02

Jewish and Christian - While some holidays cause an increase in demand - Christmas and Easter, others cause prices to decrease. In September the Jewish holidays of Yom Kippur and Rosh Hoshanna cause the Kosher lamb plant in Baltimore, MD to close for 2 - 3 days per week for four weeks in a row. That is where most of the Virginia 100 - 125 pound lambs are slaughtered. Combine this with normally higher numbers sold and that's why our lamb market bottoms in the September - October period.

Up until 1999, Virginia production in this period was much more than the east coast slaughter capacity. As a result, thousands of Virginia lambs were purchased by Ohio and Michigan firms and placed into feedlots. Virginia prices were generally below western and mid-western prices due to trucking and shrinkage. Now, Virginia production has decreased so much that this year, production was about equal with demand here in our area. (See graph #1). As a result, Virginia prices have stayed above western prices - Thank Goodness!!



Graph 1

II. Weights

Some lamb buyers may be very weight sensitive. We have generally packaged all lambs weighing 100 - 125 pounds of equal quality together. Within this range, if the average of the group approaches 120 - 125 pounds, some buyers may decrease the price they are willing to pay simply because that is what their market is dictating. In general, with lambs of equal quality, prices will be slightly higher for each 10 pounds lighter: 90 - 100, 80 - 90; 60 - 70. Lambs weighing 50 - 60 pounds have to be high quality to be suitable for slaughter.

III. Quality

Many buyers are becoming more sensitive to the quality of lighter lambs that enter the Ethnic market. Five years ago, a "bag of bones" may bring as much per pound as an average quality lamb just because they were the correct weight for that buyer. Now, light lambs that will grade Choice demand a higher price - mostly $2-5/cwt. with instances of up to $10/cwt.

To illustrate how sensitive buyers may be to weight and quality, here are some actual sale results.

AVG WGT.	$ CWT	$ HEAD
110	60.50	66.55
95	64.25	61.04
87	66.50	57.86
82	72.00	59.04

The 82 pound lambs were a medium framed, thick-muscled set of high quality lambs in the lighter end of that 80 - 90 pound weight range.

At another sale, the following happened:

AVG. WGT.	$ CWT	$ HEAD
86	59.00	50.74
68	89.00	60.52

These were lambs of equal quality, in fact from the same producers. What caused this? A buyer from PA had a load started and he and another buyer needed high quality lambs in the 60 - 70 pound range. This is extreme and won't happen often, but does occasionally.

On another occasion the following results occurred with slaughter ewes - last February just prior to Eid al-Adha:

AVG. WGT.	$ CWT	$ HEAD
141	55.50	78.25
115	65.25	75.03

A small volume buyer needed the set of lighter ewes.

IV. Numbers

There are days when a lamb buyer may need only a certain number of lambs or sheep and he may select a group based on that number. Or if a buyer fills his order and there are not sufficient buyers to take up the slack, prices may decline.

V. Trends and Forecasts

The September 11 attacks and resulting economic slowdown caused the lamb market to decline about $5/cwt. more than it normally does at this time of year.

Lamb prices in Virginia will peak the week prior to Eid al-Adha (2-22-02) and during the period lst - 3rd week of May -- not Easter. (See graphs 2 & 3)

Prices will bottom in the September - October period. (See graphs 2 & 3)

If you have the production flexibility try to market lambs in the January - May (maybe June) period and stay away from the August - October period.

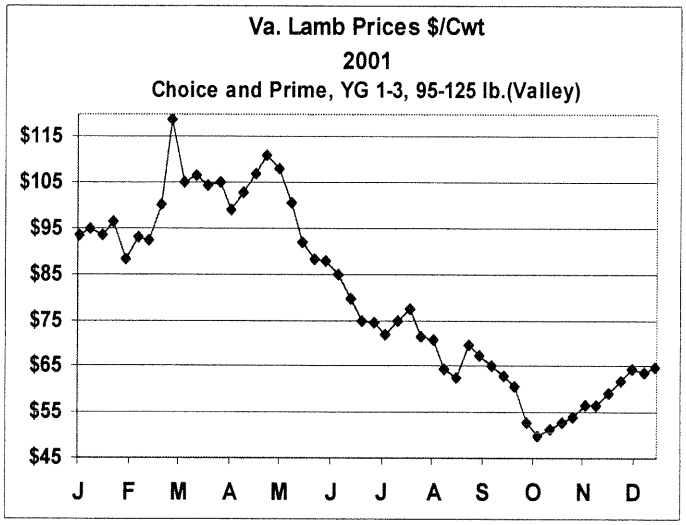
Reminder--at an auction, anything can happen. I generally recommend to sell livestock at auction to the highest bidder. It's always wise to call the market to check market conditions before you sell. If you have a buyer come calling, check the most recent price information (not last week's) and if you receive a good bid, accept it. Just remember that there is a reason for a lamb buyer to be anxiously looking for lambs: higher demand, higher price forecasts.

There are more issues affecting the sheep industry this year than in any other year in memory.

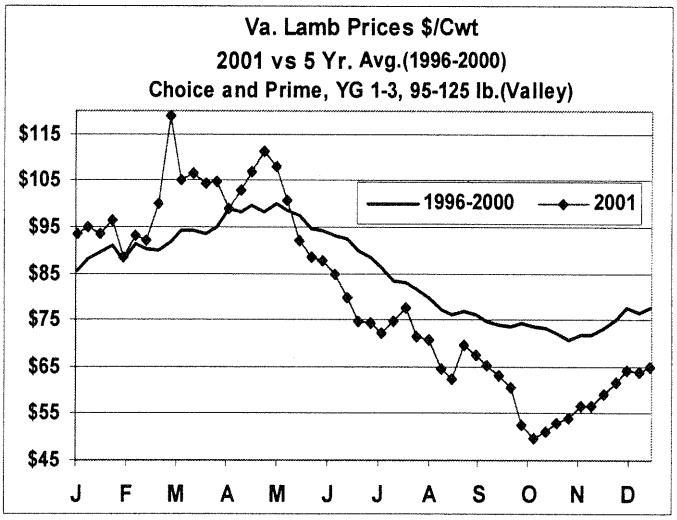
Lamb Meat Adjustment Assistance Program (LMAAP)
- -Feeder and slaughter lamb payment program
- -Ewe lamb retention payment program

Proposed National Lamb Check-off

New Scrapie Regulations



Graph 2



Graph 3

COMMERCIAL PRODUCTION SYSTEMS THAT MAKE ECONOMIC AND MARKETING SENSE

Scott P. Greiner and Bill R. McKinnon
Extension Animal Scientists, Virginia Tech

The United States sheep industry has witnessed drastic changes in recent years. The shrinkage of the industry in particular has created significant challenges. The causes for the disappearing U.S. sheep industry are varied and include decreased demand for domestic lamb and wool, predator damage, loss of the wool incentive program and lamb check-off, and shifts in producer interests. As a result, the sheep industry in Virginia and the Mid-Atlantic region have seen major changes in production systems and demographics.

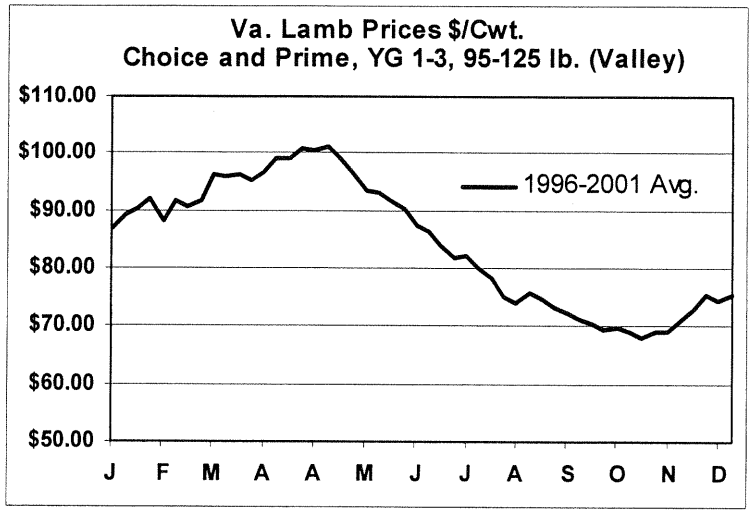
The shrinkage of the U.S. sheep industry continues to put increasing pressure upon producers particularly in the area of lamb marketing. The Virginia sheep industry has largely followed the pattern set by the nation's sheep flock. Loss of farmland to non-farm uses and a shift to more part-time farm operations have contributed to the decrease in sheep numbers in addition to the above mentioned causes of the national industry decline. During the past twenty-five years, Virginia has lost over 100,000 breeding ewes. The state's current breeding flock stands at less than 40,000 ewes. During the same period, the size of the average Virginia ewe flock has shrunk from approximately 46 to 27 head. Over this time period, more diversity in production systems, genetic base, as well as number, weight, and quality of lambs produced has been evident. This shift in production has increased variation in the state's lamb crop and resulted in a smaller number of lambs to be marketed.

With these changes, the economic climate surrounding the sheep enterprise has also changed. Virginia lamb markets are increasingly becoming more sensitive to seasonal demand associated with particular ethnic holidays. As a result, producers have altered their production systems to coincide with spikes in prices associated with these ethnic holidays. At the same time, the abundance of high quality forage that allows for cheap weight gains in early summer and fall continues to be the backbone for suitability of sheep to the region. The intent of this paper is to examine the economic viability of various production and marketing system, taking into account the changes our industry has witnessed in recent years particularly with regard to timeliness of lamb marketing.

Virginia Historical Lamb Prices

The one facet of the sheep industry that does seem to have some predictability is the seasonal pattern of the lamb market. Though there may be single year variations and variation associated with special sales (particularly those targeting ethnic holidays), the highest prices paid for lambs in weekly or monthly scheduled sales tend to come in April and May. Predictably, the lowest prices of the year are paid during the September-November period as many lambs are marketed directly off grass when pastures decline. Knowledgeable producers must factor this typical seasonal price pattern into their individual production/marketing programs.

The graph below depicts seasonal trends in Virginia's lamb market. The prices represent weekly average prices for "Blue O" lambs (Choice and Prime, Yield Grade 1-3, weighing 95-125 pounds) sold in weekly markets in the Shenandoah Valley region. This price series was used since these markets have a year round volume to track.



Production Systems

For any livestock enterprise, a key to profitability is "producing for the market" vs. "marketing what is produced." Production and management systems need to be designed with a target market for the end product. For the sheep enterprise, this relates to the production of a lamb of a certain type/quality (grade) and weight, to be marketed at a particular time of year. Based on historical prices, this generally relates to a 70 to 120 pound lamb, sold sometime after January 1 and prior to early July. This large window allows for a variety of production systems that may be feasible, depending on the resources of the individual operation. The key is implementing appropriate production and management tools that will allow for maximum returns on the sale of lambs relative to costs of production. The following systems will be examined in detail:

A. Early Winter Lambing System (December-February)
B. Late-Winter Lambing System (February-March)
C. Spring Lambing System (April-May)
D. Fall Lambing System (September-October and December-February)

For each of these systems, there are a number of variables that warrant consideration relative to their feasibility for an individual operation. The following variables will be discussed relative to each of the four systems:

1) Facility requirements- Housing needs for lambing, as well as facility and equipment requirements for both ewe flock and lamb feeding system.
2) Labor/Management resources- Labor requirements to optimize productivity of the flock, as well as specific management requirements that are necessary or unique to the production system.

3) Genetics- Genetics will largely determine lambing rate, growth potential, and kind/type of lamb to be marketed. For any system, both number and total weight of lambs marketed can vary considerably depending on genetics. Therefore, total cash income for each of the systems is influenced greatly by genetics.
4) Forage/pasture resources- Includes both the quality and quantity of pasture resources required for system.
5) Parasite control program- Critical for all systems, but influenced by mature sheep vs. lambs during grazing season.
6) Predator control program- Concern in all systems. Influenced by age of sheep (mature vs. lambs), particularly during grazing season.
7) Economic returns- Sample budget provided for each system. Calculate returns to owner labor, management, and equity.

Early Winter Lambing System

Lambing season to occur December 15 through February 15, with an average lamb birthdate of January 15. Intensive management system, with lambs creep fed and weaned at 60-70 days of age. Lambs fed in drylot on high-energy ration for maximum weight gain. Targeting marketing date of April-May for lamb crop to capture seasonal highs in lamb market.

1) Facility requirements- Facility requirements highest of four systems. Indoor lambing facility required in most areas. Shelter required for lactating ewes and lambs. Feeding facility that minimizes environmental challenges to optimum weight gain post-weaning (mud, wind, cold/wet) advantageous.
2) Labor/Management resources- Generally a high-labor system. Labor resources devoted to lambing time are critical to optimize percent lamb crop. Management expertise needed in lambing management as well as lamb feeding.
3) Genetics- Breed types that optimize lamb crop percentage as well as growth are most desirable. Ewe flock likely will require relatively high percentage of genetics with early lambing potential (Dorset cross, western type, low percentage Finn cross). High percentage blackface ewe likely not as desirable due to early lambing season.
4) Forage/pasture resources- Pasture resources devoted entirely to ewe flock and developing replacements. More ewes/acre than other systems since lamb crop fed grain-based rather than forage-based diet.
5) Parasite control program- Since parasites are generally more readily controlled in mature sheep vs. lambs, parasite control program for this system may be easiest to design and implement relative to other systems.
6) Predator control program- Lamb crop will not be grazed and therefore primarily mature ewes will be exposed to predators. Predator control will focus on ewe lamb replacements that will be developed on grass.
7) Economic returns- This system tends net some of the lowest projected returns. The system will tend to gross the smallest income from lamb sales even though they are sold on the year's highest market. The percentage lamb crop tends to be less and the average lamb sale weights the lightest since the lambs are very young. Non-pasture feed costs tend to be the highest of the four lambing systems analyzed.

Late-Winter Lambing System

Lambing season February 15-March 15, with an average lambing date of March 1. Ewes and lambs moved to pasture to utilize early spring growth. Lambs provided grain on grass to optimize weight gains. Targeted marketing date for lamb crop of June and early July, prior to precipitous drop in seasonal prices that occurs in summer.

1) Facility requirements- Lambing facility requirements similar to those needed in early winter system, although totally enclosed, heated facility not necessary in most areas. Drylot capacity for lactating ewes or lambs not required as sheep are moved to spring pasture as available.
2) Labor/Management resources- As with early winter system, labor devoted to lambing management to maximize lamb crop is needed. Utilization of forage-based system for lamb development shifts management focus to parasite and predator control, as well as pasture/forage management.
3) Genetics- System well suited to a variety of breed crosses. Most breeds capable of reasonable reproductive performance with February-March lambing.
4) Forage/pasture resources- Large portion of lamb gains derived from spring and early summer forages emphasize importance of management for high-quality forage availability early in grazing season. System coincides with enhanced forage quality and quantity available April through June.
5) Parasite control program- Strategic deworming program needs to be implemented as lamb performance on forage critical to system. Deworming flock and 4 week intervals recommended. Lamb crop marketed prior to heavy parasite infestation associated with mid-summer.
6) Predator control program- Predator concerns high as lambs will be grazing in spring and early summer, which is high-risk for coyote predation.
7) Economic returns- The net returns tend to be at the lower end of the range projected. This system has the lowest non-pasture feed costs of the systems compared. The income from lamb sales is hampered by the relatively light weights at which the lambs are marketed in an effort to avoid the sharp drop in lamb prices during the summer. The system is susceptible to unpredictable sharp lamb price drops during June and July.

Spring Lambing System

Lambing season April and May. Lambs graze with ewes through spring, summer, and into fall. Lambs are developed on forage-based system, with minimal grain until winter. Targeted lamb marketing date of January through March to sell heavier lambs on market that historically rises to more favorable prices after January 1 (avoid historically low prices in the fall).

1) Facility requirements- Minimal facilities required. Advisable to have facility suited for lambing, for optimum management of ewe and her lambs first week post-lambing. Ewes and lambs then moved directly to grass. Several paddocks and/or lots necessary

after weaning (September), so ewe flock can be managed separately from market lambs.

2) Labor/Management resources- Breeding, feeding, and lambing practices less intensive than other systems. Management focuses on parasite and predator control are necessary and critical to viability of system.
3) Genetics- Most favorable system for percent lamb crop born due to high fertility. Seasonal nature of sheep reproduction favors spring lambing. Genotypes that are well adapted to forage-based system most desirable.
4) Forage/pasture resources- Most forage-based system, so pasture management as well as acreage/ewe greatest. System designed to take advantage of spring, summer, and fall forages. Practices such as grazing aftermath hay fields, stockpiling, and utilizing fall/winter annual well suited to system.
5) Parasite control program- Strategic deworming program critical. Ewes and lambs grazing during peak parasite infestation season. Lamb health and performance dependent on controlling parasites.
6) Predator control program- Predator control program critical to maintain high percentage of lamb crop marketed. Lambs exposed to predation for prolonged period of time.
7) Economic returns- This system projects to generate the highest net returns to labor and equity primarily as a result of high income from lamb sales. These lambs are the managed to produce heavy lambs that are marketed after the first of the year with higher lamb prices. The system has relatively low feed costs with a major portion of those costs dedicated to finishing the lambs.

