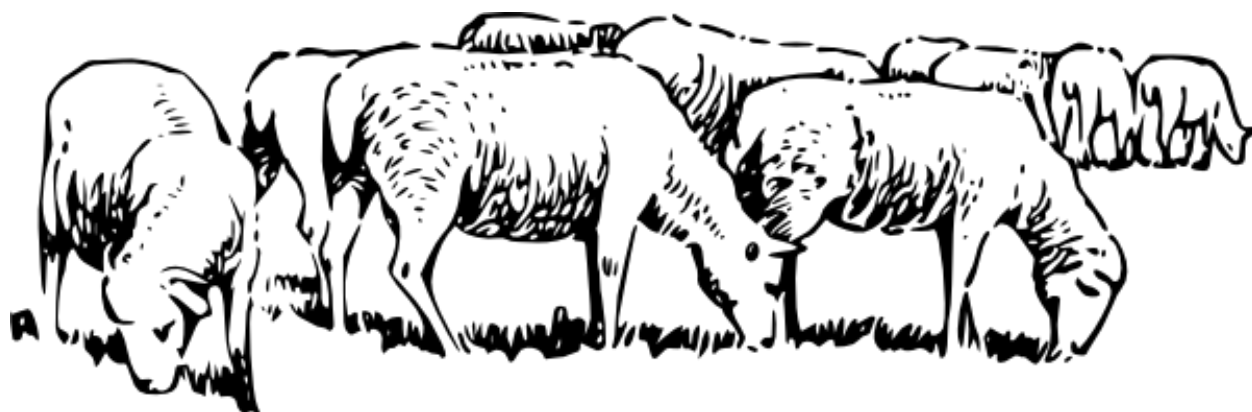


Raising a Small Flock of Sheep



**COLORADO STATE UNIVERSITY
EXTENSION**

Table of Contents

History-----3

Why Sheep-----4

 Advantages

 Disadvantages

Breeds-----5

 Selection-----6

 Culling-----7

Production Records-----8

Financial-----9

 The Investment-----10

Purchasing-----12

Marketing-----13

Management-----14

 Breeding/Gestation-----15

 Lambing-----17

 Reproduction-----20

 Health Management-----21

 Disease and Sickness

 Veterinarians

 Nutrition-----26

Handling and Facilities-----32

Predator Control and Management-----34

Wool Management-----37

Prepared by
JD Sexton
Colorado State University Extension
and
Western Center for Integrated Resource Management

This manual offers production and management information about raising a small flock of sheep for those that are interested in becoming a small flock sheep producer or for those that want to broaden their expertise in the area of sheep production and management.

History

Sheep production has changed drastically over the last six decades; in 1945 the total population of sheep amounted to 56 million head in the United States. On January 1, 2018, the United States Department of Agriculture (USDA) and the National Agriculture Statistics Service (NASS) reported all sheep and lamb inventory to be 5.23 million head in the United States. Historically, the lamb meat industry was developed as a byproduct of the wool industry. Over time, conditions in the wool industry have heavily influenced the direction of the U.S. sheep industry. Demand for wool declined after World War II due to the reduction in use by military service personnel (Jones G. Keithly USDA). Also, with the invention and use of synthetic fibers and the use of other natural fibers wool demand and use dropped dramatically from post World War II. With the decline of wool use in the United States so followed lamb and mutton consumption. In the early 1960's per capita consumption of lamb and mutton was 4.5 pounds. Today, per capita consumption is 1 pound of consumption for the average American consumer.



In the early 20th century sheep production was mainly focused on large sheep flocks in the Western United States. Large bands of sheep were grazed in dry, arid environments due to sheep's ability to thrive in less productive and harsher environments. Wool breed sheep dominated the western landscapes due to their wool quality, survivability and efficiency on high desert ecosystems. Herders moved bands of sheep across the landscape grazing forages to produce wool and protein.

Today, sheep production has shifted to less larger flocks that dominate the numbers and to more smaller flocks of sheep that consist of one hundred head or less. Large sheep operations still exist in the western United States but we have seen an increase in small farm flock production. According to the USDA, the number of sheep operations in 2010 was 81,000. The sheep industry, like the rest of the livestock industry is dominated by a few large operations with a majority of the animals. However, the proportion of small farmers with sheep operations is on the rise. In 1974, 77 percent of all farms owned fewer than 100 head of sheep. By 1997, 85 percent of all farms owned fewer than 100 head of sheep (Jones G. Keithly USDA). This still holds true today as most operations in the United States raise fewer than 100 head of sheep (USDA 2018).

Despite the large decreases in inventory over the past 25 years, there are reasons to be optimistic about the future of the sheep industry. Even though sheep numbers have shown a general decline during the past two decades, in recent years the declines have been less drastic and there have even been some periods of growth. Sheep are ideal for operations with small acreages and new or beginning farmers or ranchers. Growth of the industry will rely on these smaller operations growing and continuing to introduce more people to the industry while at the same time tapping into local niche markets for lamb and mutton, wool, and dairy products (USDA 2018). Over the last couple of years, the sheep industry has seen an increase in lamb and mutton prices as well as for high quality wool.

Why Sheep

There are many reasons to raise sheep and the reason you raise sheep is important, as your reason will have a significant impact on the breed(s) that you raise and the manner in which you manage, feed and market your sheep and the products they produce. Sheep are generally easy to handle and require less inputs and infrastructure. Sheep can offer three different sources of income (meat, wool, and milk). Wool and milk products can be turned into many different products that can have an economic benefit to your operation. Also, the initial start up costs into sheep production is much less than other livestock enterprises. Sheep are among the most efficient of all domesticated livestock and can adapt to the most extreme environmental conditions. Sheep are also very good at consuming a variance of feedstuffs such as crop residue, forbs, grass, brush and weeds. Sheep are a great natural weed control and can consume certain weeds that are otherwise detrimental to other ruminant animals. Sheep have been described as the “original greens keepers” that are highly eco friendly to the environments they are raised and grazed in.

Traditionally, sheep have been raised on farms and ranches for the purpose of generating an income for a farm and family. While some farms make a majority of their income from raising sheep, sheep production is very often a secondary enterprise on a farm. It is a popular enterprise for many part-time and lifestyle farmers as well as for 4-H and FFA youth. Some people keep sheep to improve or maintain their landscapes. Due to their small size, upland grazing



preferences, and desire for a varied diet, sheep are ideal for vegetation control, especially where the primary vegetation is grass and forbs. Their small hooves minimize soil compaction and erosion. They shy away from fragile riparian areas and are great as multi specie grazing management tool to get the most out of an ecosystem and efficiently grazing landscapes.

In the last couple of years the United States has seen an increase in ethnic groups moving into the country. This increase has boosted the sheep industry as these ethnic groups prefer to eat lamb and mutton as it is their preferred and normal diet. In 1900, roughly one in eight people in the United States were a race other than White. That figure began to rise in 1970. By 1990, nearly one in five people were a race other than White and over the next decade, that proportion continued to rise to one in four people.⁸ In coming decades, the racial composition of the population is projected to change even further, so one in three Americans—32 percent of the population—is projected to be a race other than White by 2060 (U.S. Census Bureau 2018).

There are some disadvantages to raising and producing sheep. The main disadvantage to raising sheep is their increased chance to be subject to predation. Sheep are quite venerable and have many natural predators such as Coyotes, Wolves, Bear, Bobcats, Mountain Lion, Eagles and domestic dogs. Sheep operations must be very well managed due to the risk of predation, increased time and effort will have to be put forth in the management of predators to a flock of sheep. Livestock guardian dogs or other animal defense species such as Lamas or Donkeys may

have to be used and managed within the operation to protect the flock. Sheep are more prone to sickness and disease and a good understanding of sheep or a proper Vet Client Patient Relationship will have to be established for success in sheep production. Sheep also require more fencing compared to cattle and horses. Four strand barbed wire fences will not hold sheep in pastures and also allows predators' easy access to the flock. Woven wire and electric fence are needed to corral sheep and to protect them which are increased costs for the beginning or new producer. Wool is a valuable commodity that sheep produce; however, it is getting harder to find people that will shear sheep in the United States. Not only are you not able to harvest the wool, but wool left on sheep too long can result in heat and reproductive problems. Also, wool left on sheep too long begins to lose its quality and increases the chance for parasites.

Breeds

According to some estimates, there are more than 1,000 breeds of sheep worldwide. Sheep were the first animal to be domesticated and can be found on every continent worldwide. The American Sheep Industry (ASI) recognizes 60 breeds of sheep in the United States. New breeds of sheep are being introduced to the US consistently through imported semen, however only a handful of breeds are of economic importance to the commercial industry. Many niche breeds of sheep are being raised for their different attributes of meat, wool and milk quality. Over the last decade we have seen an increase in hair sheep in the United States. While it is estimated that hair sheep comprise only 10 percent of the world's sheep population, their numbers are growing, especially in temperate climates like the United States. In 2011, 21.7 percent of US sheep operations owned hair sheep, compared to only 4.6 percent in 2001 and 1 percent in 1996 (Sheep201). Pictures and descriptions of more than two hundred sheep breeds can be found at <http://afs.okstate.edu/breeds/sheep/>.



Deciding which breed to raise in your operation is an important decision that each shepherd must make. The most appropriate breed will depend upon the environment they will be raised in, management intensity and products you plan to produce with your flock. Breeds of sheep are generally classified as Wool Breeds, Meat Breeds, Dual Purpose Breeds and Hair Breeds.

There are many wool breeds of sheep and wool breeds can be broken down to fine wools and medium wools. Some of the more common fine wool breeds are Rambouillet, Merino and Debouillet. Fine wool breeds are known for their extremely fine wool grades and uniform fleeces. The fine wool breeds wool is known to produce luxury clothing garments. Fine wool is very comfortable against human skin and can be worn to stay very warm. Popular medium wool breeds consist of Columbia, Targhee, and Corridale amongst others. These breeds wool is not as fine and as consistent as the fine wool breeds, but still produce a quality fleece. All wool breeds will be white faced sheep that are known for their wool quality, reproductive performance and hardiness.



Meat breeds consist of Suffolk, Hampshire, Southdown and Shropshire. These breeds are known to be black faced and for their meat quality and growth traits. These breeds are commonly crossed with wool breed sheep to produce market lambs. Wool from the black face breeds lacks the fineness and length of staple and is commonly used in products such as rugs and drapery.



Dual purpose breeds consist of breeds that are known for both their meat and wool quality. The most common dual purpose breed is the Dorset. It is a white faced sheep that has finer wool than that of the meat breeds and better meat quality than that of the wool breeds.



Finally, hair breeds are sheep that do not have to be sheared or shed their fleeces naturally. In the United States there has been an increase in hair sheep numbers to factors such as lack of profitability in the wool market, lack of sheep shearers, and their ability to flourish in hot dry climates. Hair Sheep are considered easy to care for and do not have to be sheared and have a higher tolerance to parasites.

Breed Images Source: OSU Sheep Breeds

Selection

The most important step in deciding what breed of sheep you should raise is to understand your environment and what products you want to produce from your flock. After you have decided what purpose and breed you are going to raise, selection is the next step to success within your flock. Selection is the most important step in designing a program for your flock. Your selection goal should provide a clear picture of what your herd, production and marketing goals within your operation are. There are many different selection criteria and emphasis on certain traits will be dictated by your operation and the management it is under. Heritability of traits in sheep is shown in Table 1. Researchers have estimated the heritability (the ability to "pass on" traits to offspring) of the economically important traits (table 1). Generally, if the heritability estimate is less than 20 percent, progress is slow. A heritability estimate of 20 to 40 percent is considered medium. A heritability estimate greater than 40 percent is high (NMSU Sheep Production and Management).

Improvement of your herd will be dictated on the measurement of the trait, records kept in the operation, variation of the traits, and the heritability. Each operations selection criteria will be different as the focus and production of the operations will vary. The type of sheep operation you are a going to operate will dictate what traits you will focus on. Traits such as carcass or wool will be focused on but a good shepherd will keep reproductive and fertility traits in mind at all times as these are the traits that will dictate success in every operation. However, it is important to

Selection Criteria:

- Reproductive
- Fertility
- Carcass and Growth
- Fleece
- Dairy
- Structure

keep in mind that management and environmental factors will dictate and influence all of these selection traits. Nutrition and environment are the two biggest factors that can affect all of these traits success. If sheep are not kept in proper body condition or are environmentally stressed, these traits will be dramatically influenced in a negative way.

Crossbreeding is a common practice in the commercial sheep industry to achieve maximum production of offspring. Heterosis or hybrid vigor allows for superiority in desired traits. Heterosis is the difference in performance or breed complementarity between the crossbred and the average performance of its purebred parents.

Economically important traits are going to depend on the individual operation. However, selection for economically important traits is key to genetic improvement and long term success to an operation and its bottom line. The more highly heritable a trait is will have a greater affect on economics and the quality of genetics your flock possesses. For example, if we look at Table 1, we can see that fleece traits are relatively high in heritability, so a producer can select certain fleece traits and expect greater genetic results than compared to some of the reproductive traits.