Fall Lambing System

Fall lambing season from September 15 to November 15. Fall-born lambs reared on forage-based system with ewes until weaning at 60-70 days. Lambs then developed in drylot for marketing in April to capture seasonally high prices. Proportion of flock fall lambing likely to range from 50-70%. Therefore, second lambing season from December through January necessary to have all ewes in production during year (ewes that did not conceive for fall lambing as well as first-time lambers). Lambs born December-January would be managed in the same fashion as described for early winter system. Second lambing season must be early winter so that ewes can be weaned and bred back in spring to lamb the following fall.

1) Facility requirements- For fall lambing covered facilities not required in most areas- similar to spring lambing from a facility standpoint. However, with second lambing season covered lambing facilities a requirement in most areas.
2) Labor/Management resources- Labor requirements highest of all systems as a result of two lambing seasons per year. Additional management required at breeding to maximize fall lambing (ram effect, teaser rams, synchronization). System essentially has two flocks that need to be managed separately.
3) Genetics- Utilization of genetics that have out-of-season breeding potential necessary. Breed crosses that contain high percentage Dorset along with Finn and/or Rambouillet well suited to fall lambing.

4) Forage/pasture resources- Systems and management that provide for an abundance of high quality forage in the fall and early winter when ewes and fall-born lambs can be grazed are most advantageous. System well suited to stockpiled tall fescue utilization. Abundance of early spring forage likely under-utilized, as all ewes will by dry at this time.
5) Parasite control program- Similar to early winter system, since lambs will not be grazed during peak parasite infestation months. Parasites have typically gone into arrested stage by October when young lambs would be at risk.
6) Predator control program- Largest concern would be with young lambs in fall and early winter. Only mature ewes and developing replacements grazed during spring and summer months.
7) Economic returns- This system projects to produce the second highest dollar returns of the systems analyzed. The attached budgets for this production system at the end of this section assume 50% of the ewes lamb in the fall and 50% lamb in the early winter. The fall born lambs are relatively heavy when they are marketed during the high price period of April which helps generate positive returns to the systems. The lambing rate for the winter lambing portion of the flock has been reduced slightly since all the ewe lambs will be first lambed in the winter. The combination of fall lambing and winter lambing do have some of the highest non-pasture feed costs.

Comparison of net returns per 100 ewes to operator labor, management and equity with 10% variations in percent lamb crop and market lamb prices

Early Winter (Jan.) Lambing

% Lamb Crop	$89.10	$99.00	$108.90
126%	$81	$886	$1692
140%	$857	$1769	$2681
154%	$1634	$2659	$3670

Late Winter (Feb.-Mar.) Lambing

% Lamb Crop	$78.30	$87.00	$95.70
135%	$124	$987	$1850
150%	$918	$1891	$2865
165%	$1712	$2795	$3879

Spring (Apr.-May) Lambing

% Lamb Crop	$76.50	$85.00	$93.50
144%	$1841	$2872	$3904
160%	$2733	$3896	$5058
176%	$3626	$4919	$6213

Fall + Winter Lambing

% Lamb Crop	$90.00/$89.10	$100.00/$99.00	$110.00/$108.90
122/122%	$608	$1450	$2292
135/135%	$1366	$2315	$3263
148/148%	$2125	$3180	$4235

Lamb prices are based upon averages for 1996-2001 period received at weekly livestock markets in the Valley region of Virginia.

SHEEP SEPTEMBER 15 - NOVEMBER 15 LAMBING; RAISE REPLACEMENTS

50 EWES
15 PERCENT CULLING RATE
Market all lambs during April

135 % LAMB CROP
10 % DEATH LOSS
1.22 = LAMBS RAISED / EWE

100 % OF LAMBS ENTER FEEDLOT
60 LBS. AVG. WEANING WT.
5.0 T0 1 POST WEAN FEED CONV.

ITEM			UNIT	PRICE	QUANTITY	TOTAL	YOUR EST
CASH INCOME							
LAMBS	23 @	1.10	CWT	$100.00	25.16	$2,516.25	
LAMBS	21 @	0.90	CWT	$103.00	19.14	$1,971.03	
LAMBS	9 @	0.80	CWT	$105.00	7.29	$765.45	
LAMBS	0 @	0.65	CWT	$100.00	0.00	$0.00	
CULL EWES	6.0 @	1.50	CWT	$30.00	9.00	$270.00	
CULL RAM	0.3 @	2.00	CWT	$30.00	0.60	$18.00	
WOOL	6.5 # /HD.		LBS	$0.20	334.75	$66.95	
				TOTAL CASH INCOME		$5,607.68	
CASH EXPENSES							
		FEED WASTE					
MIXED HAY		10.0%	TON	$80.00	15.00	$1,200.33	
ALFALFA HAY		10.0%	TON	$110.00	0.00	$0.00	
SHELLED CORN		2.0%	BU	$2.75	382.43	$1,051.69	
SOYBEAN MEAL		0.0%	TON	$225.00	0.62	$139.25	
PELLETED PROT SUPP		0.0%	TON	$395.00	0.59	$232.63	
CORN SILAGE		5.0%	TON	$30.00	0.00	$0.00	
LIMESTONE		0.0%	TON	$60.00	0.01	$0.85	
DI CAL		0.0%	TON	$320.00	0.00	$0.00	
FEED PROCESSING			CWT	$0.55	238.60	$131.23	
SALT & MINERAL			CWT	$21.50	9.61	$206.62	
VET & MED			EWE	$3.82	50.00	$190.83	
SUPPLIES			EWE	$2.00	50.00	$100.00	
PASTURE	5.0 EWE/AC		ACRE	$18.00	10.00	$180.00	
REPLACEMENT RAM			HEAD	$350.00	0.30	$105.00	
SHEARING			HEAD	$2.50	51.50	$128.75	
TAXES			$	-----	-----	$0.00	
HAUL SHEEP			HEAD	$1.55	59.55	$92.30	
MARKET SHEEP			HEAD	$1.85	59.55	$110.17	
VIRGINIA CHECKOFF			HEAD	$0.50	44.14	$22.07	
BEDDING	0 LB/EWE		TON	$80.00	0.00	$0.00	
BLDG. & FENCE REPAIR			-----	-----	-----	$100.00	
UTILITIES			EWE	$0.90	50.00	$45.00	
MACHINERY, NON-CROP			EWE	$1.78	50.00	$89.00	
				TOTAL CASH EXPENSES		$4,125.73	
ANNUAL DEBT PAYMENTS						$0.00	
RETURN TO EQUITY, MANAGEMENT, & OPER. LABOR						$1,481.95	

DEVELOPED BY VIRGINIA COOPERATIVE EXTENSION FARM MGT. STAFF
AND ANIMAL & POULTRY SCIENCE FACULTY
DEC. 2001

LATE WINTER LAMBING (FEB. - MARCH) LAMBING; RAISE REPLACEMENTS

100 EWES
15 PERCENT CULLING RATE
Lambs go with ewes to pasture and creep feeders with all lambs sold during June and early July

150 % LAMB CROP
10 % DEATH LOSS
1.35 = LAMBS RAISED / EWE

ITEM			UNIT	PRICE	QUANTITY	TOTAL	YOUR EST
CASH INCOME							
LAMBS	66 @	1.00	CWT	$87.00	66.00	$5,742.00	
LAMBS	27 @	0.90	CWT	$85.00	24.30	$2,065.50	
LAMBS	27 @	0.80	CWT	$82.00	21.60	$1,771.20	
LAMBS	0 @	0.65	CWT	$75.00	0.00	$0.00	
CULL EWES	12.0 @	1.50	CWT	$30.00	18.00	$540.00	
CULL RAM	0.6 @	2.00	CWT	$30.00	1.20	$36.00	
WOOL	6.5 # /HD.		LBS	$0.20	669.50	$133.90	
				TOTAL CASH INCOME		$10,288.60	
CASH EXPENSES							
		FEED WASTE					
MIXED HAY		10.0%	TON	$80.00	36.40	$2,912.36	
ALFALFA HAY		10.0%	TON	$110.00	0.00	$0.00	
SHELLED CORN		2.0%	BU	$2.75	492.50	$1,354.37	
SOYBEAN MEAL		0.0%	TON	$225.00	1.03	$230.88	
PELLETED PROT SUPP		0.0%	TON	$395.00	0.46	$183.65	
CORN SILAGE		5.0%	TON	$30.00	0.00	$0.00	
LIMESTONE		0.0%	TON	$60.00	0.03	$1.89	
DI CAL		0.0%	TON	$320.00	0.00	$0.00	
FEED PROCESSING			CWT	$0.55	306.25	$168.44	
SALT & MINERAL			CWT	$21.50	19.40	$417.05	
VET & MED			EWE	$7.26	100.00	$726.04	
SUPPLIES			EWE	$2.00	100.00	$200.00	
PASTURE	4.0 EWE/AC		ACRE	$18.00	25.00	$450.00	
REPLACEMENT RAM			HEAD	$350.00	0.60	$210.00	
SHEARING			HEAD	$2.50	103.00	$257.50	
TAXES			$	-----	-----	$0.00	
HAUL SHEEP			HEAD	$1.55	132.60	$205.53	
MARKET SHEEP			HEAD	$1.85	132.60	$245.31	
VIRGINIA CHECKOFF			HEAD	$0.50	93.00	$46.50	
BEDDING	80 LB/EWE		TON	$80.00	4.00	$320.00	
BLDG. & FENCE REPAIR			-----	-----	-----	$200.00	
UTILITIES			EWE	$0.90	100.00	$90.00	
MACHINERY, NON-CROP			EWE	$1.78	100.00	$178.00	
				TOTAL CASH EXPENSES		$8,397.54	
ANNUAL DEBT PAYMENTS						$0.00	
RETURN TO EQUITY, MANAGEMENT, & OPER. LABOR						$1,891.06	

DEVELOPED BY VIRGINIA COOPERATIVE EXTENSION FARM MGT. STAFF AND ANIMAL & POULTRY SCIENCE FACULTY

DEC. 2001

SPRING LAMBING (APRIL - MAY) LAMBING; RAISE REPLACEMENTS

100 EWES
15 PERCENT CULLING RATE
Lambs put on feed in early Nov. and sold Jan.-Feb

160 % LAMB CROP
15 % DEATH LOSS
1.36 = LAMBS RAISED / EWE

100 % OF LAMBS ENTER FEEDLOT
80 LBS. AVG. WEANING WT.
6.0 T0 1 POST WEAN FEED CONV.

ITEM			UNIT	PRICE	QUANTITY	TOTAL	YOUR EST
CASH INCOME							
LAMBS	7 @	1.30	CWT	$82.00	8.84	$724.88	_____
LAMBS	101 @	1.15	CWT	$85.00	115.69	$9,833.65	_____
LAMBS	14 @	0.90	CWT	$90.00	12.24	$1,101.60	_____
LAMBS	0 @	0.65	CWT	$100.00	0.00	$0.00	_____
CULL EWES	12.0 @	1.50	CWT	$30.00	18.00	$540.00	_____
CULL RAM	0.6 @	2.00	CWT	$30.00	1.20	$36.00	_____
WOOL	6.5 # /HD.		LBS	$0.20	669.50	$133.90	_____
				TOTAL CASH INCOME		$12,370.03	_____
CASH EXPENSES							
		FEED WASTE					
MIXED HAY		10.0%	TON	$80.00	32.82	$2,625.66	_____
ALFALFA HAY		10.0%	TON	$110.00	0.00	$0.00	_____
SHELLED CORN		2.0%	BU	$2.75	565.15	$1,554.17	_____
SOYBEAN MEAL		0.0%	TON	$225.00	0.04	$9.70	_____
PELLETED PROT SUPP		0.0%	TON	$395.00	1.37	$542.97	_____
CORN SILAGE		5.0%	TON	$30.00	0.00	$0.00	_____
LIMESTONE		0.0%	TON	$60.00	0.00	$0.00	_____
DI CAL		0.0%	TON	$320.00	0.00	$0.00	_____
FEED PROCESSING			CWT	$0.55	344.84	$189.66	_____
SALT & MINERAL			CWT	$21.50	20.98	$450.98	_____
VET & MED			EWE	$8.58	100.00	$857.68	_____
SUPPLIES			EWE	$2.00	100.00	$200.00	_____
PASTURE	3.0 EWE/AC		ACRE	$18.00	33.33	$600.00	_____
REPLACEMENT RAM			HEAD	$350.00	0.60	$210.00	_____
SHEARING			HEAD	$2.50	103.00	$257.50	_____
TAXES			$	-----	-----	$0.00	_____
HAUL SHEEP			HEAD	$1.55	133.60	$207.08	_____
MARKET SHEEP			HEAD	$1.85	133.60	$247.16	_____
VIRGINIA CHECKOFF			HEAD	$0.50	107.40	$53.70	_____
BEDDING	0 LB/EWE		TON	$80.00	0.00	$0.00	_____
BLDG. & FENCE REPAIR			-----	-----	-----	$200.00	_____
UTILITIES			EWE	$0.90	100.00	$90.00	_____
MACHINERY, NON-CROP			EWE	$1.78	100.00	$178.00	_____
				TOTAL CASH EXPENSES		$8,474.27	_____
ANNUAL DEBT PAYMENTS						$0.00	_____
RETURN TO EQUITY, MANAGEMENT, & OPER. LABOR						$3,895.76	_____

DEVELOPED BY VIRGINIA COOPERATIVE EXTENSION FARM MGT. STAFF AND ANIMAL & POULTRY SCIENCE FACULTY

DEC. 2001

EARLY WINTER LAMBING (DEC.15 - FEB.15) LAMBING; RAISE REPLACEMENTS

100 EWES
15 PERCENT CULLING RATE
MARKET ALL LAMBS DURING APRIL/MAY

140 % LAMB CROP
10 % DEATH LOSS
1.26 = LAMBS RAISED / EWE

100 % OF LAMBS ENTER FEEDLOT
60 LBS. AVG. WEANING WT.
5.0 T0 1 POST WEAN FEED CONV.

ITEM			UNIT	PRICE	QUANTITY	TOTAL	YOUR EST
CASH INCOME							
LAMBS	4 @	1.00	CWT	$99.00	3.90	$386.10	_____
LAMBS	44 @	0.90	CWT	$102.00	39.69	$4,048.38	_____
LAMBS	50 @	0.80	CWT	$104.00	40.32	$4,193.28	_____
LAMBS	13 @	0.65	CWT	$99.00	8.19	$810.81	_____
CULL EWES	12.0 @	1.50	CWT	$30.00	18.00	$540.00	_____
CULL RAM	0.6 @	2.00	CWT	$30.00	1.20	$36.00	_____
WOOL	6.5 # /HD.		LBS	$0.20	669.50	$133.90	_____
				TOTAL CASH INCOME		$10,148.47	_____
CASH EXPENSES							
		FEED WASTE					
MIXED HAY		10.0%	TON	$80.00	35.21	$2,816.41	_____
ALFALFA HAY		10.0%	TON	$110.00	0.00	$0.00	_____
SHELLED CORN		2.0%	BU	$2.75	626.10	$1,721.77	_____
SOYBEAN MEAL		0.0%	TON	$225.00	1.12	$251.83	_____
PELLETED PROT SUPP		0.0%	TON	$395.00	0.79	$313.83	_____
CORN SILAGE		5.0%	TON	$30.00	0.00	$0.00	_____
LIMESTONE		0.0%	TON	$60.00	0.03	$1.77	_____
DI CAL		0.0%	TON	$320.00	0.00	$0.00	_____
FEED PROCESSING			CWT	$0.55	389.48	$214.21	_____
SALT & MINERAL			CWT	$21.50	19.28	$414.51	_____
VET & MED			EWE	$3.85	100.00	$385.27	_____
SUPPLIES			EWE	$2.00	100.00	$200.00	_____
PASTURE	5.0 EWE/AC		ACRE	$18.00	20.00	$360.00	_____
REPLACEMENT RAM			HEAD	$350.00	0.60	$210.00	_____
SHEARING			HEAD	$2.50	103.00	$257.50	_____
TAXES			$	-----	-----	$0.00	_____
HAUL SHEEP			HEAD	$1.55	123.60	$191.58	_____
MARKET SHEEP			HEAD	$1.85	123.60	$228.66	_____
VIRGINIA CHECKOFF			HEAD	$0.50	48.00	$24.00	_____
BEDDING	80 LB/EWE		TON	$80.00	4.00	$320.00	_____
BLDG. & FENCE REPAIR			-----	-----	-----	$200.00	_____
UTILITIES			EWE	$0.90	100.00	$90.00	_____
MACHINERY, NON-CROP			EWE	$1.78	100.00	$178.00	_____
				TOTAL CASH EXPENSES		$8,379.34	_____
ANNUAL DEBT PAYMENTS						$0.00	_____
RETURN TO EQUITY, MANAGEMENT, & OPER. LABOR						$1,769.13	_____

DEVELOPED BY VIRGINIA COOPERATIVE EXTENSION FARM MGT. STAFF AND ANIMAL & POULTRY SCIENCE FACULTY

DEC. 2001

SHEEP DECEMBER 15 - FEBRUARY 15 LAMBING; RAISE REPLACEMENTS AS PART OF A FALL LAMBING FLOCK

50 EWES
15 PERCENT CULLING RATE

135 % LAMB CROP
10 % DEATH LOSS
1.22 = LAMBS RAISED / EWE

100 % OF LAMBS ENTER FEEDLOT
60 LBS. AVG. WEANING WT.
5.0 T0 1 POST WEAN FEED CONV.

ITEM				UNIT	PRICE	QUANTITY	TOTAL	YOUR EST
CASH INCOME								
LAMBS	2	@	1.00	CWT	$99.00	1.61	$159.64	
LAMBS	21	@	0.90	CWT	$102.00	19.14	$1,951.90	
LAMBS	21	@	0.80	CWT	$104.00	17.01	$1,769.04	
LAMBS	9	@	0.65	CWT	$100.00	5.92	$592.31	
CULL EWES	6.0	@	1.50	CWT	$30.00	9.00	$270.00	
CULL RAM	0.3	@	2.00	CWT	$30.00	0.60	$18.00	
WOOL	6.5	#	/HD.	LBS	$0.20	334.75	$66.95	
					TOTAL CASH INCOME		$4,827.84	
CASH EXPENSES								
			FEED WASTE					
MIXED HAY			10.0%	TON	$80.00	14.31	$1,144.99	
ALFALFA HAY			10.0%	TON	$110.00	0.00	$0.00	
SHELLED CORN			2.0%	BU	$2.75	306.33	$842.41	
SOYBEAN MEAL			0.0%	TON	$225.00	0.55	$124.18	
PELLETED PROT SUPP			0.0%	TON	$395.00	0.37	$146.81	
CORN SILAGE			5.0%	TON	$30.00	0.00	$0.00	
LIMESTONE			0.0%	TON	$60.00	0.01	$0.85	
DI CAL			0.0%	TON	$320.00	0.00	$0.00	
FEED PROCESSING				CWT	$0.55	190.30	$104.67	
SALT & MINERAL				CWT	$21.50	9.61	$206.62	
VET & MED				EWE	$6.06	50.00	$302.78	
SUPPLIES				EWE	$2.00	50.00	$100.00	
PASTURE	5.0	EWE/AC		ACRE	$18.00	10.00	$180.00	
REPLACEMENT RAM				HEAD	$350.00	0.30	$105.00	
SHEARING				HEAD	$2.50	51.50	$128.75	
TAXES				$	-----	-----	$0.00	
HAUL SHEEP				HEAD	$1.55	59.55	$92.30	
MARKET SHEEP				HEAD	$1.85	59.55	$110.17	
VIRGINIA CHECKOFF				HEAD	$0.50	22.88	$11.44	
BEDDING	80	LB/EWE		TON	$80.00	2.00	$160.00	
BLDG. & FENCE REPAIR				-----	-----	-----	$100.00	
UTILITIES				EWE	$0.90	50.00	$45.00	
MACHINERY, NON-CROP				EWE	$1.78	50.00	$89.00	
					TOTAL CASH EXPENSES		$3,994.97	
ANNUAL DEBT PAYMENTS							$0.00	
RETURN TO EQUITY, MANAGEMENT, & OPER. LABOR							$832.87	

DEVELOPED BY VIRGINIA COOPERATIVE EXTENSION FARM MGT. STAFF AND ANIMAL & POULTRY SCIENCE FACULTY

DEC. 2001

SUMMARY OF MATERIAL TO BE COVERED BY CRESCENT MOON FIBER MILL

Opportunities for American Wool Domestic and International

Home Decoration: Arrangements are being explored to export medium range and coarser wools (such as Suffolk/Dorset) to Nepal where they will be made into rugs and carpets, then imported back into US and marketed.

A proposal was made by Crescent Moon to the UN Global Alliance Committee to send the same type fibers to Afghan women to make tribal carpet and rugs that would be imported back into the US and marketed. Prior to the Taliban regime, there were legions of women who made these carpets and who have these ancient skills.

Export of raw wools to textile producing countries such as India, Pakistan, South Africa, and China are being explored.

A market for finer wools is being developed in the craft market in the form of hand knitting yarns, weaving yarns, felts, wall hangings, blankets, etc. We will be attending 2 shows at Charlotte Merchandise Mart, The National Needlework Show in Chicago, The Knitting Guild of America show in Winston Salem, the home decorator show at High Point Furniture Mart. An article and ads of Crescent Moon will be showcased in Vogue Knitting International in February promoting American natural fibers to the largest knitting community in the world.

Crescent Moon has applied to the National Sheep and Goat Improvement Center for a grant to study the viability of the market for technical wool products that are in their prototype stage of development. A new company is being formed alongside of Crescent Moon, called American Wooltech to handle the research, development and marketing of these products. These products are related to building insulation, acoustical insulation, medical devices and geotextiles. If viability is proven, a matching funds loan will be sought from NSGIC to build a nonwoven wool processing mill. These products alone will consume 10s of thousands of pounds of lower quality wools. Shows planned include the National Home Builders of America show, The National Green Building Conference in Seattle and the open house in April of the Farmhouse Project in Boulder Co, where Crescent Moon 100% wool building insulation and wool rugs will be on display before builders, architects, reps from Home Depot and Lowe's, all across the nation. This project is a cooperative effort between the University of Colorado at Boulder Architectural Dept and the USDA.

I am asking for the name, phone, email, and address of every sheep producer at the symposium as well as the type sheep, number of head, and average annual wool poundage produced. Also a short questionnaire of whether you are willing to have your wools skirted, core tested for micron and yield. The cost for this is under $100.00 and allows us to determine which market your wool will used for.

Name: _____

Address: _____

Farm Name: _____

Phone: _____

Email: _____

Type sheep raised: _____

Number of head: _____

Average lbs of wool per year: _____

Are you willing to have your wool skirted and core tested to determine market type?

Any other comments:

DIRECT MARKETING

Martha Mewbourne
Thorntree Farm
ttfarm@mounet.com

Everything I Learned About Direct Marketing I Taught Myself

Most likely, everyone selling sheep or lamb products is a direct marketer. The lamb and wool markets have changed so significantly that most of us are supported by some form of niche marketing. It is therefore important that we take advantage of the situation and capitalize on the available opportunities.

What are the disadvantages of direct marketing?

Direct marketing requires more time.
Customers can be demanding
There is very little help available from anyone except other direct marketers

But, the advantages far outweigh the disadvantages.

You get to meet a lot of really wonderful people
You get to share your pride in a product you raise
You don't have to worry about the weekly sale barn prices
You can be different from your neighbors
It makes more return

So, what have I learned from direct marketing?

Know what and why you want to direct market
Believe in your product
Have a plan, and a goal or two which you can articulate and measure
Spend less time on production and more on sales and marketing
Price is a small factor in the customer's decision
Packaging is important
The USDA inspector is your greatest ally
Make it easy for people to do business with you
Look for unique places to sell
Investigate what others are doing
The market potential is enormous
You can have a great time and receive a greater return

MILKING SHEEP

Pat Elliott

Sheep produce wool, meat, and, of the most value, milk. Sheep milk is wonderful to drink, but most of it is used to make various types of cheese. Sheep milk dairying is still a young industry in the United States - about ten years old. Most of the sheep's milk cheese sold in the United States is imported - over 75 million pounds of it. In fact, there are more sheep milked in the world than cows. The biggest sheep cheese producing countries are Greece, France, Italy, Israel, the Near East, and Britain. Milking sheep goes back many hundreds of years in many places.

IT'S BIG NEWS -- There is a huge surge of interest in sheep milking right now. At the recent 7th Annual Dairy Sheep Symposium in Wisconsin which I attended there were about 125 people, most of them interested in getting into sheep milking from just thinking about it to ready-to-start in the spring. This interest is well-placed:

1. As Yves Berger the shepherd and director of the sheep program at the University of Wisconsin, says of the Wisconsin sheep dairy coop members, in the August Shepherd, "The common denominator is a strong affection for the animals and the desire to operate a successful livestock enterprise." Milking sheep is a way to combine these two sides of owning sheep.
2. Wool prices have been low and will probably continue so. Meat prices are extremely low and are always a worry. Most shepherds can't feed many sheep on either lamb or wool income. In fact, a recent article I read about producing hothouse lambs suggested that one partner continue an off-farm job!
3. This is an exciting time to be getting into sheep dairying. Demand is high and there are only a hundred farms or less milking sheep. I feel thrilled that I know many of these farmers. Most of us are small - from 30 to 300 sheep. Old Chatham in New York is the biggest at 2000 ewes.
4. It doesn't take much time to take care of sheep. When I am not milking I don't spend more than an hour and a half with mine. I prefer to spend more time with them, to know them individually. Milking is ideal for that.
5. The biggest factor in dairying is "Does it make economic sense?" which I will explore in the next section.

WHAT'S THE BOTTOM LINE? -- The Wisconsin Sheep Dairy Cooperative is selling its milk at $60 a cwt. Sheep milk production varies averaging 500 to 800 pounds per ewe per lactation, depending on many factors. High production ewes produce more, yearlings less. But even 500 pounds adds up to $300 per ewe.

GETTING STARTED -- If you are interested, there are a number of decisions to make:

1. Consider the amount of energy you have or can muster in the family or can hire. You will be looking at 6-10 hours a day (or more).
2. Start-up costs. You need to have a milking parlor that meets the regulations. You need some sort of bulk cooler arrangement. You need to have milk storage, and probably a freezer if you are selling bulk milk. Sheep milk freezes well, unlike cow milk. You need fencing adjustments to get the sheep into the parlor. You need to feed them more grain for maximum production (some people don't). You will want a milker/milkers if you are going to milk more than two sheep.
3. What kind of operation you want? Do you want to sell fluid milk or are you thinking about a value added product which I will discuss briefly below.
4. How will you market your product? To whom? Who will transport it? Old Chatham buys most of the milk produced by the Wisconsin Dairy Sheep Cooperative now and it is shipped frozen to New York. There are cheese plants around the country that would be interested in a quality product. Do the leg work first.

A VALUE ADDED PRODUCT -- I started milking sheep because I got a Border Collie at one of the Montpelier Wine Festivals about ten years ago. Bill Crowe was demonstrating with his Border Collie and had a couple of pups for sale. I was hooked. Eventually, Beck grew up and I had to have something for her to do, so I got a few sheep. One day, I was wondering how to get them to pay for themselves and it occurred to me that people must milk sheep. (That shows you how much I knew!) . I found out that indeed they do. And make cheese. I was already making cheese for my own use from the cow down the road, so I began looking around and found some sheep from a lady in Pennsylvania, and started. So making cheese was a decision I made in the beginning, without really thinking it through. I am glad for that decision because from that hundredweight of sheep milk that the fluid milk producers get $60 for, I get $300 to 480, depending on where I sell it - but for more work.

DECISIONS TO MAKE

1. Breed of Sheep. Where to find them. It will pay you to get as high percentage of dairy breeding as you can afford, but you can start where you are and work up.
2. Nutrition-pasture/grain. Most producers grain quite heavily although Mary Falk in Wisconsin has a hay-based operation. I feed hay ad lib and five pounds of grain a day.
3. What to do about lambs. You have to have lambs to have milk. If you have a dairy breed, you should average 250% lambs a year as I did this year. How to feed them? Keep them on the moms for a month and wean them. Use share time? Wean them at a day or two and put the lambs on milk replacer? The latter is what I do. I wean mine at a day and a half (so they have colostrum) and put the ewe on the milking line and the lamb on a coke bottle with a Pritchard nipple until he can graduate to a lambar in a couple of days. There is a whole talk's worth of bottle lamb considerations.
4. How long to milk? I know people who milk only four months up to the nine months I milk. It is possible to breed milking sheep to milk year round.

5. How to finance this thing? I couldn't get financing so that has slowed me down to starting small and this has been fine.
6. What can I use what I have, and what do I have to construct to meet state requirements?
7. What is my goal or mission statement?
8. What am I going to do with this great milk when I get it?

SOURCES OF INFORMATION

1. Dairy sheep L under Yahoo groups
2. CreamLine
3. University of Wisconsin
4. VA or NC Dept of Agriculture. Totally essential. You need to be legal. I found them very helpful even if they had never heard of milking sheep. Mary Janme, my milk inspector, continues to provide valuable advice.
5. BSDA publication
6. Visit individual sheep farms for ideas and questions. There are no dumb questions.
7. Cheese making classes
8. Cheese "recipe" books

SOURCES OF EQUIPMENT -- Where you find it. This can be difficult:

There are many other decisions to make if you become interested in sheep dairying. Things like nutrition (how much protein, how much grain), how to be clean while milking, flock health - these are standard, and also, you will run into disasters like my two years of copper poisoning that killed some of my best ewes. There is a lot of research being done and it is exciting to keep up.

In summary, to have a viable sheep industry in this country, I think we need to join the rest of the world and milk sheep. In my opinion their best product - and a profitable one if you are willing to do the work.

ADDENDUM SOURCES

Dairy Div., Dept of Ag, W.J. Farley, 540-434-3897, regulations, inspection
Lamb Supplies:

Ob gloves, disinfectant, iodine, towels, hair dryer
Heat lambs with bulbs
Pritchard nipple
Coke bottle (sic: brand name)
Milk replacer
140 cc syringe with clear plastic tubing
Caprine bucket, stand, tubing, and teats or cold milk feeding machine
BoSe (selenium), scissors, elastrators, etc. (widely available)

Milking Machines and stanchions, inflations, hose, etc.
- Dairy Supply Stores: Dairymen in Harrisonburg, 800-572-2123
- David Major, Vermont, 802-387-4473
- Hoegger Supply, 800-221-4628
- Caprine, 800-545-7796
- Schleter?? Kugel
- Teat dip, washing powder, brushes, etc. (dairy store)
- Collars, leg bands (Hoegger's)

Storage Room
- Some way to cool the milk to 40 within 2 hours
- Sinks, hot water
- CIP?
- Pasteurizer?

Freezer (for milk storage) or bulk tank (for pick up)

Make Room

Ripening Room or cave used – Storemens, 540-867-9211
- Humidity
- Temp control 48-58
- Make vat
- Sinks Dairy Supply, Superior, etc.
- Stainless work space
- Cultures, rennet, etc.
- Small equipment – Nelson-Jamieson, 800-826-8302
- Scales – Storemens
- Pasteurizer, 15 gal – 603-744-6644
- Molds for cheese (Hoegger's, Caprine)
  - Iverson, 414-351-0700
  - Sonoco, 518-392-2000
- Icers, pails – Superior Restaurant Products, 800-328-9800
- Shipping boxes, ice brix, 800-423-2749
- Pails, pots, Rubbermaid, 800-362-1000

Information Sources
- CreamLine, PO Box 186, Willis, VA 24380
  - www.biblio.org/creamery - much info and sources in summer 2001 issues
- Yves Berger Spooner Agricultural Research Station, W6646 Hwy 70,
  - Spooner, WI, 549-1-2335, ph 715-635-3735
- Great Lakes Dairy Symposium proceedings
- http://www.uwex.edu/ces/animalscience/sheep/
- Practical Sheep Dairying Olivia Mills. The "Bible"
- Dave Thomas Dairy Sheep Research Specialist, UWIfaxstaff.wisc.edu
- Wisconsin Sheep Breeders Cooperative, 608-868-3\2505
- Ken Kleinpeter, Old Chatham Shepherding Co., 155 Shaker Museum Rd,
  - Old Chatham, NY

This is a very incomplete list but will get you started. It is hard to find used equipment as the industry is so new, but some things can be adapted.

PASTURE MANAGEMENT AND RENOVATION

Ray Smith
Forage Extension Specialist, Virginia Tech

Plan for a Full Year Forage Plan

A well-planned forage system makes use of pasture, hay, and silage crops to provide an adequate and reliable supply of forage for livestock throughout the year. Such a forage plan must be based on the requirements of the animals and must be fitted to the topography, soils, and other characteristics of the farm. Availability of labor, capital, and harvesting, storage, and feeding equipment also influences the system utilized.

It is possible for well-managed pastures to provide grazing year-round. In order to obtain this much grazing without overgrazing, it may be necessary to supplement cool-season pastures with summer grazing crops, such as pearl millet, Bermudagrass (depending on location), Caucasian Bluestem, or Switchgrass. Some graziers are even making use of crabgrass for summer pasture. It is often possible to reduce grazing pressure during critical periods by changing population and type of livestock; e.g., selling lambs after the spring growth of pasture is utilized. Winter annual crops such as rye, or a mixture of rye and barley, can provide additional late-fall and early-spring grazing. Stockpiled tall fescue can provide grazing through the winter months.

In selecting grasses and legumes, consider how each pasture fits with other forages on the farm, the grazing management it will receive, and the suitability of the soil for the species in the stand. Fortunately, most forage mixtures adapted to Virginia conditions lend themselves to more than one use. For example, alfalfa-orchardgrass is primarily a hay or silage mixture, but it also makes excellent pasture. Harvesting surplus spring pasture for silage or hay begins to build stored feed supplies early in the season, when climatic conditions are best for growth of most pasture plants.

Forage plants and mixtures differ in growth habits and in the amount of feed they produce during different seasons of the year. No forage mixture provides adequate grazing for the entire season; but, by recognizing the growth habits of each forage species, mixtures can be selected to meet grazing needs and provide silage or hay.

The summary in Table 1 gives seeding rates, adaptation, and general management for forage plants to be used for pastures in Virginia west of the Blue Ridge Mountains and in the northern Piedmont.

Liming and Fertilizing

The most common fertility problem on Virginia's mountain pastures is low P_2O_5. Although K_2O is usually not a limiting factor, it may be in some instances. Applying P_2O_5 to soils containing low levels of this nutrient, but capable of high production, encourages growth of white clover. Grass growth will be stimulated by N fixed by the

clover. Clover is also high in feed value and improves the intake and digestibility of the mixture. Calves, for example, often gain an additional 50 pounds when grazing grass-clover rather than pure grass stands.