Culling

Unfortunately culling or eliminating sheep from the herd that are not producing is a practice that each shepherd needs to perform. It can be difficult, particularly in smaller flocks where the sheep almost become part

Heritabilities of Various Sheep Traits

Traits	Percentage
Reproductive	
Ewe Fertility	5
Prolificacy b	10
Scrotal Circumference	35
Age at Puberty	25
Lamb Survival c	5
Ewe Productivity d	20
Growth	
Birth weight	15
60 day wt.	10
90 day wt.	15
120 day wt.	20
240 day wt.	40
Preweaning gain	15
Postweaning gain	25
Carcass	
Carcass wt.	35
Weight of trimmed retail cuts	45
Percent trimmed retail cuts	40
Loin eye area	35
12th rib fat	30
Dressing percentage	10
Fleece	
Greased fleece wt.	35
Clean fleece wt.	25
Yield (%)	40
Staple Length	55
Fiber diameter	45
Crimp	45
Color	45
Dairy	
Milk yield	30
Fat %	30
Protein %	30
Fat yield	35
Protein yield	45

a May increase to 10% in ewe lambs, in ewes lambing in the fall and in ewes lambing in the spring in flocks with low fertility

b Lambs born per ewe lambing

c May increase to 10% in flocks with low lamb survival

d Pounds of lamb weaned per ewe exposed

Table from Sheep Production Handbook; pg. 55, 2015 edition
volume 8

of the family. But, we need to keep production and costs in mind. If a sheep is not performing than it is costing you money. Common culling reasons are poor reproductive performance, health, structure, disposition, udders, age, dystocia issues, fertility, and fleece quality. Culling practices in the ewe flock need to happen annually. Proper records of individual ewes performance will assist you in making those tough decisions. If a ewe is only producing milk from half of her utter, she needs to be culled. If a ewes lambs are not growing compared to their counter parts every year she needs to be culled. Culling will allow you to keep the best genetics in your flock and by holding on to ewes that are not performing is only hurting the genetic progress and your bottom line. Same holds true for rams, if fertility is an issue for a ram, he needs to be culled. Also, sometimes rams become very aggressive and a safety hazard, if this happens they need to be culled. Structural correctness is also a big culling issue. If a sheep is constantly dealing with structural issues they need to be culled. Age is a major factor as well, with age, performance sometimes reduces, resulting in poorer performing lambs, never being able to maintain weight and higher risk to disease and sickness. With the proper culling practices, the genetics and performance of your flock will increase and allow those economically important traits flourish.

Production Records

The goal of every shepherd should be to increase production and stay sustainable along the way. Without proper production records a manager cannot monitor or track the production or the sheep flock. Not only will proper records allow you track production, but they will also assist you in selection, flock health, fleece quality and yield, reproductive performance and culling. All sheep need to be permanently identified through ear tags. All production dates also need to be documented such as breeding, birth, weaning and shearing. All performance records such as birth weights, weaning weights, 90 day and 120 day weight, and fleece yield and quality will allow you to compare genetics and to see how the flocks' offspring are performing as well as individual ewes and rams. Production records are a producers best tool to advance the flock genetically as well as have proper documentation of flock health and performance. Production records are must within any operation and will pay off in the end to allow the flock to flourish.

It is also important for every sheep producer to know they need to register their flock with the USDA's National Scrapie Irradiation Program. Scrapie is a transmissible spongiform encephalopathy (TSE) affecting sheep and goats. The presence of classical scrapie in the U.S. sheep and goat population affects industry economically through production losses, lost exports, and increased production and disposal costs. Public health concerns related to the transmission of bovine spongiform encephalopathy (BSE) to humans have resulted in efforts to eradicate all TSEs in food-producing animals.

Surveillance for scrapie in the United States is conducted through the National Scrapie Eradication Program (NSEP), a cooperative State-Federal-industry program. The surveillance components of the NSEP include:

1. Regulatory Scrapie Slaughter Surveillance (RSSS);
2. Non-slaughter surveillance (e.g., trace investigations, on-farm testing); and
3. The Scrapie Free Flock Certification Program (SFCP).

United States Department of Agriculture Animal and Plant Health Inspection Service

The program’s goals are to eradicate classical scrapie from the United States and to meet World Organization for Animal Health (OIE) criteria for disease freedom. Since 2002, the prevalence of scrapie has decreased significantly through existing eradication efforts, largely a result of effective slaughter surveillance.

With this program you will be required to put a scapie ear tag with your flock identification number in every intact male and female sheep you own. Sheep that you purchase from other operations will be given an ear tag and id number from that operation. It is unlawful to remove a scrapie tag from any sheep and the sheep will carry this tag for its entire life.

Example of performance records.

Date lambled	Sire	Dam	Sex of lamb	Birth type	Birth weights	Lamb ID’s	Comments
1/10/18	Suffolk	101	R/R	TW	7.5,6.5	1801,1802	
1/11/18	Suffolk	110	E	S	8.5	1803	
1/12/18	Dorset	201	E/E/R	TR	5.0,5.5,4.5	1804,1805,1806	
1/12/18	Suffolk	108	E/E	TW	8.0,7.0	1807	
1/13/18	Dorset	202	E/R	TW	7.0,9.0	1808	
1/13/18	Suffolk	107	R/R	TW	10.0,5.0	1809,1810	
1/13/18	Suffolk	103	R	S	12.0	1811	Backwards
1/14/18	Dorset	203	R/R/R	TR	5.0,6.0,5.5	1812,1813,1814	

Example of individual ewe records.

Ewe ID	101	Scrapie ID	22	Breed	Suffolk				
Date of birth	1/15/15	Sire	123	Dam	321				
Type of birth	2 - 2	Birth weight	7.0	Weaning weight	80.0				
Date lambled	Sire	Sex of lambs	Birth weight	Type of birth	Type of rearing	Lamb ID	Date weaned	Weaning weight	Comments
1/1/16	456	E	8.0	S	S	1601	4/1/16	82	
1/10/17	456	R,E	7.0,7.5	TW	TW	1701,1702	4/15/17	72,79	
1/10/18	654	R,R	7.5,8.0	TW	TW	1801,1802	4/10/18	80,83.	

The Investment

Now that you have decided on a breed of sheep and what their purpose is going to be, you now have to make the investment. You might already have a small flock in place and are want to

grow, or you may be starting with nothing and need to make the initial investment to begin your sheep enterprise.

Either way you are growing to want to see if your sheep enterprise is going to cash flow and be profitable. If you are investing your own money or loaning funds from a bank you are going to want to get some simple financial forms together such as an enterprise budget, cash flow statement, and balance sheet.

The best way to estimate the profitability of a sheep enterprise is to do an enterprise budget. An enterprise budget is a simple listing of income and expenses based on assumptions of your enterprise. They are useful for performing breakeven analyses and can be used to select the best type of enterprise or a mix of enterprises for your operation. Examples of this would be doing an enterprise budget for meat and wool, or wool and milk.

By performing an enterprise budget you will see if your sheep enterprise will be profitable or if you will have to expand or decrease your production focus. Many small flocks are not expected to be profitable; however, if it does not create some profit, longevity of the flock may not occur. The ewe herd should be expected to sustain its self even if it is not the primary income of the owners. Profit from your sheep flock will allow you to purchase superior genetics and increase the production of the herd. A sheep flock's biggest expense is feed costs and loss to predators. By performing different enterprise budgets and setting up different scenarios for feed and other costs as well as other income sources, you may just find that your sheep flock can make a substantial profit or may never work. It is better for the enterprise budget to tell you whether its going to work or not before you make the investment.

The biggest expense for most sheep operations is feed costs, which has the largest effect on profitability. Each operation is going to vary depending on location and feed resources available. Due to drought conditions in much of the western United States over the last couple of years, the industry has seen hay and grain prices increase. An advantage to raising sheep is they are very good at adapting to different feed sources and can be very productive on forages and feeds that other livestock are not. Work with area producers and your local Extension Office to find cheaper sources of feed.

Colorado State University Agriculture Business Management is a great resource to help assist you with the financial and business side of your business. The Agriculture and Business Management Economists are dedicated to providing extension/outreach information including:

- principles and concepts of production economics
- financing methods and analysis
- investment analysis
- legal regulations on business activities
- concepts of marketing and price determination
- issues related to estate planning

Colorado State University Agriculture
Business Management and Economics
www.wr.colostate.edu/ABM/

Example Enterprise Budget for 100 ewe enterprise

FLOCK INFO		PRODUCTION EXPECTATIONS				
Number of ewes	100	Percent lamb crop raised			180%	
Number of rams	4	Ewe replacement rate			20%	
Adult death loss	3%	Ram replacement rate			25%	
INCOME						
	No. hd	lbs/hd	Price	Unit	Total	Per ewe
Market lambs	180	90	1.85	lb	\$29,970	\$299.70
Cull ewes	12	170	\$0.75	lb	\$1,530	\$15.30
Cull rams	1	200	\$0.40	lb.	\$80	\$0.80
Wool	104	8	\$0.90	lb.	\$749	\$7.49
TOTAL INCOME					\$32,329	\$323.29
OPERATING COSTS						
	No. hd	Amt/hd	Unit	Cost	Total	Per ewe
Feed costs						
Hay	104	0.4	ton	\$110.00	\$4,576	\$45.76
Grain	104	100	lb	\$0.20	\$2,080	\$20.80
Salt and minerals	104	15	lb.	\$0.52	\$811	\$8.11
Feed for lambs	180	100	lb.	\$0.18	\$3,240	\$28.80
Pasture Lease	284	20 ac./3 months	head	\$0.25	\$8,520	\$85.20
Deworming	104	1	dose	\$0.65	\$68	\$0.68
Deworming (lambs)	180	2	dose	\$0.55	\$198	\$1.98
Vaccinations (adults)	104	1	dose	\$0.50	\$52	\$0.52
Vaccinations (lambs)	180	2	dose	\$0.50	\$180	\$1.80
Other vet costs	104		head	\$2.50	\$260	\$5.15
Shearing	104		head	\$4.50	\$468	\$4.68
Ram replacement	1		head	\$500	\$500	\$5.00
Bedding	104		head	\$3.00	\$312	\$3.12
Supplies	104		head	\$2.50	\$260	\$2.60
Hauling	162		head	\$4.50	\$729	\$7.29
Livestock protection					\$500	\$5.00
Manure Removal					\$300	\$3.00
Other expense						
Fixed Costs						
Depreciation on Breeding Ewes	104		head	6.50%	676	6.76
Interest		5% for 6 months			\$576	\$5.76
TOTAL COSTS					\$24,306	\$242.01
Profit					\$8,023	\$81.28

Purchasing

Now that you have done your enterprise budget and profit is in your future, where do you buy sheep? This is a common question and purchasing sheep from the right operation or person is very important. It is becoming more difficult to find large numbers of sheep for sale. Important factors that you need to keep in mind as you purchase sheep are:

- Flock History
- Age
- Immunizations given
- If bred, what too
- Disease and sickness issues on operation you are purchasing from
- Feed they are currently on or being fed
- Environment they are being raised in
- If purchasing yearling rams or older, have they been through a breeding season

One can always go to the local auction barn and purchase sheep. However, if sheep are purchased from an auction barn you need to use caution and research the group of sheep that you are potentially buying. Contact the seller of the sheep and find out their history and status. Ask the seller what they have been vaccinated with, the age of the sheep and what they have been currently eating. Also, keep in mind that when sheep are purchased at an auction barn they have been exposed to an abundant amount of disease and sickness. Proper evaluation and quarantine will have to take place when the sheep are brought home to prevent any loss due to exposure of disease and sickness. Another avenue to purchase sheep is to talk to local producers to see if they know of any sheep for sale. This could be dispersals of neighboring farms or ranches or other producers that will have the amount of sheep you are looking for to sell. If purchasing another operations dispersal, make sure that the sheep are in good health and proper animal husbandry has occurred with the flock. Another avenue to purchase sheep is seed stock producers. Seed stock producers are in the business to sell yearling ewes, ewe lambs and aged ewes. Aged ewes from another producer may not be performing for the current producer, but they can be a great start for the first time sheep owner. When purchasing aged ewes, 3 years old or older, make sure to ask about any lambing issues such as dystocia problems, bad in the lambing jug, mothering ability and general health of the ewe.

One area to approach with caution is purchasing sheep from a broker that purchases sheep from multiple operations to build numbers that a customer needs. This situation is very similar to purchasing sheep for the local auction barn. When sheep are purchased from multiple operations and brought together you are asking for trouble. You have now exposed each flock to each ones disease and sickness issues. Make sure that the operation or individual you are purchasing sheep from is someone you can trust and they provide the correct documentation and records on the sheep.

Anytime a producer purchases new sheep from another operation there are proper bio-security and quarantine protocols they should go through. Do not turn newly purchased sheep out with the existing herd. New sheep to an operation should be quarantined or kept away from existing sheep for at least 30 days. This will allow the new sheep to break with sickness if they are going

to and allow you to treat them properly without exposing the existing sheep to sickness and disease.

Another important thing to keep in mind is to understand your states regulations on transportation and health requirements. Some states are a brand state for sheep just like cattle, where they require a brand inspection before sheep can be transported in out of the state by a state brand inspector. Most states also require health papers to accompany sheep after they have been health inspected by a licensed veterinarian. If your state does not require brand inspection to be done on sheep, it may require proof of purchase or a bill of sale. It is extremely important to research and follow what your state requires for transportation of sheep and other livestock.

Marketing

Your marketing strategy of your sheep operation will determine the success and longevity of your operation. Marketing of your products whether it is meat, wool, dairy product or a combination of these is why you are in the sheep business. Most producers begin a business venture because they have a passion for the business and enjoy producing products to customers. Your marketing strategy is about defining your customer or target market and tailoring your product, pricing, distribution and promotion strategies to satisfy that target market (Building a Sustainable Business, pg. 106). There are six areas that you should focus on when developing a marketing plan.