Most mountain pastures low in P_2O_5 require an application of this nutrient at least every 3 to 4 years. An example of the yield response to fertilization of pastures on productive soil is shown in Table 2. Note that a 41% increase in forage production was obtained over a 3-year period as the result of one application of fertilizer that was primarily P_2O_5. Much of this increase was caused by increased clover in the stands.

Since very small amounts of P_2O_5 and K_2O are actually removed from the pasture by grazing animals, soil fertility levels remain fairly constant once they are built up by fertilization. This is an important consideration when considering the economics of pasture fertilization.

Have the soil tested at the Virginia Tech Soil Testing Laboratory to be sure pH, P_2O_5, and K_2O are not limiting. Whenever possible, lime to maintain a soil pH of at least 6.0 except for Caucasian Bluestem and Switchgrass. Response to fertilizer will be small if the soil pH is below 5.4; so, such areas should have a low priority for fertilization unless lime can also be applied. If the pH is below 5.0, do not fertilize unless lime is applied. It is especially difficult to keep clover in the stand if the soil is acid. Fertilizer and lime can be effectively applied any time of the year, but between October 1 and April 15 is considered ideal. Tables 3 and 4 provide guidelines for P_2O_5 and K_2O applications based on soil test results.

Some steep areas have soils capable of high pasture production but are inaccessible to conventional equipment. However, many areas within steep boundaries can be reached with conventional applicators. Such areas should be treated first, since they are often the most productive soils.

On marginal soils, priority should be given to fertilizing slopes with a northern rather than a southern exposure. Slopes facing south green-up earlier in spring and grow longer in fall than slopes facing north. However, southern slopes are first to turn brown during dry periods because of higher summer temperatures. Cool season plants such as bluegrass often cannot survive these higher temperatures and the dry conditions that often accompany them.

The fertilizer dollar for pastures can generally be best spent for P_2O_5, K_2O, and lime. In some instances, particularly for stockpiling tall fescue for winter grazing, N fertilization is practical. In deciding how much N to apply, the decision should be governed by the percent clover in the stand, the need for early and late grazing, the stocking pressure on the pasture, and type of livestock grazing the pasture. If the clover stand is poor, and additional grazing is needed, managing the pasture temporarily as a pure grass stand is often best. Apply up to 120 pounds of N per acre each season on orchardgrass or tall fescue stands and 100 pounds of N per acre on the native grass stands. Apply half of this N in early spring and the other half in late summer or early fall.

Remember that N applications cause soil pH to drop, making it necessary to lime more often. If the clover stand is strong or clover growth is to be encouraged, do not apply N.

Grazing Management

Sound grazing management increases pasture yields and prolongs the life of grasses and legumes in the stand. Well-managed pastures result in utilization of the forage produced. This is essential if an economic return is to be gained from fertilization and other expenditures on pastures. Growth habits of a particular plant determine the method of grazing that it can withstand and still be productive.

Grazing management is based on light interception and organic food reserve. Leaves intercept light from the sun and, through the process of photosynthesis, manufacture food for production of new leaves and other plant parts. Food in excess of that needed for growth is stored in the lower portion of the plant as organic food reserves and is used later when there are not enough leaves to furnish adequate food for growth. If the leaves are not allowed to develop because of overgrazing, or are removed too early by grazing or mowing, the plant does not have sufficient time to manufacture organic food in amounts necessary for growth and replenishment of food reserves. Thus, the plant is weakened, regrowth is slow, and
some plants may be lost.

Kentucky bluegrass, white clover, and other low-growing species can be grazed continuously if not grazed closer than 1/2 - 1 inch. Such plants produce leaves so close to the ground that animals cannot easily remove them. These leaves maintain a partial supply of food necessary for new growth after the upper portion of the plant has been removed, thereby reducing the drain on the plant's food reserve.

Mountain pastures are predominantly Kentucky bluegrass and can usually be grazed continuously or in long rotations. Before a pasture is grazed so short that livestock are not getting enough to eat and the plants are being injured, rotate the livestock to other pastures, or supply additional feed. It is difficult under continuous grazing to avoid overgrazing some areas, while undergrazing others, resulting in wasted forage.

Tall-growing grasses and legumes, such as orchardgrass, ladino clover, and alfalfa, grow erect. Since leaves on these plants are high above the ground, they can easily be removed by grazing or clipping. After leaves are removed, the food for new growth comes from reserve food in the roots and stubble. This means that tall-growing species should be grazed rotationally to give them a rest period after they are grazed or cut. This gives them time to replace the sugars and starches. The goal should be to graze pastures down within seven days and then allow about 15 days of rest in spring and 30 days rest in summer. Ladino clover usually replaces its food reserve when it grows to a height of 4-6 inches. Orchardgrass usually restores its reserve food by the time it reaches a height of 6-10 inches.

More livestock product can be produced per acre if pastures are stocked heavily enough to use spring growth. When stocked this heavily in spring, it is usually necessary to have some way to lower the grazing pressure during mid-summer or during periods when pastures are short. Having reserve silage or hay, selling off lambs, and making additional acreage available for grazing are methods of lowering grazing pressure during these periods. Grazing steep areas heavily in spring and taking a hay or silage cutting from accessible areas that are to be grazed later in the season is an effective system.

Heavy grazing pressure gives lower gains per animal during the grazing season, but more beef is produced per acre than with light grazing pressure. However, when grazing pressure is too heavy, both animal and pasture production suffer. Work toward a compromise where both per acre and per animal gains are acceptable.

The goal in proper pasture management is to maintain and utilize vigorous forage plants that will produce adequate amounts of high-quality grazing for livestock year after year. A guideline for the carrying capacities of pastures of different levels of productivity assuming 70% of utilization is:

Level of Productivity	Acres per Animal Unit (five ewes with lambs)
Excellent	1.0
Good	1.5
Average	3.0
Poor	6.5

In order to obtain optimum benefit from productive pastures, the growth must be utilized while it is of high quality. Allowing cool season pasture to get ahead of grazing animals, especially during the period of rapid growth in the spring, results in tough, fibrous growth of low quality that is often wasted (Table 6). At the same time, clover is often crowded out by the tall growth and weeds grow that would be eaten under heavier grazing pressure. Grazing only those pastures actually needed in the spring, and stocking those heavily enough to keep up with the growth, results in higher quality grazing and greater utilization of plant growth.

Pastures not needed for grazing in the spring should be harvested as silage or hay when heads emerge from the boot. This results in higher-quality stored feed and greater regrowth for grazing than when the plants are more mature when harvested. These excess pastures also will make higher-quality feed if not partially grazed, tramped down by livestock, and fouled with manure.

Tall fescue should not be allowed to grow taller than 6-8 inches during the spring and summer. It decreases in palatability rapidly if it becomes too tall, especially during the summer months. It is especially critical to maintain clover in tall fescue stands to reduce the possibility of poor livestock performance.

Do not seed tall fescue in mixtures with orchardgrass or Kentucky bluegrass. Given a choice, livestock will leave the tall fescue ungrazed and often overgraze the other species. The tall fescue then becomes clumpy and low in quality.

Provide a reliable water source for each pasture. In some instances, this will require use of natural springs or planning and developing other water sources. Even high quality pasture areas will often not be used if they are too far from water. Locate salt boxes in under-utilized portions of the pasture to encourage livestock to spend more time there.

Other Management Suggestions

Maintaining Clover-Grass Balance

The maintenance of clover in pastures should be the goal of every good manager. The legume provides its companion grass with nitrogen and improves the feed value of the pasture. Clover is especially important in tall fescue pastures to improve livestock performance.

If the clover is thinning out, keeping the pasture grazed or clipped encourages clover growth. Be sure soil pH and K_2O levels are adequate. Clover, like other legumes, requires a pH of at least 6.0. When K20 is limited, grasses and weeds use most of the available supply and cause the clover to be lost from potassium starvation.

If the grass is thinning out, let pastures grow to 8-12 inches in the spring before grazing or, better still, cut it off silage or hay. Avoid overgrazing and undergrazing during late summer and fall. Use 25-50 pounds of N in a complete fertilizer for topdressing.

Renovating Pastures

A combination of the use of lime, liberal use of a complete fertilizer, and reseeding is the most effective way to improve run-down pasture. Existing stands composed of approximately 50% desirable species can be thickened by reseeding in late winter-early spring. Apply a herbicide the previous fall if it is necessary to kill weeds, and fertilize as needed. Graze the sod very closely by late winter before seeding to reduce competition with the new seedlings. Seed the grass-clover mixture into the sod with a no-till drill or ordinary grain drill capable of placing the seed in the sod.

If a satisfactory stand of grass is present, make the same preparations as when drilling a grass-clover mixture, then broadcast clover and/or lespedeza seed on the sod surface in late winter while the soil is freezing and thawing. Grazing the existing sod closely in the spring favors development of the seedlings.

If there is less than half a stand of desirable grasses and legumes, it is generally best to completely reseed. This may be done by tilling a seedbed or by killing the old sod with herbicides and seeding no-till.

Control Undesired Spread of Tall Fescue

Tall fescue has several desirable traits, the most important being its ability to grow and produce forage on marginal soils and its suitability for winter grazing. However, livestock performance is usually less than desirable when grazing tall fescue during the summer months, particularly if the tall fescue is infested with the endopytic fungus. If other grasses are suited for use in a particular forage system, no more than 1/3 of the forage acreage should be devoted to tall fescue.

Many bluegrass and orchardgrass pastures have been invaded and taken over by tall fescue. It is a very vigorous, persistent species that will usually crowd out other pasture grasses once it gets started. Since livestock usually graze other pasture plants in preference to tall fescue, it often produces seed in pastures. This encourages its spread. Tall fescue hay made from mature plants contains large quantities of seed. Consequently, pastures that have such hay fed on them are unintentionally but very effectively seeded with tall fescue. Also, seed will readily germinate after passing through livestock. Manure from animals that have eaten tall fescue seed heads, either from standing plants or mature hay, is a source of new tall fescue plants.

Preventing tall fescue from producing mature seed heads is the key to limiting its spread to unwanted areas. Livestock having access to mature seedheads should not be permitted on pastures where tall fescue is not wanted.

Clipping

When pastures are stocked heavily enough to utilize plant growth, clipping is rarely necessary. If horses alone are grazing the pasture, or if it is not stocked heavily enough to use the growth, pastures should be clipped to remove older unpalatable growth and to control weeds. Mowing should be done after the grass heads have emerged, but before seeds mature. Clipping at this time encourages more vegetative growth and generally reduces the period of semi-dormancy that follows after most grasses mature seed. Clip high enough to leave the grass leaves for future grazing, particularly if the clippings are not going to be saved for silage or hay. The seed heads and stalks are the only portions of the grass that need to be removed. Clipping is not necessary after each grazing for rotationally grazed pastures. If late summer weeds are a problem, clip to prevent their seeding. Usually 1 to 3 clippings a season are sufficient.

Stockpiled Winter Grazing

Winter feeding costs can be greatly reduced by utilizing winter grazing to lower the need for stored feed. Tall fescue is particularly well-suited for winter grazing since it

responds well to late summer fertilization, withstands heavy grazing, and retains its quality during the winter.

Tall fescue pastures to be stockpiled should be grazed down to about 2 inches by mid-August and topdressed with 75-100 pounds of N per acre alone or in a complete fertilizer if P_2O_5 and K_2O are needed. The stockpiled growth should not be grazed until other pastures are grazed down in late fall. One acre of stockpiled growth per animal unit will usually provide up to 120 days of winter grazing.

Strip grazing the stockpiled tall fescue with a single electric fence stretches the supply of winter forage and assures that high quality grazing will still be available when the last of the growth is grazed. Since the tall fescue is not actively growing, no back fence is required. Provide enough forage in each strip to last for 7-10 days.

Creep Grazing

Providing openings in the pasture fence or simply raising the fence to permit lambs to leave their ewes and creep-graze another pasture of higher quality is a very sound, practical technique for insuring that high quality grazing is available to the growing animals that need it. Where it is not practical or feasible to improve a particular pasture, ewes can often be forced to utilize the lower quality grazing and keep weeds down, while lambs graze an adjacent pasture of higher nutritional value than the ewes really need. It is often practical to fertilize, seed, and otherwise improve a relatively small area in or next to a large pasture boundary specifically to provide creep grazing for lambs. Hay fields adjacent to pastures provide excellent creep grazing.

Fencing

It is nearly impossible to truly manage pastures and control the grazing animals without adequate fencing. Implementation of most desirable management practices is dependent upon controlling the grazing pressure on a particular pasture. There is no optimum pasture size since this depends on numbers and types of livestock, quality of pasture, use to be made of the particular pasture, availability of water, distance from other pastures, and many other practical considerations. For a given group of livestock, it is desirable to have 3-6 different pastures available during the year. This includes hay fields that can also be grazed as needed. Upland or mountain pastures need to be fenced separately from more level, usually higher quality, pastures to force livestock to graze the steep pastures. This is particularly important for brush control. In many instances the level pastures can be harvested for hay if they are not needed for grazing at particular times during the grazing season.

Grazing Various Classes of Livestock

Sheep are close grazers that will eat many brushy and weed plants left by cattle. Goats are browsers that will consume many woody plants that cattle will not eat. Horses are notorious spot-grazers because they prefer to graze short plants. Most livestock

prefer not to graze areas where their feces and urine have fallen, but will often graze such areas soiled by other livestock. Different animal species can be grazed together in the pasture or in sequence to improve utilization of pastures.

Weed Control

Weeds compete strongly with the desirable pasture plants for light, soil nutrients, and moisture. Weedy plants are low in palatability, reduce quality and yield of pastures and, in the case of spiny weeds, prevent livestock from grazing desirable plants.

The first step in controlling weeds in pastures is to maintain a thick, vigorous stand of desirable plants by proper fertilization and grazing management. Many weedy plants thrive under conditions of low fertility as a result of little competition from desirable pasture plants. Fertilizing such pastures stimulates growth of desirable plants, often forcing out such weeds as broomsedge. Combine fertilization with proper grazing to put additional pressure on weeds. Livestock will graze many weeds after fertilization, especially if grazing pressure is heavy. Most weeds cannot withstand grazing, so this helps to eliminate them. Overgrazing weakens the desirable plants and permits invasion of weeds.

An increasingly serious problem with steep pastures is the invasion of woody plants, such as cedars, locusts, multiflora rose, and others. Placing extreme stocking pressure on brushy areas for short periods to force livestock to eat shoots and leave will help to control growth of these plants. In many instances, this is the only physically possible or economically feasible technique, assuming that hand digging or cutting is not an alternative.

Feeding hay, particularly large bales on brushy areas, encourages livestock to eat brush and clear out such areas. Manure and urine deposited in the area, plus seed that may be in the hay, help to develop the pasture sod. Hay used for this purpose should not contain large quantities of weed seed.

Timely clipping will help to control many weeds. Clip annual weeds at the early bloom stage, before seed production occurs, to prevent them from reseeding the pasture.

There are many weeds that cannot be controlled by clipping or grazing. Herbicides should be considered for these. Since recommendations for the use of herbicides change frequently, consult your Virginia Cooperative Extension agent for up-to-date chemicals and application rates for use on pastures.

In considering a chemical application, the first step is to identify the weeds found in the pasture. The weed species will determine which chemical should be used, time of application, and rate. Some weeds may require two or more applications. Seed from some weeds remain alive in soils for several years while others have largely fleshy tap roots or many rhizomes that produce new growth. It may take more than one season of spraying to control such weeds.

Using chemicals to control weeds is a sound practice for improving pastures. However, their use is only one management tool and should not be considered a replacement for management procedures that maintain a dense, vigorous stand of desirable pasture plants that can resist weed invasion.

Select and use pesticides carefully. Before using any pesticide, read the instructions printed on the label of its container; follow those instructions, heed all cautions and warnings, and note precautions about residues.

The majority of this paper was taken from Harlan White's extension publication "Managing Virginia's Steep Pastures."