Markets: Who are our target customers and what do they value

Product: What product will we offer and how is it unique

Competition: Who are our competitors and how will position ourselves

Distribution and Packaging: How and when will move our product to market

Price: How will we price our product

Promotion: How and what will we communicate with buyers or customers

It is important to remember that there is a cost associated with each one of these marketing areas and how you develop your marketing strategy will dictate profit.

Depending on what product(s) you are marketing or producing from your sheep flock will depend on where you market your product. For example if you are planning on raising lamb for consumption, there are multiple avenues one could take in the production of lamb meat. A producer could market as all natural grass fed lamb, one could market as grain fed or could market feeder lambs to the feedlot or market finished lambs to local meat processor. Another option would be to market and sell high quality wool. One could market their wool to a local spinner that turns wool into clothing garments or one could sell their wool to the commercial wool industry. Maybe a farmers market is in your marketing and sales strategy where you sell all

natural grass fed lamb and spun yarn from your flock. The options are limitless but you need to have a marketing strategy in place in order to sell your products with success.

When selling live sheep there are many marketing alternatives for you to successfully market and sell your sheep. Some different options are that you can sell on the cash market. This would be taking your sheep to an auction. Advantages to this are it is easy, you get immediate payment, the quantity is flexible and the price is efficient. Disadvantages to this are there is more price risk involved, what you get is what you get and there are some costs involved with this option. Another alternative would be to utilize forward contracts for your sheep with a lamb buyer or feedlot. This allows you to set a price for your sheep that you know will allow you at least break even but hopefully make a profit. There is less price risk involved with this option and is an easy process to market and sell your sheep. A major advantage to this is if prices fall you are guaranteed the contracted price. Disadvantages to this are if prices increase you are committed to your contract and have to sell upon the contracted price and there is less price discovery.

There are many niche products found in the sheep industry where producers can find multiple products to sell from sheep. Examples are:

- Meat
- Clothing
- Cheese
- Yarn
- Milk
- Wool
- Yogurt
- Grazing and Weed Control
- Dairy
- Lanolin and Lotions



Management of the Sheep Flock

Breeding

Breeding season for the shepherd is one of the most exciting times of the year. This is when you select which genetics will be mated to each other and any new genetics you have brought in will be utilized. A good amount of time needs to be spent with selecting mating options and when you will breed the ewe flock. Timing of breeding will dictate when you start lambing and will have a major influence on your production calendar and when your sheep products will be ready to harvest.

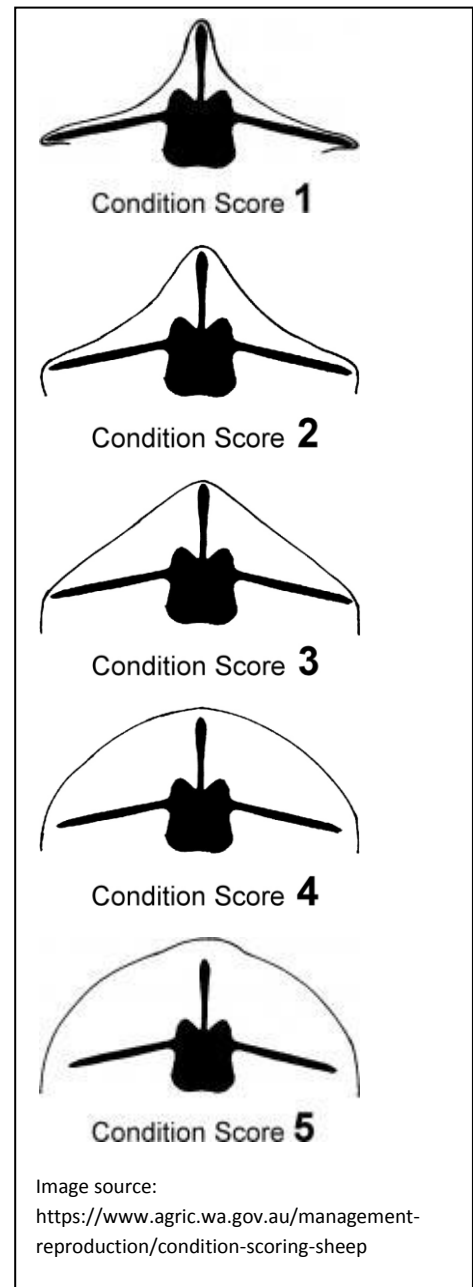
Sheep are short day breeders, causing them to enter estrus as the day length begins to shorten in late summer and early fall. Some wool breed sheep will enter estrus outside of the normal breeding season making them more suitable to operations that want lambs at different times of

the year or are in an accelerated lambing operation where ewes lamb three times in a year and a half. The gestation period for most sheep is between 145 and 152 days with an average gestation of 148 days or roughly 5 months. The gestation of your ewe flock will dictate when you will begin to lamb. Thus, if you want April born lambs, bucks will need to be turned out in Novembers and if you want January lambs, bucks will need to be turned out in August.

Before breeding you will want to perform breeding soundness exams on both the ewes and the rams. Ewe's feet should be trimmed 30 days prior to breeding so that lameness issues are found or prevented during the breeding season. If the ewe flock is in a range situation, feet may not need to be trimmed but most small farm flock ewes need their feet trimmed at least once a year. A producer will want to also treat the ewes for internal and external parasites at this point as well. Use caution with internal parasite drugs as some products can prevent or hinder cycling and egg production of the ewe. It is important to not treat for internal or external parasites within 30 days of breeding season.

Ewes should be evaluated for Body Condition (BCS) and given a BCS score prior to breeding. Ewes should not be over fat or too thin as both of these can cause reproductive failure. BCS is a numerical score of 1 through 5. It is recommended that the breeding ewe maintain a BCS of 3 throughout the production year. This holds true for rams as well, overly fat or to thin of rams can have reproductive and breeding issues. A BCS of 3 is also recommended for rams to ensure reproductively sound bucks.

- BCS 1** Spinous processes are sharp and prominent. Transverse processes are sharp; one can pass fingers under ends. It is possible to feel between each process. Loin muscle is shallow with no fat cover.
- BCS 2** Spinous processes are sharp and prominent. Transverse processes are smooth and slightly rounded. It is possible to pass fingers under the ends of the transverse processes with a little pressure. Loin muscle has little fat cover, but is full.
- BCS 3** Spinous processes are smooth. Transverse processes are smooth and well covered, and firm pressure is needed to feel over the ends. Loin muscle is full with some fat cover.
- BCS 4** Spinous processes can be detected only with pressure as a hard line. Transverse processes cannot be felt. Loin muscle is full with thick fat cover.
- BCS 5** Spinous processes cannot be detected. Transverse processes cannot be detected. Loin muscle is very full with very thick fat cover.



Ewes should be flushed 2 weeks prior to breeding and continued through the breeding season. Flushing is a management practice that increases nutrients to the ewe to help increase her ovulation rate. This can be done by feeding 1 pound of grain per head per day or high quality legume hay to the ewe. By flushing, a shepherd could see an increase of 10 to 20 percent in lambing rate.

Due to new technology in the sheep industry we have seen an increase in synchronization programs (ES), artificial insemination (AI) and embryo transfer (ET). These unique breeding options have changed the industry and have allowed sheep producers to utilize genetics that were not always available to them. These breeding technologies are used more frequently in the small farm flocks and seed stock flocks. ES is a great tool for the shepherd to use to synchronize when the ewe herd will ovulate and breed and when the flock will begin to lamb. In ES programs you may need to increase the amount of rams you use due to the increased amount of ewes ovulating at the same time. ES also shortens your lambing period and allows the shepherd to know exactly when the flock will begin and end lambing. Marking the ram with a breeding harness to show when the ram mounts and breeds the ewe will also allow the shepherd to know approximately when the ewe will lamb. This is a common practice in sheep flocks to allow you to have an idea of how many ewes the ram has bred and when they will lamb as well as if the ewe does not settle when she will re-cycle.

Rams should also go through a strict breeding soundness exam prior to be turned out with the ewe flock. Rams should be evaluated for structural correctness, BCS, and reproductive soundness. Rams sheaths should be evaluated for infection and the scrotum and testicles should be evaluated. Testicles should be firm and free of any lumps or abnormalities. If abnormalities are present in the scrotum or testicles this could cause reproductive problems and prevent the rams from breeding ewes. Semen testing should be done by your veterinarian prior to breeding season to evaluate motility, quality and amount of semen produced per ejaculate. Rams should also be flushed or given high quality nutrient starting 2 weeks prior to breeding season and through the breeding season. Mineral supplementation is extremely important with rams to ensure semen quality and high production of semen.

During Gestation of the ewe, ewes should be fed high quality nutrients to maintain the pregnancy and ensure vigorous lambs at lambing. Due to ewes normally presenting multiple births at lambing (Twins, Triplets, Quads) nutrition will become very important in the ewe flock in the last 4 to 6 weeks of gestation.

Inadequate nutrition during gestation may result in:

- Pregnancy Disease (Ketosis)
- Milk Fever (Calcium)
- Weak lambs at birth
- Low milk production
- Low lamb birth weights
- Increase lamb mortality



Ewes should gain 20 to 30 pounds during gestation with most of the gain occurring in the last month of gestation. The fetus makes roughly 70 percent of its growth during the last month of gestation. Due to this rapid growth and the beginning to produce milk, nutrient demands on the ewe elevate. If nutrients are not available to the ewe she could experience gestational problems. Also, due to fetus's growing, they begin to crowd the digestive system making it harder for the ewe to consume enough feed to meet her nutritional requirements. This is why it is important to feed very high quality legume hay or grain to meet the nutrient requirements of the ewe during the last month of gestation. Less high quality alfalfa can be fed than grass hay which will meet



her requirements while not taking up as much digestive tract space. Mineral and salt supplementation is also very important during gestation as well as free choice of high quality water. Proper feeder space if in a confinement situation is very important as crowding can cause injury to ewes and kill lambs.

Depending on when your lambing season is will determine whether you shear the ewe flock prior to lambing. A sheared ewe is more sensitive to the needs of a baby lamb as they can nurse easier and the ewe rewires less jug and barn space. However, if you are in a winter lambing season, shearing ewes may not be the best management practice for your flock. During spring and fall lambing seasons it is

encouraged to shear the ewe flock 2 to 3 weeks prior to lambing. In winter lambing flocks, ewes can be crutched where docks, flanks, udder and the belly can be sheared to accommodate lambs during the birthing and nursing process.

Lambing

Lambing season is the most exciting time for the shepherd but is also the time that requires the most work. There will be many sleepless nights as you check ewes to make sure that there are no lambing difficulties or that newborn lambs have been cleaned off, nursed and are warm.



The lambing barn needs to be prepared prior to lambing to ensure that there is enough space, it is clean and ready for baby lambs. It is recommended that you have enough pen space to allow ewes that are very close to lambing to be separated from the rest of the flock. You also want to have a drop pen or an area where lambing ewes can be kept by their selves away form the rest fo the flock. It is imperative that you have lambing jugs set up in the lambing barn to put ewes with their new lambs in so that proper mothering and imprinting can occur

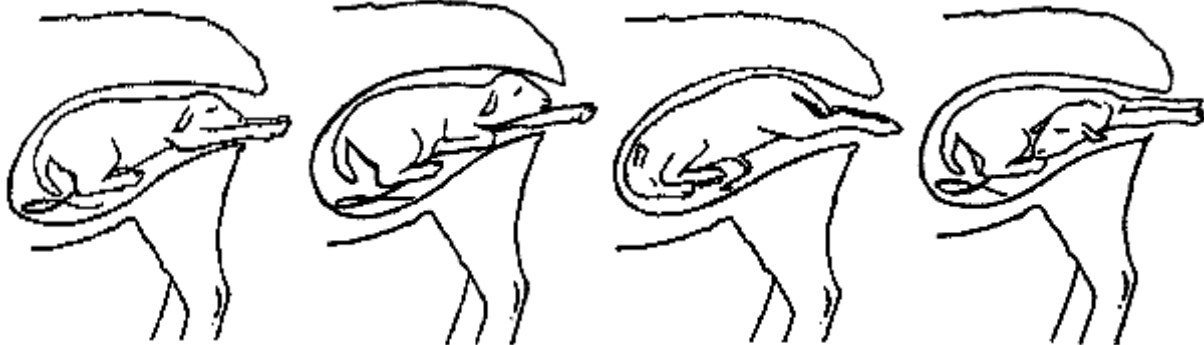
for the new lambs and the ewe. This is very important in ewe lambs or yearling ewes that have just had their first lambs. Bonding and time to realize they are new mother is very important and can be done in the lambing jug. Heat lamps can be used



when weather is cold to help keep new lambs warm. It is recommended that lambing jugs be at least 5x5 cubicles to ensure enough space for the ewe and her lambs. Jugs also prevent other ewes from stealing another ewes lambs. Ewes are

notorious for trying to mother or steal new lambs, which can cause the natural mother to abort her lambs and cause the lambs to be without a mother. This is particularly important for a new mother in the ewe flock as she is already not sure of her role as a mother and if another ewe steals her lambs she will not take them back.

Time needs to be spent with the ewe flock during lambing to increase the number of lambs born and saved during this very important time. Each ewe is different in how she shows if she is in labor or going to lamb. The first sign is that her udder or bag is very tight and hard, this means



Normal Presentation

One Leg Back

Backwards

Head Back



Both Legs Back

Breech

Twins - Front and Back

Four Legs - One Head

Images Sourced from: Ontario ministry of agriculture, food and rural affairs

she is close to lambing. Other sign of a ewe that is going to lamb is secluding herself from the rest of the flock, excessive pawing at the ground and constant lying down and getting back up. A water bag should be presented before the actual lamb comes out during the birthing process. Lambs should be presented muzzle and front feet first as they are birthed but there can be many presentations that can cause birthing difficulties or death of lambs at lambing if proper management and treatment is not done. Figure 6 shows different presentations that the shepherd could see during the lambing season. If a ewe has been in labor for more than one hour without making any progress she should be examined to check for any problems that could be preventing her from lambing. Sanitation is a must in this situation and you must use thoroughly wash and use rubber gloves and ob gloves when examining a ewe vaginally. When examining a ewe you must be gentle, quite and be patient. If at any time you feel that the presentation of the lamb or the size of the lamb may cause problems of the normal lambing process, contact your local veterinarian to assist.