Table 1. Forage Mixtures and Their Management West of the Blue Ridge Mountains and in the Northern Piedmont

Use	Mixtures and Seeding Rates in Pounds Per Acre		Soil Adaptation	Management
	No. 1			
Grazed Continuously	Kentucky bluegrass	6	All types of well-drained to somewhat poorly drained soils. Also, areas too steep for making hay for silage.	Seed August 15 to September 15 or Mar 1 to Apr 15. If grazed continuously, pasture will be white clover-bluegrass. Productivity of the taller plants may be increased by rotational grazing.
	Orchardgrass	6		
	Timothy	2		
	White clover	2		
	Red clover	2		
	No. 2			
Rotational grazing or hay or silage followed by rotational grazing (will become ladino clover-orchardgrass mixture).	Orchardgrass	5-8	All types of well-drained to somewhat poorly drained fertile and limed soil.	Seed Aug. 1 to Sept. 15 or Mar. 1 to Apr. 15. Graze continuously until June, then rotate grazing. Graze to 3 inches, then let recover to 6-12 inches. The spring crop may be cut for silage or hay, then the pasture may be grazed rotationally. Red clover or alfalfa increases total yields for about 2 years.
	Ladino clover	1-2		
	Red clover	2-3**		
	No. 3			
Continuous grazing or rotational grazing (furnishes more summer and late grazing than mixture 1 or 2).	Tall fescue	6-10	Better for excessively well-drained (shale) and poorly drained soils than mixture 1 or 2.	Seed Aug. 1 to Sept. 15 or Mar. 1 to Apr. 15. Graze continuously until June, then rotate grazing. Graze to 1 inch to 2 inches, then let recover to 6-10 inches. Tall fescue is more tolerant of close and continuous grazing than orchardgrass.
	Ladino clover	1-2		
	Red clover	2-3		
	No. 4			
Rotational or continuous grazing or rotational grazing and hay.	Annual lespedeza	10	Suitable for all types of soils, and better than above mixtures for infertile soils. Use fescue on dry (shale) or poorly drained soils and lespedeza for altitudes below 1,500'.	Seed lespedeza in Feb. or early Mar. 1 to Apr. 15. Graze continuously until June, then rotate grazing. Graze to 1 inch to 1/2 inch, then let recover to 6-10 inches. Tall fescue is more tolerant of close and continuous grazing than orchardgrass.
	Ladino clover and	1		
	Tall fescue or			
	Orchardgrass	6-10		
	No. 5			
Silage-rotational grazing or silage-hay-rotational grazing.	Alfalfa	10-15	Fertile, limed, and well-drained soils suitable for alfalfa.	Seed Aug. 1 to Sept. 15 or Mar. 1 to Apr 15. Silage in spring, then rotate grazing. Cut first crop for silage when orchardgrass heads, then let alfalfa reach 1/10 bloom before grazing or harvesting for hay. Stock small fields heavily to graze pasture down in about 1 week. Heavier rotational grazing as for mixture 2 will result in loss of alfalfa stands.
	Orchardgrass	3-5		
	Ladino clover	1		

Table 2. Yield Response of Pasture on Steeply Sloping Westmoreland Soil - Tazewell, Virginia, 1968-1970.

	Pounds of 12% - moisture Forage Per Acre			
Treatment	1968	1969	1970	Total
No Fertilizer	2,538	3,288	1,891	7,697
300# 0-38-18/ acre	3,480	4,848	2,549	10,877
Increase, lbs	942	1,560	658	3,180
Increase, %	38	47	35	41

*Fertilized March, 1968. Soil Test pH - 5.8, $P_2 0_5$-L, $K_2 0$-M.

Table 3. Fertilizer Rates for Annual Applications on Tall-Grass/Ladino Pastures on Group II Soils

Soil Test Class	Pounds/Acre N	$P_2 0_5$	$K_2 0$
L		110	110
M		80	80
H	0	0	0
VH		0	0

Table 4. Fertilizer Rates for Application Every 3-4 Years on Bluegrass/White Clover Pastures on Group II Soils

Soil Test Class	Pounds/Acre N	$P_2 0_5$	$K_2 0$
L		175	175
M		100	100
H	0	0	0
VH		0	0

Table 6. Stages of Plant Growth as Related to Feeding Value of Mixtures Used for Pasture

	Vegetative	Bud or Heading	Full Bloom
Steminess	Low	Medium	High
Protein	High	Medium	Low
Minerals	High		Low
Digestibility of dry matter (%)	65-75		55-60
47-53			
Fiber and lignification	Low	Medium	High
Palatability	High	Medium	Low
Kind of supplements needed	Energy or None	Energy	Energy and Protein

CLUB LAMB FUNGUS: PREVENTION AND TREATMENT

Robert L. Stewart, Coordinator, Extension Programs
Animal and Dairy Science Department
The University of Georgia

Club Lamb Fungus began in Georgia in the late 80's. As far as I can tell, the first case officially reported occurred after the Tift County lamb show in 1987. We sheared our lambs the day before the show and were terrified to see scabs which were bloody from shearing on one of our wethers. Being close to a Veterinary Diagnostic Lab, we took the lamb to see what was happening. They had never seen anything like this but took biopsies and cultured a fungus. Identifying the exact infectious agent took a few weeks and turned out to be *Trichophyton verrucosum*. Unknown to me at the time, many states were discovering the same problem simultaneously. Because it was prevalent in market lambs being shown, this new disease rapidly became known as club lamb fungus.

What is Club Lamb Fungus?

Skin fungus is relatively rare in the sheep population. Supposedly, the layer of lanolin next to the skin acts as a protective barrier. If this barrier is compromised, then the skin is subject to an infection. Under normal flock conditions, the lanolin barrier remains intact even when sheared. Before being shown, market lambs are usually washed with soap before shearing and then slick shorn with combs that are designed to clip very closely. The washing removes the lanolin and the close shearing (often with surgical blades) causes at least minor skin abrasions. No one could design a better situation for challenging these animals with a fungal infection.

In lambs, this fungus appears as a lesion which consists of circular areas of matted wool with a raised, crusty scab. These lesions may be as small as a pencil lead or as big as a half dollar. When the scab is parted, the skin is bloody and may ooze. The lesions may appear on any portion of the body but are most prevalent where the skin is actually abraded, usually along the top of the loin or on the outside of the leg. Club lamb fungus is also contagious to humans. The lesions in humans may be irregularly shaped, unlike common ringworm. The skin will itch and ringworm medications are seldom effective. Left untreated, the lesions can leave a permanent scar. If you think someone in your family has club lamb fungus, then inform your doctor of what you suspect and he will have to prescribe medication.

Because of the contagious nature of this fungus to both sheep and humans, the Georgia State Veterinarian requires a health certificate stating that your local veterinarian has inspected the lamb and certifies that it is free of fungus. Animal health inspectors are present at every show and inspect all lambs before they are allowed to enter the barn. Any lamb showing suspect lesions are loaded back on the trailer and not allowed to show. As you can imagine, there have been many tears when a youngster was informed that his/her lamb could not participate in a show that they had been looking forward to.

A member of the ringworm family, club lamb fungus reproduces via spores. These spores may survive for several years. If a lamb with this fungus has ever been in your barn or at the fairgrounds where you show, then you must consider those premises forever contaminated and develop strategy to prevent your lambs from becoming infected.

Because this fungus affects a relatively small population of food animals, there has been very little research conducted. Most of what is known has been developed via trial and error. Consistency and attention to detail are key factors in successfully controlling this fungus. Once you have infection, there are effective treatments. However, as with any other infectious process, prevention is of utmost importance.

Prevention:

I can't over emphasize that prevention is infinitely more pleasant than treatment. We have been challenged with club lamb fungus for 14 years. This is what works for us:

1. Purchase garden variety Captan. Make sure it is pure Captan and not a mixture with a pesticide. Captan is a fungicide and is very effective against club lamb fungus. It has good residual properties which mean that it will retain its protective abilities for days or even weeks.

2. Purchase Nolvasan (vet label) or Chlorosan (over-the-counter). These are two brand names of the same thing. Mix in water according to directions. Nolvasan is a disinfectant which acts quickly, but has very little residual value.

When shearing lambs, dip your clipper blades in the Nolvasan solution often. This will disinfect the blades and help to prevent exposure.

When you get home from the show, mix the two together (one tablespoon Captan per gallon of the Nolvasan mixture) and bathe the lambs. We put our lambs on the blocking table and completely soak them. You may want to put this solution in a hand sprayer for easy application. However, you should work the liquid into the wool with a brush or your hands.

We have adhered to this regimen and had very few skin lesions. The lesions we did notice were probably not club lamb fungus.

An additional protective measure is to feed organic Iodine. The active ingredient is EDDI (ethylene diamine dihydro iodide). Iodine 40 is commonly available from your vet supply dealer. We feed one pinch (the amount you can pick up between your thumb and forefinger) per feeding. Be careful not to over feed EDDI for a prolonged period of time.

Treatment:

Almost any antifungal treatment will kill club lamb fungus. This fungus persists because of the thick scab that develops over the lesion. The fungus is actually in the skin. The scab prevents anything from reaching the level of the skin. That is why topical treatments are seldom effective. The most effective strategy we have found is:

1. Purchase strong tincture of Iodine (7-9% I). Lesser concentrations such as Betadine are not effective. Strong tincture of Iodine is available from either your vet supply dealer or from your local drug store. If purchasing from a drug store, you may need to ask the pharmacist. Strong tincture may not be on the shelf, but they often have it behind the counter. Also purchase a small squeeze bottle of baby oil.

2. Pour out 1/4 of the baby oil and replace with the tincture of Iodine. The Iodine separates from the oil, but will stay in suspension when shaken.

3. Treat any suspected club lamb fungus lesion with this mixture. I recommend using latex gloves for your protection and to facilitate rubbing the solution into the scab.

This will kill club lamb fungus. In 3-4 days, you can peel the scab and see bare skin. If the lesion does not respond in this time period, then the lesion is not club lamb fungus.

Many other strategies have been tried with varying degrees of success. I have heard of everything from black liquid shoe polish to Fluid Film (a penetrating oil available from John Deere dealers) are reported to work. You may have a remedy that works, but try to depend on reliable sources in order to avoid actual harm to the animal or exhibitor. I have seen the hide scalded where the "treatment" had dripped and run down the side of the lamb.

Unfortunately, there are other skin infections which might appear similar to club lamb fungus if one is not experienced with the problem. I have witnessed several *staph* and *strep* infections which were misdiagnosed as club lamb fungus. If the above treatment with Iodine and baby oil is not effective, then pursue other avenues. The best recommendation in these cases is to have your veterinarian biopsy the lesion so the infective agent can be identified and sensitivity tests can be determined.

In summary, I can say that we have experienced the full siege of club lamb fungus in Georgia over the past 14 years. I don't envy those families and kids in Virginia and North Carolina who are not aware of the problem. They will eventually be affected. There are only two kinds of market lamb exhibitors -- those who have had club lamb fungus in their sheep and those who are going to get it. Without preventive measures, club lamb fungus is inescapable. I strongly encourage you to develop a strategy to deal with club lamb fungus. We, at all costs, want to avoid disqualification from the shows and possible infection of exhibitors and their families.

CURRENT CONCEPTS IN SHEEP PARASITE CONTROL

W. Dee Whittier, DVM, MS, Extension Veterinarian
Virginia-Maryland Regional College of Veterinary Medicine
Virginia Tech, Blacksburg, VA

INTRODUCTION

Internal parasites, or worms, cause economic and production losses to sheep producers where pasture conditions allow the worms to complete their life cycle. Sheep infected with parasites may become ill and even die. Infected sheep don't gain well or loose, weight, become lethargic and may have diarrhea. Sometimes losses occur which are undetected because the signs of parasitism are not obvious. The internal parasites responsible for the greatest losses to sheep in the mid-atlantic area are the ones that infect the abomasum, or true stomach, of the sheep. Every flock in the mid-atlantic area harbors some of these parasites. By far the most important of these is a parasite technically known as Haemonchus contortus, or the barberpole worm. Lung worms are rarely a problem in flocks. Since control programs for Haemonchus usually result in the control of intestinal worms, they will not be considered separately in this discussion.

LIFE CYCLE

An understanding of the Haemonchus life cycle is important to understanding effective control programs. The life cycle of Haemonchus is defined as direct. This means that it does not need any other animals in order to complete its cycle. Adult Haemonchus worms live in the abomasum and lay eggs in huge numbers that are then passed in the manure. Following passage onto the pasture in the manure, they must develop into infective larvae before they are capable of infecting the sheep. The period of time required for the hatching of the egg and development of the larvae is dependent on weather conditions, but it may be as little as five days or as long as several months. Larvae develop and survive best under warm, wet conditions. This explains why parasitism is a much greater problem in moist climates than in dry, arid climates. It also explains the seasonal occurrence of parasitic disease following periods of warm, moist weather.

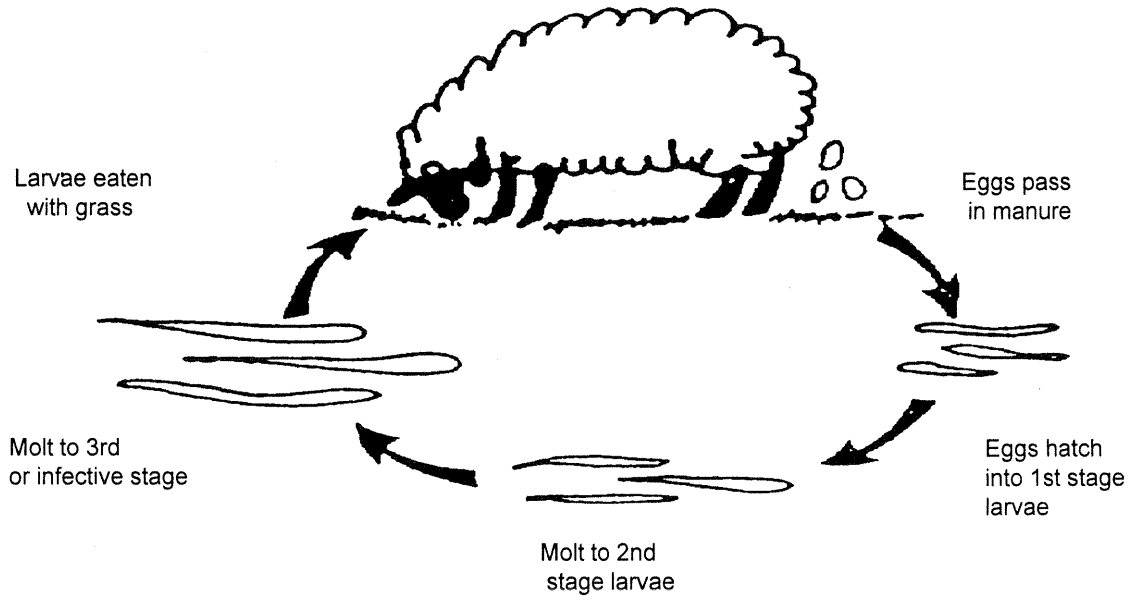
After larvae have developed into the stage where they are infective, they must be eaten by the sheep in order to complete their life-cycle. The larvae have a limited ability to transport themselves from the manure onto the pasture plants. Therefore, continuation of the cycle depends on disintegration of manure during rains, which transports larvae in splashes and small currents to the surrounding grasses. When sheep are forced to graze pastures very closely, the number of larvae ingested usually increases because the concentration of larvae is higher in the lower parts of pasture plants. The fact that sheep naturally tend to graze selected areas of the pasture very closely, even when other pasture is available is one of the characteristics that makes them so susceptible to worms.

Once the larvae are eaten, they must continue the development process before becoming adults and being able to lay eggs. This requires a very specific time period; about 14 days in the case of Haemonchus contortus. For Ostertagia and Trichostrongylus, it takes approximately 21

days of development after being eaten before the mature worm is able to produce eggs. These specific periods of time become important when strategic parasite control programs are initiated.

Figure 1 depicts the cycle of a typical stomach worm.

FIGURE 1. LIFE CYCLE OF THE STOMACH WORM



A factor that has important implications in the parasite life cycle is the discovery that stomach worms have the ability to go through a stage of arrested development (hypobiosis). Hypobiosis means that some of the larvae consumed by the sheep go into a dormant state instead of continuing their development. This allows them to get through periods of adverse climatic conditions for larval development and survival in the environment. This occurs in our area in the winter. These hypobiotic larvae accumulate and may reach large numbers. They may also be protected from some dewormers that are not effective against this stage of the parasite. In the spring or at lambing, a sudden resumption of their development to adult worms may occur and result in an increase in egg shedding onto the pasture and occasional disease signs in the sheep.

The damage caused by the parasite in the sheep is related to two factors. The first way that damage occurs is specific to Haemonchus. Haemonchus is a ravenous blood-sucker and removes considerable quantities of blood from the sheep. Blood loss can rapidly become greater than the animal is able to replace, resulting in anemia (a low blood cell level). Anemia may become so severe that animals are unable to transport adequate oxygen to tissues, resulting in the death of the animal. Secondly, the developing larvae damage the gland cells of the stomach, which produces a disturbance of the digestive process.

SHEEP SUSCEPTIBILITY TO PARASITISM

Sheep, as a group, tend to very susceptible to parasites and their damage. Experts suggest that this is due to a combination of several factors including:

1. Haemonchus is often the major parasite of sheep and its blood sucking characteristic makes it very damaging.

2. The Haemonchus worm is a very prolific egg layer so that worm numbers can build up very rapidly.

3. The short life cycle of the Haemonchus worm allows rapid, even explosive build-ups in worm numbers

4. The small fecal pellets of sheep disintegrate very easily thus releasing the worm larvae onto pastures.

5. The ability and tendency of sheep to graze close to the ground where larvae numbers are higher increases drastically their exposure to parasites.

6. Sheep, different from many other animals, have very little aversion to grazing areas of high fecal contamination.

7. Sheep have a flocking instinct that encourages them to graze close together where worm exposure and pasture contamination becomes greater.

8. The inability of even older sheep to develop immunity that controls the parasite life cycle.

9. Increasingly there is resistance to deworming treatments by the parasites thus making their control more difficult.

SYMPTOMS AND DIAGNOSIS

Stomach worms cause the loss of large quantities of blood and protein, which results in weakness and anemia. Anemia is characterized by paleness of the gums and the linings of the eyelids. When there is a rapid build-up in the number of parasites, sheep may die suddenly due to excessive blood loss, even if they are in good body condition and appear healthy. When the build-up is slower, sheep lose weight, become anemic, and their wool becomes brittle and may fall out. Weak animals may go down, develop pneumonia, and eventually die. A condition known as "bottle jaw" (where fluid accumulates under the skin of the lower jaw) may develop as a symptom of low protein levels.