After lambs are born, there is still work to be done to ensure lamb survival. There are three basic steps to follow directly after lambs are born:

- Strip the ewe's teats to remove the wax plug to make sure the teat canal is open to allow the nursing lamb easy access to its first milk.
- Clip the lambs' naval (umbilical cord) to about 1 inch and dip the naval cord in iodine to prevent any infection.
- Be sure that the ewe passes her placenta (afterbirth) or cleans. This can take some time but it is critical that the ewe passes her afterbirth as this could cause extreme infection and death in the ewe if it is not passed. Some ewes will clean very quickly and other may take a few hours. Research shows that proper nutritional and mineral status can help this process.

Make sure that each lamb nurses the ewe so that it receives Colostrum. Colostrum is the ewes' first milk that is rich in antibodies that helps lambs fight disease and sickness. It is crucial that newborn lambs receive Colostrum as this will ensure that lambs start off right and receive immunity from their mothers' Colostrum. If the lamb is too weak to nurse or has been chilled a stomach tube may need to be used to assist in getting the lamb its first milk. It is best to milk the ewe so the lamb receives its mother's milk, but milk replacer with Colostrum can be used.

It is also important to take care of the ewe after the lambing process as many shepherds are guilty of focusing so much on the lambs they forget about the mother. The ewe has just worked very hard to deliver lambs, give her fresh water after she has started to lick and dry off the lambs. Give her a small amount of hay but wait at least 24 hours to begin to give her



Image Source: sheep201

grain again and take a couple of days to get her back to recommended feed levels. Also, keep an eye on her for any infection or post lambing problems so that proper care can be administered if she needs it. Due to the fact that you will have many lambs running around the lambing lot, it is important for you to identify which lambs belong to certain ewes. Identify the lambs with the ewes number or order that the ewe lambed in, in the lambing season. This can be done with ear tags, paint branding or tattoo.

After lambs have been in the jug with their mothers for 1 to 3 days depending on lamb and ewe conditions, they can be transferred to larger pens with 5 to 10 other ewes and their lambs. This allows for a slower transition and increased mothering until they are moved with the rest of the flock. This is crucial for new mothers or ewes that have triplets. If a ewe has triplets the shepherd is going to have to keep a close eye on them as they may need to be supplemented milk or if the ewe cannot support the trio, one lamb may need to be grafted to a ewe that has a single or turned into a bottle lamb.

Reproduction

Reproduction on the farm is the most important factor to success and production of your operation. Reproduction is evaluated on the rate or number of lambs born for the given year. Reproductive rates vary by farm, breed, production system, and geographic area.

Puberty is when a ewe reaches sexual maturity and exhibits estrus (heat) for the first time. The age of puberty is influenced by

Characteristic	Average	Range
Age at puberty,	5 to 12 months	
Length of estrus cycle, days	17	13-19
Duration of estrus, hours	30	18-48
Timing of ovulation	20-30 hours after start of estrus	
Gestation, days	146-147	138-149

breed, genetic selection, body size, nutrition, and season of birth. Most ewe lambs reach puberty between 5 and 12 months of age. Ewe lambs can reach puberty between 5 and 12 months allowing them to be bred before they are year of age. Breeding ewe lambs will depend on the operation, labor available and breed of sheep. Some shepherds will wait to breed ewe lambs and opt to breed them as a yearling.

Reproduction in sheep is regulated by an estrus cycle. In sheep, the length of the estrus cycle ranges from 13 to 19 days and averages 17 days. The phases of the estrous cycle are proestrus, estrus, metestrus, and diestrus. Estrus is the period of time when the ewe is receptive to the ram and will stand for mating or allow the ram to breed her. Estrus lasts approximately 24 to 36 hours depending on breed. Ovulation (release of eggs by the ovary) occurs in mid to late-estrus. Metaestrus begins with the cessation of estrus and lasts for about 3 days. The corpus luteum produces progesterone and maintains pregnancy in the ewe. Diestrus is the period of the estrus cycle when the CL is fully functional. Proestrus begins with the regression of the CL and drop in progesterone and extends to the start of estrus. Rapid follicular growth is occurring during this

period. It usually extends from day 4 to day 13-15 of the cycle. Anestrus refers to a state where the normal cycle stops. Estrous cycles are usually affected by the seasons. The number of hours daily that light enters the eye of the animal affects the brain, which controls the release of certain hormones. Most sheep are seasonally polyestrous and short-day breeders. They will begin to exhibit estrus when length of day begins decreasing. They will come into heat every 16 to 17 days until they are bred or return to anestrus. The most natural time for sheep to breed in the U.S. is the fall where October and November are the most common months to see sheep begin to cycle. Some sheep breeds are less seasonal. They breed almost year-round or have an extended breeding season. The less seasonal breeds include Dorset, Rambouillet, Merino, Finnsheep, and hair sheep.

Signs of estrus in the ewe are much less pronounced than in the cow and can usually not be detected unless a ram is present. When mature ewes are in heat, they will seek out the ram and stand still for him to mount them. Sometimes they wag their tails vigorously. They may nuzzle the ram around the belly or scrotum and even try to mount the ram. Young ewes rarely exhibit these behaviors.

Health Management

The health of your flock will be one of the single most important management practices that you will deal with as a shepherd. There are many diseases and sickness that you will have to deal with and proper protocols and management will ensure success and production of your flock. When dealing with health management, it is imperative to have a good working relationship with your local veterinarian. This section of the small sheep flock manual will cover common disease and sickness in U.S sheep flocks. If you suspect any of these diseases in your flock it is recommended to contact your local veterinarian.

External Parasites: Keds, ticks, lice, mites and flies are common in sheep flocks. External parasites cause irritation and disease transfer and need to be managed in the sheep flock. External parasites also reduce the quality and value of wool. Sprays, dusts and pour-ons are available for the use of control and prevention of external parasites. Check with your veterinarian for recommended and approved pesticides.

Internal Parasites: Every sheep is susceptible to internal parasites. Sheep that are on pasture are exposed to many different types of parasites that can affect production and overall health of the sheep. De-worming and grazing management will prevent and control parasite populations and keep sheep healthy and productive. Lambs are more susceptible to internal parasites but older ewes and rams can have problems as well. Rotating pastures and turning out on



pastures that have been rested and dry will reduce parasite populations. Fecal samples can be collected and analyzed by a veterinarian if there is concern about internal parasites.