Diarrhea may or may not occur as a result of parasitism. Diarrhea results from intestinal irritation and from disturbed digestion of food. Infections with Haemonchus very rarely result in diarrhea. The other worm species are more likely to cause diarrhea.

By the time symptoms appear, significant damage has already occurred, and prompt action is necessary to prevent further loss. Many of the symptoms mentioned are also symptoms of other diseases. Therefore, it is wise to consult a veterinarian in order to arrive at an accurate diagnosis. Only after an accurate diagnosis is made can an effective treatment and control program be undertaken.

In general diagnosis of parasitism can be made from clinical signs. Examination of feces for worm eggs may help to understand the entire picture but it must be remembered most normal sheep will shed some parasite eggs in their feces. In addition to the examination of feces for parasite eggs, pasture grass may be examined to determine approximate levels of pasture contamination, and total parasite counts can be obtained from an autopsy.

PARASITE LARVAE NUMBERS ON PASTURES

Research in recent years has increased our understanding of when and why build-ups of parasites occur. An understanding of seasonal changes in pasture larvae numbers is inherent to a successful control program. In the past, parasite larvae were considered to be relatively fragile and able to survive on pastures for only short periods. Recent research indicates that the larvae survive for considerably longer periods of time than once thought. In fact, many larvae survive on pastures through the winter or even longer.

As the lush grass growth of spring proceeds and grazing begins, the over wintered larvae are picked up by grazing animals. The number of over wintered larvae on grass tends to decrease during the spring season due to increased temperature and sunlight, which kill larvae. If sunny, dry conditions prevail, larvae numbers may decline dramatically. Larvae eaten by sheep as they begin the grazing season go through the two-week development and begin to produce eggs. Since one larva can result in an adult that produces thousands and thousands of eggs, a multiplication in parasite numbers occurs. This is particularly true if moist, warm weather conditions are favorable to the development of larvae from eggs.

From mid-summer on, if weather conditions are appropriate, a large number of larvae accumulate on the pasture. This is referred to as the "midsummer explosion" in larval numbers. Depending on weather conditions, these larval numbers may remain high on pastures for the balance of the grazing season. If hot, dry weather conditions prevail, larval numbers will decrease due to the killing effect of drying. Figure 2 is a graph of typical numbers of larvae on the pasture during grazing season.

SHEEP FACTORS

Sheep have the ability to develop some immunity to parasites. As sheep get older, they are less susceptible to the negative effects of parasites. Also, if sheep have been exposed to parasites, they will, to a certain degree, be able to inhibit parasite development and egg laying. However, this resistance is not complete and may break down during times when sheep are challenged with high numbers of infective larvae of Haemonchus. Treatment of mature ewes is, therefore, important in an attempt to prevent infection of young animals. Sheep imported from areas where parasite exposure is considerably lower may have less resistance to parasites than sheep produced locally.

A phenomena called the periparturient (meaning around lambing time) egg rise must also be considered in parasite control programs. Beginning about two weeks before lambing, and continuing up to eight weeks after lambing, the ewe has a reduced ability to deal with worms. This process occurs regardless of when during the year lambing takes place and results in decreased ability to prevent development of incoming larvae, expel worms, and inhibit egg production by parasites already present in the stomach. These parasites produce large numbers of eggs that are shed in the manure. This is evidently a mechanism by which the parasite ensures the infection of the new generation of sheep about to be born. Effective parasite control programs must prevent this contamination of the surroundings into which very susceptible lambs will be born.

PARASITE CONTROL PROGRAMS

Control programs are based on understanding the above-discussed principles. The most effective programs require the use of dewormers to some extent. However, well planned programs will provide for a minimal amount of dewormer usage. This provides a number of benefits, including 1) decreased cost due to less dewormer usage, 2) decreased parasite resistance caused by indiscriminate use of dewormers, and 3) decreased production losses due to parasitism since dewormers are used to prevent rather than treat disease.

Many control programs used in the past, although well intentioned, resulted in the sheep having only a few days without worms before the process of reinfection began. Sheep quickly returned to worm burdens of essentially pretreatment levels. This resulted because the treatment programs did not stop the pasture contamination buildup; and therefore, sheep were dewormed and returned to very heavily contaminated pastures. Effective control programs should, therefore, combine the preventive use of dewormers with appropriate grazing management.

The management on the farm will determine the required intensity of a parasite control program. The two biggest management factors affecting this are stocking density and season of lambing. With low stocking rates, much less control is needed. If lambing and weaning occur such that young lambs are not grazing from midsummer on, then the intensity of the parasite control program may be greatly decreased.

LEVEL OF PASTURE CONTAMINATION

A very useful concept in parasite control involves considering the level of contamination on pastures. Almost never can a pasture be considered to be free of worm larvae but in some cases the number of worms may be low. Pastures that have been harvested for hay, silage, or small grain crops can generally be considered to have low levels of contamination. Pastures that have been grazed by cattle, horses, or other species for a grazing season or longer are considered low because only a small amount of cross-infection between species occurs. Contrary to previous belief, a pasture that has not been grazed for a few weeks can not be considered safe. In fact, a year or more without grazing is required for ungrazed pastures to become safe. Most rotational grazing systems currently practiced do not aid in parasite control and, in fact, usually provide for an increased parasite challenge because sheep densities are higher on pastures!

If a flock is moved to a safe pasture after treatment, it may enjoy several weeks of low worm burdens rather than only two or three days as the result of treatment alone. A safe pasture should not be grazed by infected sheep; they should be treated before being allowed to graze. This treatment serves two purposes: 1) it removes the potentially harmful worm burden in the sheep, and 2) it protects the safe pasture from new contamination.

TREATMENT FOR PARASITES WHEN GRAZING PERMANENT PASTURES

To completely control parasites that are grazing permanent pasture deworming would have to be administered every two weeks. This frequent treatment is both expensive and labor intensive. However, early in the season 2-week treatments may be justified to prevent large pasture build-ups. Dewormers with perisitent activity are marketed for cattle but are not currently approved for sheep. These dewormers stay in the animals' body for days or weeks after treatment and kill incoming larvae different from the approved products that kill only the adult and larval worms that are in the sheep at the time of deworming. The use of products with persistent activity would allow deworming intervals to be extended.

Figures 2-7 are results of trials conducted at the Southwest Agricultural Research and Extension Center in Glade Spring, Virginia on grazing ram and ewe lambs. They were conducted to evaluate the effectiveness of deworming programs using dewormers containing a deworming product called milbimycin which has persistent activity. Two commercial preparations that contain this dewormer are Quest®, a paste horse dewormer and Cydectin®, a pour-on cattle dewormer. When cattle and horses are treated with these products the active ingredient stays in the animal for several weeks after treatment and continues to kill incoming larvae so that the animals stay free of worms for several weeks after treatment. In 1999 lambs were treated at 6-week intervals with these products, applied by the same route and at the same doses as recommended for horses and cattle. In 2000 the Cydectin® was given orally at the same dose as for cattle pour-on and the interval between treatments was extended to 8 weeks. In 2001 the dose for Cydectin was increased to 7.5 ml of Cydectin given orally at 8-week intervals.

Figure2. Fecals worm eggs passed with three deworming strategies in 1999.

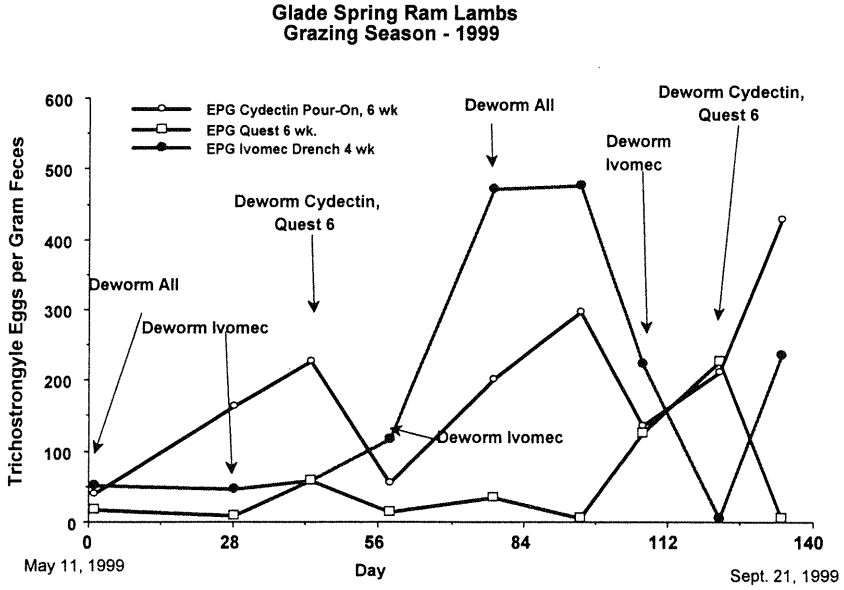


Figure 3. Red blood cell levels in grazing ram lambs with three deworming strategies in 1999.

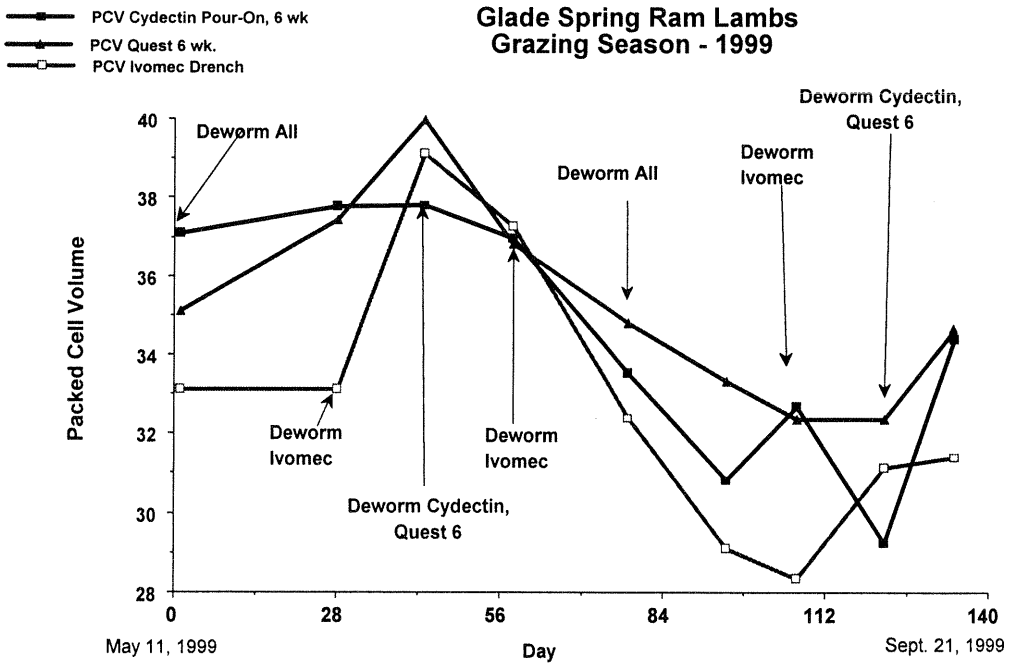


Figure 4. Fecals worm eggs passed with three deworming strategies in 2000.

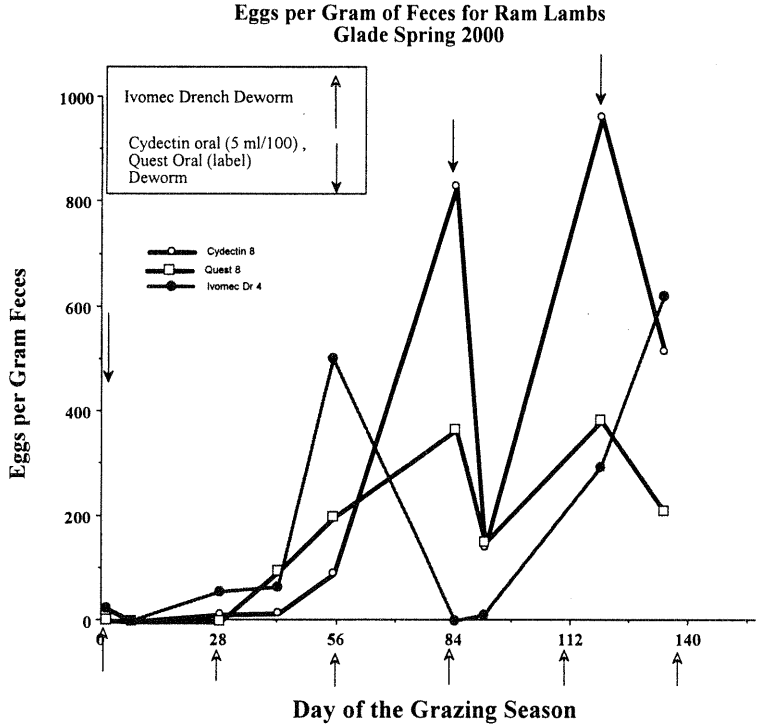


Figure 5. Red blood cell levels in grazing ram lambs with three deworming strategies in 2000.

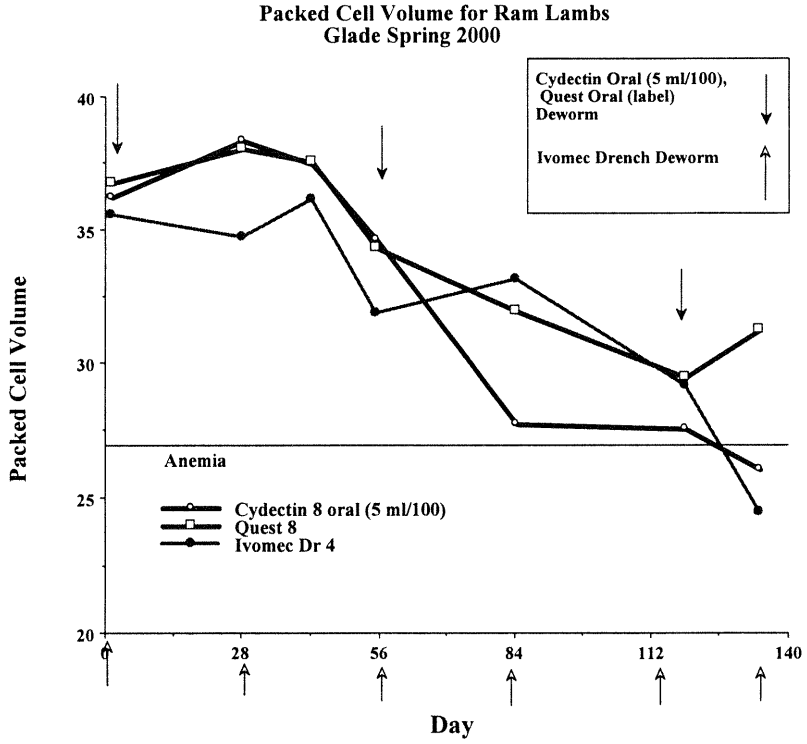


Figure 6. Plasma protein levels in grazing ram lambs with three deworming strategies in 2000.

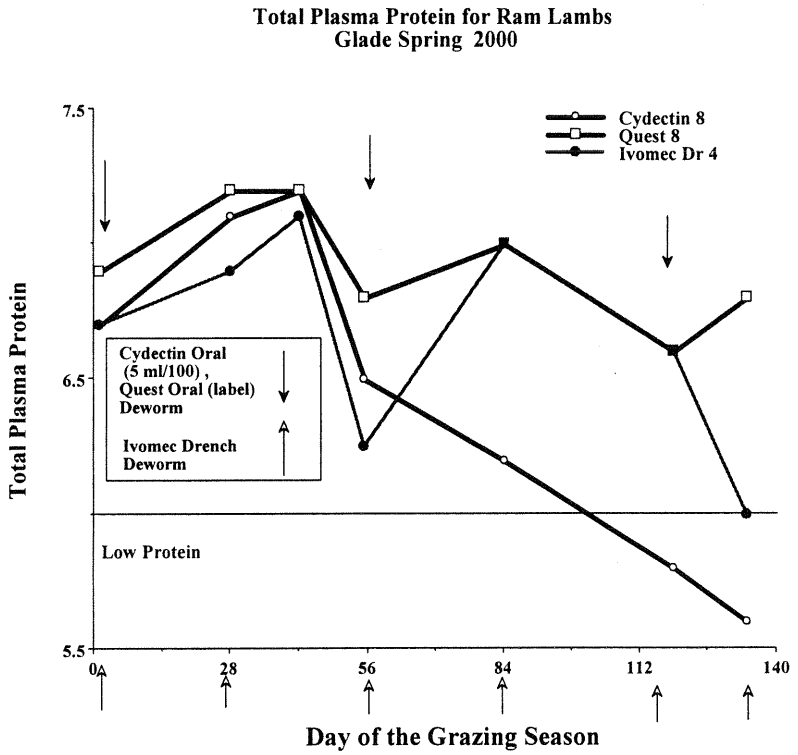
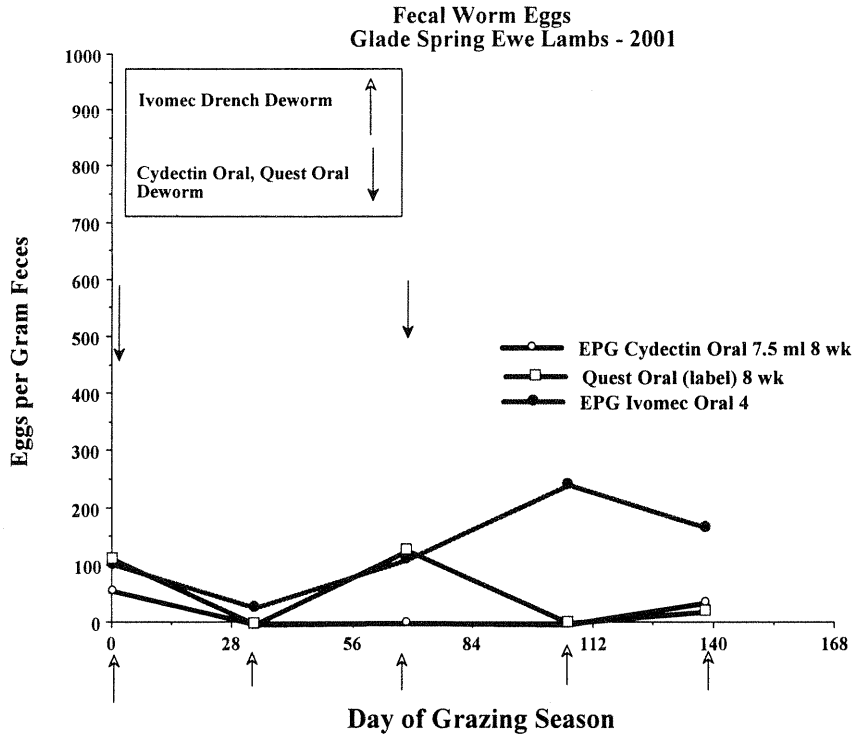


Figure 7. Fecals worm eggs passed with three deworming strategies in 2001.



Programs must be worked out on a per-farm basis that will balance the expense and labor of frequent treatments with the risk of losses due to heavy infections of worms. The ability to put sheep on less infected pastures and decreasing the frequency of deworming during periods when pastures are to dry to support survival of larvae will help reduce the frequency of deworming. In general pastures in Virginia will support the survival of Haemonchus larvae from late April through the beginning of October. Cooler temperatures during the late fall and winter do not support larval development so grazing sheep would not be expected to acquire large parasite loads. Larvae during these months are also more likely to be programmed for hypobiosis so that they do not develop into blood sucking adults during these months.

For treatment programs to be effective, it is essential to include all sheep. Mature ewes, any lambs over a few weeks of age, rams, and replacements must all be dewormed. Leaving a few untreated sheep mixed with sheep on a program may allow for enough parasite build-up over a period of weeks and months to destroy earlier efforts.

An alternative program used by many producers involves monthly treatments throughout the grazing season. This program will probably fail in severe parasite years because of the long interval between treatment allowing reinfection and egg laying by the worms.

Pre-lambing treatment is critical in a parasite control program and should be administered approximately two weeks before ewes lamb, thus preventing the contamination from the periparturient egg rise from occurring. This can conveniently be done when ewes are bagged prior to lambing or coupled with vaccination or crutching procedures. Waiting until lambing has occurred, or until ewes are turned out of the lambing barn with their lambs, results in considerable contamination of the environment prior to the treatment. If prelambing deworming

is not possible, ewes can be dewormed at lambing and moved to safe pastures. It is important that animals be treated with a dewormer that is effective against hypobiotic larvae. Levamisole and ivermectin are approved products which have that ability. Thiabendazole does not remove hypobiotic larvae at high rates when given at approved dosages.

Sheep kept in dry lots do not pick up larvae from grazing and need only be dewormed when introduced to lots from pastures.

OTHER DEWORMING PROGRAMS

Continuous feeding of a dewormer in the salt or mineral is sometimes used for parasite control. While this provides some parasite control, problems may develop because the dewormers available in these forms are not highly effective against all stages of parasites. Parasitism may, therefore, continue to cause production losses even though severe signs of parasitism are not seen. The low-level feeding of these dewormers also encourages the development of parasites that are resistant to the dewormer; consequently, the effectiveness of these programs decreases with time.

When fall or winter lambing is practiced so that young lambs never graze, less strenuous control programs may be practiced. This is because all grazers have greater age and acquired immunity. Pre-lambing deworming should still be practiced. Remember that young replacements must be grazed separately and given an effective parasite control program. Sheep imported from arid areas will usually be quite susceptible to parasites and require an intensive control program.

DRUGS OF CHOICE

Drug resistance, the situation where parasites survive deworming, represents a major problem for the sheep industry. Several studies have reported resistance in the major parasite species against several drugs. Essentially no drug group exists to which some resistance has not been reported.

Four techniques have been suggested for reducing the development of resistance: 1) Use a full dose of dewormer whenever treatment is done. 2) Reduce dosing frequency by decreasing stocking rates or use of pasture management 3) Treat all new introductions with the best products available and perhaps with a double dose. 4) Avoid alternating dewormers during the grazing season. Alternating dewormers between seasons may be advisable.

Table 1 contains a list of dewormer products approved for use in sheep. The table provides information concerning trade names, manufacturers, dosage forms, and effectiveness of dewormers against the various important sheep parasites.

Table 1. Dewormer Products Approved for Sheep

Table 1 . Deworming products approved for use in sheep			
Generic Names	Levamisole	Ivermectin	Albendazole
Trade Names	Levasole, Tramisol, Prohibit	Ivomec Sheep Drench	Valbazen
Manufacturer	Schering-Plough, AgriLabs	Merial	Pfizer
Dosage Forms	Drench, bolus	Drench (injectable not FDA approved)	Drench
Parasites	**Control**	**Control**	**Control**
Haemonchus *Adults* *Young (immature)*	 all most	 all all	 all all
Ostertagia *Adults* *Young (immature)*	 all some	 all all	 all all
T. Colubri formis *Adults* *Young (immature)*	 all all	 all all	 all all
Lung worms	all	all	all
Tapeworms	none	none	all
Comments	Some documented resistance in the U.S.	Effective against nasal bots. Some external parasite control (sucking, lice, ticks, keds)	Resistance may be a problem due to relationship to long-used thiabendazole

TAPEWORMS

The tapeworm of sheep (Moniezia) lives in the small intestine and is transmitted to sheep by a small non-parasite mite that lives on pasture. Sheep are infected when they ingest the infected mites on grass. Although tapeworms are often accused of causing weight loss and/or diarrhea, they rarely cause much damage. The effective drug is albendazole

SUMMARY

Internal parasites continue to be a threat to sheep health and productivity. Increased understanding of the role and actions of internal parasites provides the basis for control programs with considerable increases in effectiveness. Treatment programs should be based on the seasonal infectivity level of pastures. Preventive or move-and-dose systems, along with other management procedures, will allow for decreased use of dewormers and result in less loss from parasitism. The emphasis for these programs is on prevention rather than treatment. The two-week maturation period of Haemonchus after ingestion, the development of hypobiotic larvae, and the periparturient egg rise must all be considered in the implementation of effective parasite control programs.

CONTROL OF ABORTION AND RINGWOMB IN EWES

Kevin D. Pelzer, DVM, MPVM
Virginia-Maryland Regional College of Veterinary Medicine

ABORTION: expulsion of fetus before the normal end of pregnancy
lambs may be dead or born alive (premature)

What to do when abortions occur:

1. Assume that abortion is infectious in nature
2. Isolate aborted ewes, identify
3. Remove aborted lambs and after births, either bury or burn
4. Remove bedding, apply lime to contaminated area
5. Wear rubber or plastic gloves -- Wash hands thoroughly
6. Contact health professional
7. Place the fetus and membranes in a plastic bag and send to lab immediately

Discovery of cause:

1. Over 50% of the samples sent to lab yield no results
2. Samples contaminated with bedding
3. Decomposition
4. Insufficient material submitted - need to submit placenta and fetus
5. Wrong samples submitted
6. Abortion caused by something other than the infectious agent screened for.

What to collect for the veterinarian:

1. Management practices, feeding practices, housing, pre-lambing procedures
2. Source of female replacements
3. History of previous abortions, lambings, and lambing percentages
4. Vaccination history
5. Prediction of start and end of the lambing season
6. Stage of pregnancy when abortion occurred
7. Health status of ewes

What to send to the lab:

1. Fetus and placenta
   - submit the whole thing
   - keep chilled but do **not** freeze
   - submit in a leak proof container
   - submit as quickly as possible

2. Serum from ewes
   - collect a blood sample from all aborting ewes and a sample of still pregnant ewes.
   - Collect sample and then rebleed about 3 weeks later.
   - Separate blood clot from serum and freeze serum
   - Submit the two samples together

   Blood from ewes
   - collect in a purple top tube (EDTA)
   - Selenium levels and virus isolation

3. If you can't submit the whole fetus immediately
   Collect the following and chill
   - fluid from the chest cavity – sterile syringe and needle
   - fluid from the stomach
   - cotyledons – buttons on the afterbirth

   Collect the following in 10% formalin
   - liver, lung, kidney, stomach, small intestine, lymph nodes, spleen, adrenal glands, cotyledon and brain

4. South Dakota State University
   Department of Veterinary Science
   Animal Disease Research and Diagnostic Lab
   North Campus Drive
   PO Box 2175
   Brookings South Dakota 57007 – 1396
   605-688-6003

RINGWOMB

Definition: failure of the cervix to dilate at parturition.

Cause:

a) failure of secretions of hormones that control labor
b) failure of tissue response to hormonal secretions

Epidemiology:

a) Highest occurrence is during the last 2 weeks of February
b) Usually observed in multiparous ewes carrying multiple fetuses, majority of cases occur in ewes 2 years of age or older
c) Usually occurs at the expected lambing date or the ewes are up to 2 weeks past the expected lambing date.

Clinical presentation:

a) No noticeable swelling of the vulva or loosening of the pelvic ligaments.

b) Early signs: labored breathing while lying down and abnormally large amounts of thick, clear, vaginal mucus discharge during the last 3 weeks of gestation.
c) Usually do not show signs of first stage labor.
   - Do not seek isolation from the rest of the flock.
   - Continue to eat.
d) Udder development is slow but normal.
e) Appearance of fetal membranes without signs of labor
   - although may see straining in some cases
f) Vaginal exam findings: undilated cervix, can insert 1 or 2 fingers through the cervix into the uterus.
   If left alone for several hours, no change occurs.
   In nonproductive labor, cervical ring starts to close 2 –3 hours after partial opening.
g) Spontaneous labor will occur after the fetus dies, usually 48 hours after the onset of labor. Fetuses are dead and rotten.
h) Most cases ewe will breed the following season. Consecutive cases of ringwomb usually don't occur.

Treatment:
a) Administer Penicillin
b) C- section
c) If truly ringwomb, dilation of the cervix usually will result in rupture of the cervix/uterus resulting in peritonitis and death.

Causes:
a) Not caused by:
   - malpresentation
   - mineral imbalances or deficiencies
   - premature lambing
   - consumption of estrogenic compounds
   - infectious agents
b) Inherited condition of a recessive gene
   - appears in bloodlines
   - determined by the genotype of the fetus

Prevention:
a) Cull affected ewes
b) Cull females from affected ewes
c) Cull service sire

Related conditions
Early Dilation Syndrome
   - incomplete dilation occurs 7 to 14 days prior to due date
   - ewe has little or no udder development
   - cervix can usually be dilated but lambs are previable
   - occurs in ewe lambs and first lambing 2 year olds

VETERINARY BIOLOGIC AND THERAPEUTIC AGENTS IN SHEEP PRODUCTION

R. Rorrer, K. D. Pelzer, F. Elvinger, S. Greiner
Department of Large Animal Clinical Sciences
VA-MD Regional College of Veterinary Medicine, Blacksburg, VA

At the Shepherds' Symposium last January we introduced the idea of beginning a study to look at pharmaceuticals used in Virginia sheep production. There was an overwhelmingly positive response to the idea and many conference participants were interested in being involved with the study. It has been wonderful working with all of the study participants over the past year. The cooperation all of you have shown has been incredible and I think the results of this study will be useful. Thank you for all of the time and effort you have invested in making this project successful.

Biological and therapeutic agents are used in food animal production to maintain animal health and well being, prevent and treat disease, and to maintain or enhance production. Concerns about the use of pharmaceutical agents in food animal production have been raised, especially in relation to food quality and safety. This study addresses the scarcity of information concerning the quantity of pharmaceuticals being used and the reasons for their use in sheep production. Thirty-nine Virginia sheep producers were chosen to participate in this study of four months duration. After completing an initial questionnaire to determine management practices, participants were asked to record all treatments with biological and therapeutic agents. A total of 14310 treatments were recorded. Parasite control and vaccination were the most frequent reasons for treatment (64.9% and 15.2%, respectively) with vitamin/mineral supplementation being the next most common (8.4%). Preventative therapeutics, such as vaccines, dewormers and nutritional and vitamin/mineral supplements were the most frequently used group of pharmaceuticals, accounting for 92.0% of all treatments performed. Antibiotics accounted for 4.8% and insecticides for 1.1% of the remaining treatments. Miscellaneous products such as anti-inflammatories, hormones and electrolytes accounted for the remaining 2.1% of treatments. The results of this study will enhance the ability of producers to make treatment decisions, allow comparisons to be made between operations and provide a base of information for future research

SHEPHERD'S SUPPLY INVENTORY
Dr. Dee Whittier
VA-MD Regional College of Vet. Med.

Equipment
Clean towels _____
OB sleeves _____
Placenta Cup/Dipper _____
Stomach tube:
Stallion catheter adapted to 60cc syringe _____
Esophogeal Feeder _____
Thermometer _____
Ear Tags & Tagger _____
After Birth Bucket _____
Barn Trash Can _____
Vaginal retainer _____
Warming Box/ tub – hair dryer _____
Milk Supplement Feeder w/ Nipples _____
Heat lamps _____
Scissors _____
Wound Clips (for inverted Eyelids) _____
Docking Castrating tool _____
Elastrator _____

Injectables
C & D – Tetanus _____
Oxytocin _____
BoSe _____
Vitamin B Complex _____
Vitamin A & D _____
Antibiotics:
LA200_____
Penicillin _____
Nuflor _____
Epinephrine _____
Covexin 8 _____
Tetanus Antitoxin___

Supplies
Syringes:
Tuberculin _____
6 cc_____
12 cc _____
Needles
18 ga._____
20 ga - 1½"_____
20 ga – 1" _____

Propylene Glycol _____
Tincture of Iodine _____
Alcohol _____
Cow, Goat & Ewe Colostrum _____
Mineral Oil _____
Paper Towels _____
Dextrose _____
Calcium Gluconate _____
Pepto Bismol, Kaopectate _____
Lamb Milk replacer _____
Anthelmintic – Ivomec drench _____
Wound dressing _____
Blood stopper _____
Screw Worm spray _____
Ophthalmic Ointment _____
Electrolytes _____

Alternative Feeds for Sheep

Mark L. Wahlberg
Extension Animal Scientist, Virginia Tech

Prepared for Virginia-North Carolina Shepherds' Symposium
January 5, 2002

Introduction There is an abundance of different feedstuffs that can be included in rations for sheep. But there is nothing special about particular ingredients. Rather, the nutrients they provide are what matters. In addition, the cost of the nutrition provided is another important factor. We will first look at the important factors related to animal nutrition, then look at various feeds that can provide that nutrition, and finally discuss the economic aspect of those feeds.

Nutrients for Animal Nutrition. Although some people have long lists of what they call essential nutrients, we will shorten that list considerably for this discussion. Energy is certainly a critical nutrient, and can be measured in various ways. These include Digestible Energy, Metabolizable Energy, Net Energy (subdivided into use for Maintenance, Gain, and Lactation), MegaJoules, Therms, and Total Digestible Nutrients. All of these are just different units for measuring energy, just like Centigrade and Fahrenheit are different ways of measuring temperature. For this paper we will use the last one, Total Digestible Nutrients (abbreviated TDN) as the units of measure for feed energy.

Another important feed value is protein. We can make this real complicated too. There is Crude Protein (also known as Total Protein), Digestible Protein, Metabolizable Protein, Rumen Degradable Protein, Soluble Protein, Bypass Protein, Undegraded Intake Protein, Preformed Protein, and NonProtein Nitrogen. Although there are places to use the various other measures, we will again keep it simple in this paper and deal with Crude Protein.

Animals cannot use the nutrition in a feed if they don't eat it. Consequently amount of feed consumed is very important. Factors that inhibit the level of voluntary feed intake, or Dry Matter Intake (DMI), are harmful to production. There is no single measure of a feed that tells you how much of a feed will be consumed, but there are characteristics of certain feeds that reduce voluntary intake by animals.

Ruminant animals, such as sheep and cattle, have a requirement for fiber if long-term digestive health and function is to be maintained. Fiber level is high in pasture, hays, silages, and some byproduct feeds, while it is low in most grains. Normally an animal will eat feed until it is full, and fiber is the component of a feed that fills it up, so fiber level relates directly to DMI.

The long list of essential nutrients would include many micronutrients, including both macro and microminerals and also vitamins. While certain feeds may contain deficiencies or imbalances of these nutrients, these can quite easily be overcome with proper supplementation of minerals or vitamins as needed. Consequently, we are not going to dwell on these in this paper. Thus, we are left with energy (TDN), protein (Crude Protein, CP), and intake as the noneconomic factors to be considered.

Feeds and the Nutrition Provided Before any alternative feeds are investigated, let's look at a few common and basic ones, so we have a basis of comparison. First of all, let's use good quality grass hay as a baseline roughage. Leafy, green well-made hay can contain TDN that approaches 60% and CP in the mid teens. This kind of hay is often a grass-legume mix. Grass hay that is more mature, with a lot more stems and seedheads, is in the low to mid 50's on TDN and around 10% CP. Animals eat less of this hay, since it contains a higher fiber content and they fill up faster. Straight alfalfa hay is readily consumed by sheep, and contains high levels of nutrition if it is cut at an earlier stage of growth.

Corn is a readily available concentrate that is the basis of comparison for energy sources. It contains around 90% TDN, and most of the energy comes from starch. Corn is not high in protein, with around 9-10% CP. It's readily available from feed suppliers, is readily consumed by animals, and is modestly priced. For sheep, corn can be fed in whole shelled form, thus saving the producer the cost of grinding or cracking.

Soybean meal, like corn, is readily available and modestly priced. It is the material left after the soybean oil is removed from whole soybeans, the oil being used in human foods and other products. Soybean meal has a TDN level in the mid 80's, but more importantly, it contains from 45 to 50% CP. Thus, just a small amount is needed to overcome a protein deficiency in most sheep feeding situations. It is palatable and readily consumed by animals.

Byproduct Feeds Most all byproduct feeds are what's left over after a food ingredient for human consumption is removed from a commodity. Because of this, the composition of byproducts can be quite different from the whole grain it is derived from. Also, since a component of the grain is removed, all remaining components in the byproduct are more concentrated. Below is a short list of byproduct feeds derived from various whole grains.

Table 1. Common Byproduct Feeds Derived from Food & Fiber Processing

Raw Product	**By-Product Feed**	**Component Removed**
Soybean	Soybean Meal Soy Hulls	Soybean Oil Dehulled Soybean Meal
Wheat	Middlings (Midds) Bran	Flour (starch) Starch & Germ
Barley	Brewers Grains	Starch→Alcohol
Corn	Distillers Grains Gluten Feed Hominy	Starch→Alcohol Starch→Sweeteners Degermed Corn Meal
Cotton	Whole Cottonseed Cottonseed Meal	Cotton Fiber Hulls & Oil
Sugar Beets	Beet Pulp	Sugar & Starch

In most cases the starch component of the raw material is removed. As a result of concentrating the remaining material, most byproduct feeds are higher in fiber, fat, and protein than the raw product from which they originate. Although the rapidly-digested starch is removed from the feed, the fiber is in the form of cellulose, which is highly digestible by ruminants such as cattle and sheep. Consequently, the energy (TDN) content of these feeds is not very different from the TDN of the

whole grain from which these byproducts originate. See Table 2 for some comparative energy and protein values of selected byproduct feeds.

Table 2. Nutrient Value of Selected Byproduct Feeds and Grains

Feed	Dry Matter Percent	TDN Percent (DM)	Crude Protein Percent (DM)
Whole Soybeans	90	85	38
Soybean Meal	90	75	54
Soy Hulls	91	75	14
Ground Wheat	89	86	14
Wheat Midds	89	80	19
Wheat Bran	89	70	17
Ground Barley	88	80	12
Brewers Grains	21 or 92	66	26
Cracked Corn	88	87	10
Distillers Grains	25 or 91	89	29
Corn Gluten Feed	30 or 90	82	28
Hominy	90	92	12
Whole Cottonseed	90	87	22
Cottonseed Meal	92	77	44
Beet Pulp	91	74	10

Limitations on Use of Alternative Feeds The main reason most people use alternative feeds is to save money. We will look at economics later. But there are other factors to consider as well.

Physical Form: Many of these feeds are light and fluffy, including midds, bran, soy hulls, corn gluten feed, and both dry brewers and distillers. Because they are less dense, it takes more space to store the same weight of material. Plus, they can blow around in the wind. Pelleting goes a long way to solving this problem.

Availability: Few of these feeds are available in small quantities. You can't just go to the feed store and buy a couple of hundred pounds. It's frequently at least one ton, and often at least 5 tons at a time. You often must purchase byproduct feeds through a broker. The best prices are obtained when buying in multi-ton quantities. Networks of producers may join together to receive and share a truckload of feed to reap the benefits of reduced cost. Some feed mills around the state are handling certain of these byproducts, so ask around for availability, minimum quantity, and price.

Storage and Handling : Coupled with the quantity issue is the aspect of storing these feeds. They don't normally come in bags. Large farms use a "commodity shed", which is a pole barn with a high roof that can accommodate dump trucks to deliver their feeds. They use a front end loader to handle the feeds. Grain bins can be used to store and deliver some feeds, as long as they flow through the bin successfully. Some feeds, such as whole cottonseed, don't flow well, and thus should not be stored in such gravity-flow bins. In all cases, dry feeds need to be kept dry. This can be especially difficult during the summer due to high humidity and nighttime condensation.

Limits on Amount to Feed: Some feeds have unique characteristics that mean producers must limit the amount fed. The high fat content of whole soybeans or whole cottonseed results in a limit of ½ pound per head per day for lambs and not more than 1 pound per head per day for mature ewes. Many feeds have an imbalance of minerals, resulting in much more Phosphorous than Calcium. Because the animal requires more Calcium than Phosphorous each day, this imbalance must be fixed with proper supplementation. Some alternative feeds may actually be toxic. Although cattle producers can safely feed large amounts, sheep producers should not feed broiler litter because of the high copper levels in this material.

Economics of Alternative Feeds There are several ways to look at the cost effectiveness of alternative feeds. One of the simplest is to compare the cost of nutrition provided by the alternative feed to that of corn and soybean meal. Table 3 provides this information for selected feeds.

Table 3. Economic Value of Alternative Feeds Relative to Corn and Soybean Meal

FEED INGREDIENT	DRY COMPOSITION Energy (TDN%)	Protein (%)	VALUE ($/TON)* Energy and Protein	Energy only	RELATIVE VALUE Energy and Protein	Energy only
Ground shelled corn	87	10	121.14	121.14	1.00	1.00
Soybean meal (48% CP)	81	54	200.00	112.66	1.70	0.92
Hominy feed	92	12	132.62	126.54	1.10	1.05
Ground ear corn	80	9	110.11	112.38	0.91	0.93
Grain screenings	70	14	108.32	97.66	0.89	0.81
Wheat midds	80	19	129.76	112.26	1.07	0.92
Dried-brewer's grains	66	26	127.52	94.84	1.05	0.78
Wet br. grains (21% DM)	66	26	29.11	21.65	0.24	0.18
Dry corn gluten feed	82	28	149.84	116.91	1.24	0.97
Soy hulls	75	14	121.19	112.42	1.00	0.93
Cookie meal	97	10	132.98	135.00	1.10	1.11
Broiler litter	40	22	75.50	49.60	0.62	0.41
Whole cottonseed	87	22	145.35	123.57	1.20	1.02
Ground wheat	86	14	129.07	122.00	1.07	1.01
Ground barley	80	12	118.19	113.46	0.98	0.84
Excellent hay	65	16	100.26	88.86	0.83	0.73
Medium-quality hay	55	10	81.26	74.84	0.67	0.62
Cottonseed meal	77	44	174.91	114.73	1.44	0.95
Peanut hulls	22	8	38.40	31.16	0.32	0.36
Cottonseed hulls	42	4	60.82	62.62	0.50	0.52
Corn silage (35% DM)	68	7	36.25	36.80	0.30	0.30
Corn silage (30% DM)	68	7	31.07	31.55	0.26	0.26
Corn silage (25% DM)	68	7	25.89	26.29	0.21	0.22
Sorghum silage (35% DM)	60	7	32.62	32.48	0.27	0.27
Cotton fiber by-product	50	4	66.24	69.56	0.55	0.57

*Value based on corn at $3.00 per bushel plus $14 per Ton grinding charge (total price of $121 per ton) and on Soybean Meal Priced at $200 per Ton.

From: Alternative Feeds for Beef Cattle, Publication AG-520-4, also Electronic Publication Number DRO-28, from North Carolina Cooperative Extension Service, 1994. Also available on-line at: http://www.ces.ncsu.edu/drought/dro-28.html

The Relative Value allows you to compare the feed of interest to corn at any price. A value of 1.00 means that the feed is equal to corn, while a value of 1.20 means that the feed is worth 1.2 times the price of corn. If you have high quality forages, thus you do not need to feed a protein supplement,

and then energy is the only nutrient of concern. If forages are low in protein, then both protein and energy must be considered in making the economic comparison.

To use the tables, simply multiply the appropriate Relative Value by the price of corn per ton and then compare this value to the price of the alternative feed. For corn at $100 per ton, the relative value of Ground Barley is $98 for both nutrients, but only $84 if energy is the only consideration. If barley can be purchased at less than $84 per ton it is more economical than corn priced at $100 per ton, since it has a relative value of 0.84.

While alternative or byproduct feeds can theoretically provide more economical nutrition, do not overlook the mainstays of corn and soybean meal. Both of these feeds are fairly low-cost sources of nutrition. In addition, they are readily available, easy to feed, and well liked by livestock. It may be smarter for you to look for ways to purchase corn less expensively than to look to substitutes for corn in your feeding program.

Often, the feeds grown locally by farmers are the most economical feeds to use. For example, corn can be purchased less expensively from the grower than from the feed store. It is not necessary to grind or crack corn or barley for sheep. They can very efficiently digest these feeds. Whole soybeans should be ground or cracked, however, especially for lambs.

Feeding Programs Using Alternatives In most cases, the alternative feeds listed in table 2 can be used interchangeably with corn. This means using the same amounts of feed in the same combinations for the same type of sheep. There is an exception for the high fat products, whole soybeans and whole cottonseed, as mentioned above. When feeding the ewe flock, the typical system would start with forage of appropriate quality and then grain supplementation as needed. For details of feeding recommendations relative to forage quality, see the VCE Publication entitled "Feeding Sheep", Number 410-853. It is available through Virginia Cooperative Extension offices, or online at
http://www.ext.vt.edu/pubs/sheep/410-853/410-853.html.

Because of the importance of intake, alternative feeds should not be used in lamb creep diets. Young lambs can be quite picky, and highly palatable feeds must be used here. Soybean meal is the preferred protein supplement for a lamb creep diet. Lambs will very efficiently utilize creep feed for body weight gain. Don't cut corners on cost with creep feeds. Use the highly palatable ingredients recommended for lamb creep feeds.

Finishing lambs can consume a lot of feed. Here is a good place to utilize alternative and byproduct feeds. Lambs are susceptible to various diseases when fed high grain finishing diets, such as enterotoxemia, urinary calculi, Polioencephalomalacia, and general rumen upset caused by acidosis. Many of these problems originate from the high starch content of typical finishing diets. Since many of the byproduct feeds have had the starch removed, they can be fed without limitation and with a greater margin of safety. Many producers have successfully finished lambs on rations using large amounts of corn gluten feed, for example. The higher protein content of corn gluten feed results in a savings on protein supplement cost.

Whole soybeans can be utilized in sheep diets effectively. In studies done at Kansas State University, the use of raw soybeans for both ewes and lambs was investigated. Lamb finishing diets were processed through a hammermill and were delivered in a self feeder. In the ewe diets the

soybeans and grain sorghum were fed whole, and the diets were total mixed rations fed daily. See tables 4 and 5 for details.

Table 4. Raw Soybeans for Grow-Finish Lamb Production

	Diets Fed to Grow-Finish Lambs			
Item	A	B	C	D
Alfalfa Hay,%	15	15	15	15
Corn,%	69	62	--	--
Grain Sorghum,%	--	--	75	70
Soybean Meal,%	13	--	7	--
Raw Soybeans,%	--	20	--	12
Limestone,%	2	2	2	2
Salt,%	1	1	1	1
Number of Lambs	76	75	78	77
Initial Wt	41.4	40.9	38.7	40.8
Final Wt	107.2	100.3	102.0	105.1
ADG, lb	0.78	0.67	0.71	0.72
Feed:Gain Ratio	4.33	4.09	4.83	5.12

Vitamin A, D, and Terramycin were added to all diets.

Table 5. Raw Soybeans in Silage-Based Diets for Lactating Ewes

	Diets Fed to Lactating Ewes			
Item	A	B	C	D
Corn Silage, lb	8.0	8.0	8.0	8.0
Alfalfa Hay, lb	1.0	--	--	0.5
Grain sorghum, lb	1.5	1.0	1.5	1.0
Raw Soybeans, lb	--	1.0	0.5	0.5
Dry matter intake, lb	4.61	4.20	4.17	4.19
Cr Protein intake, lb	0.49	0.68	0.53	0.56
TDN intake, lb	3.29	3.27	3.20	3.10
Number of Lambs	34	32	36	35
Birth Wt, lb	11.8	11.6	11.8	12.1
Weaning Wt, lb	44.8	42.9	43.6	44.4
Lamb Adg, lb	0.65	0.62	0.63	0.65
Weaning Age, Days	50.9	50.6	50.5	49.9

The author did not report any economic data. However, enough information is available to be able to calculate comparative economics from local feed prices.

Summary Many byproduct feeds are available for use in sheep feeding programs. While offering useful nutrient content, these feeds are often not readily available, at least not in quantities of less than 1 ton. Networks of producers may be able to join forces to purchase larger quantities of feeds to be shared among the members, thus reaping the economic advantages offered by volume purchases. Not all alternatives to corn and soybean meal are cost effective, and the relative economic value must be considered. Shrewd purchasing of corn and soybean meal may be a more worthwhile use of time than trying to find ways to access alternatives to these readily available feeds.

References and Other Sources of Related Information

Virginia Cooperative Extension Publications

Feeding Sheep, VCE Pub Number 410-853. On-line access at:
http://www.ext.vt.edu/pubs/sheep/410-853/410-853.html

Sheep Management Schedule, VCE Pub Number 410-365. On-line access at:
http://www.ext.vt.edu/pubs/sheep/410-365/410-365.html

Other Sheep information from Virginia Tech available on-line at: http://www.ext.vt.edu/resources/

Publications from other states

Corn Gluten Feed, Composition and Feeding Value for Beef and Dairy Cattle, MF2488, Kansas State University Extension.
http://www.oznet.ksu.edu/library/lvstk2/mf2488.pdf

Soybean Hulls: Composition and Feeding Value for Beef and Dairy Cattle, MF2438, 416K, Kansas State University Extension.
http://www.oznet.ksu.edu/library/lvstk2/mf2438.pdf

Wheat Middlings: Composition, Feeding Values and Storage MF2353, 465K, Kansas State University Extension.
http://www.oznet.ksu.edu/library/lvstk2/mf2353.pdf

Nutritional Composition of Feedstuffs for Beef Cattle L884, 192K, Kansas State University Extension.
http://www.oznet.ksu.edu/library/LVSTK2/L884.PDF

Alternative Feeds for Beef Cattle, Publication AG-520-4, also Electronic Publication Number DRO-28, from North Carolina Cooperative Extension Service, 1994. Also available on-line at:
http://www.ces.ncsu.edu/drought/dro-28.html

Use of Alternative Feeds for Beef Cattle, Leaflet 406 from University of Georgia Extension.
http://www.ces.uga.edu/pubcd/l406-w.htm

Byproduct Feedstuffs for Beef and Dairy Cattle, Pub Number G90-978, University of Nebraska Extension.
http://www.ianr.unl.edu/pubs/beef/g978.htm

Feeding Ewes, North Central Extension Pub 235.
http://www.ianr.unl.edu/pubs/sheep/ec235.htm

Raw Soybeans in the Diets of Sheep, in Pub Number SRL96 from Kansas State University Extension.
http://www.oznet.ksu.edu/library/lvstk2/SRL96.pdf

SHEPHERD'S SUPPLY INVENTORY
Dr. Dee Whittier
VA-MD Regional College of Vet. Med.

Equipment
Clean towels _____
OB sleeves _____
Placenta Cup/Dipper _____
Stomach tube:
Stallion catheter adapted to 60cc syringe _____
Esophogeal Feeder _____
Thermometer _____
Ear Tags & Tagger _____
After Birth Bucket _____
Barn Trash Can _____
Vaginal retainer _____
Warming Box/ tub – hair dryer _____
Milk Supplement Feeder w/ Nipples _____
Heat lamps _____
Scissors _____
Wound Clips (for inverted Eyelids) _____
Docking Castrating tool _____
Elastrator _____

Injectables
C & D – Tetanus _____
Oxytocin _____
BoSe _____
Vitamin B Complex _____
Vitamin A & D _____
Antibiotics:
LA200_____
Penicillin _____
Nuflor _____
Epinephrine _____
Covexin 8 _____
Tetanus Antitoxin___

Supplies
Syringes:
Tuberculin _____
6 cc_____
12 cc _____
Needles
18 ga._____
20 ga - 1½"_____
20 ga – 1" _____

Propylene Glycol _____
Tincture of Iodine _____
Alcohol _____
Cow, Goat & Ewe Colostrum _____
Mineral Oil _____
Paper Towels _____
Dextrose _____
Calcium Gluconate _____
Pepto Bismol, Kaopectate _____
Lamb Milk replacer _____
Anthelmintic – Ivomec drench _____
Wound dressing _____
Blood stopper _____
Screw Worm spray _____
Ophthalmic Ointment _____
Electrolytes _____