Pneumonia: Pneumonia is a common problem in the sheep flock and particularly lambs. It can be caused by bacteria or viral. Symptoms of pneumonia are fever, rapid breathing, coughing and discharge from nostrils. Stress and environmental factors increase the onset of pneumonia. Prevention is key to controlling pneumonia outbreak in the flock. By removing stress factors from the flock and offering sheep well ventilated clean facilities pneumonia should be kept to a minimum. For winter lambing operations it is important to keep your lambing barns no more than 45 to 50 degrees. Elevated temperatures in the lambing barn can cause major pneumonia problems due to young lambs and ewes going from warm moist conditions in the barn to cold dry conditions outside. By keeping the lambing barn between 45 to 50 degrees it will not be as much of a shock to the sheep and also keep ammonia down in the barn.

Enterotoxemia (overeating disease): Enterotoxemia is caused by toxins produced by *Clostridium perfringens* types C and D. Type C (hemorrhagic enterotoxemia) is a disease of lambs less than 10 days old. The toxin destroys the lining of the gut wall. Affected lambs may die unexpectedly with no symptoms. Type D enterotoxemia (pulpy kidney) causes sudden death in lambs that are usually older than 30 days. Symptoms may include head pressing, grinding of teeth, staggering and convulsions. Generally animals are found dead. Treatment for both Type C and D are rarely effective, thus prevention is key to prevent this disease. Vaccinate pregnant ewes 30 days prior to lambing with Type C & D toxoid which will increase antibody levels in colostrum. Also, vaccinate the lambs 2 weeks of age and then again 3 to 4 weeks later with a booster.

Contagious ecthyma (soremouth): Soremouth is caused by a pox virus that affects the lips and mouth of sheep. It causes open sores and scabs on the lips and mouths of sheep but can also be found on other areas of the body such as where an ear tag was put in the ear or on the dock. Soremouth can be transferred to the udders of their mothers causing it to be very painful when she is nursed resulting in lambs not being allowed to suck. Lambs that have it on their mouth and lips do not want to eat or nurse due to the pain. This can result in malnourished lethargic lambs. Once a sheep has soremouth there is no treatment and you have to let the virus run its course. Prevention methods can be used through giving sheep a commercially available live vaccine. Antibiotic ointments can be used to help soften the scabs to allow for easier eating and nursing. Soremouth virus and the vaccine is contagious to humans so extreme caution needs to be used when treating or vaccinating sheep. Rubber gloves and good sanitation methods are a must.

Lamb scours: Scours may be caused by noninfectious or infectious agents. Humidity, nursing dirty udders, overcrowding, deep and wet manure in corrals or inadequate colostrum are some of the non-infectious causes. Infectious causes are bacterial or viral. Keeping corrals and facilities clean and dry are key to the prevention of non-infectious scours. Keep bedding areas well bedded with clean straw or other bedding materials. Scours leads to dehydration of the lamb causing death if untreated. Electrolytes need to

administered to lambs with scours and oral antibiotic solutions can help with the treatment of scours.

White Muscle Disease (Stiff Lamb Disease): This disease is caused by a deficiency of selenium and Vitamin E. It is a degenerative disease of the skeletal and cardiac muscles. Lambs exhibit stiffness and rapid breathing. Sudden death may occur due to heart or breathing failure. Prevention methods are successful in the control of White Muscle Disease in sheep. One can either supplement feeds or minerals with a selenium and Vitamin E source or inject lambs with a selenium/vitamin E source at birth and then 30 days later. One can also inject pregnant ewes with the same injection 30 days prior to lambing, however proper nutrition through mineral and vitamin supplements will prevent any White Muscle Disease issues. Most lamb creep feeds are fortified with additional selenium and vitamin E to prevent this disease.

Pregnancy Disease (ketosis): This is a metabolic disease of pregnant ewes that normally occurs during the last 6 weeks of pregnancy. It is caused by the rapid growth of the fetus and decreased room in the digestive tract. Affected ewes become lethargic and sluggish and in later stages can grid teeth, seem blind and stagger. Treatment is successful if caught early with the use of an oral drench of propylene glycol. The best prevention of this disease is to provide ewes with adequate levels of energy during the final 4 to 6 weeks of pregnancy. Supplementation with grain or molasses lick tubs will supplement enough energy to the ewe to prevent this disease.

Mastitis: Mastitis is an infectious disease of sheep. There are two recognized types of mastitis, but the gangrenous type (bluebag) is more severe. With bluebag, gangrene develops rapidly in the udder; ewes become sick, depressed, and feverish. As the infection progresses, the udder, or more commonly, half the udder, becomes hard, red, and swollen. The pain often causes the ewe to limp as she tries to avoid hitting the udder with the rear leg. Affected ewes usually do not let lambs nurse. Within a day or two, the udder generally becomes very hard, gangrene develops, and the udder turns blue. Death occurs in about 25 percent of cases. In ewes that recover, the affected portion of the udder remains nonfunctional. In those that survive, the affected portion of the udder sloughs off. The nongangrenous type may go unnoticed. The udder becomes hard, swollen, and inflamed, and the milk clots. Abscesses may form in the udder. Milk production is generally reduced, and the udder, or half of udder, becomes nonfunctional. Survival rate is greater than with the gangrenous type of mastitis. The incidence of mastitis is greater in closely confined flocks than in flocks that are allowed to bed on relatively clean ground. The disease may be spread by the lamb of an infected ewe attempting to nurse other ewes or by milk excreted on the bed ground. Milk and fluids should never be "milked-out" of the teats in an area where other ewes may contact with the fluids. Separate affected ewes from the main flock and treat with antibiotics as recommended by a veterinarian. Examine the udders of all replacement ewes annually before breeding, and cull any ewes with hard udders.

Abortions: There are several infectious organisms that can cause abortions to the ewe flock. Abortions are extremely detrimental to production and the bottom line of the

operation and can put an operation out of business. Abortions can be infectious or can be caused by physical injury, poor nutrition, toxins or noxious weeds.

Campylobacteriosis (Vibriosis): Vibriosis is caused by bacteria. Infected ewes often abort in the last 3 to 4 weeks of pregnancy, or lambs born at term are dead or weak and normally die within 24 hours. Ewes contract the disease through the mouth, so it is important to remove aborted fetuses and all placental material from the rest of the flock. A vaccine is available, when given annually, it can help prevent abortions due to vibriosis. Treatment is not as effective but high levels of antibiotics may reduce losses.

Chlamydial Abortions: Ewes abort in the final 3 to 4 weeks of pregnancy and resembles Vibriosis, so lab diagnosis is important to differentiate the two. A vaccine is available for the prevention of chlamydial abortion and antibiotics can be used for treatment during an outbreak, however, by the time the disease is diagnosed losses can be quite high.

Toxoplasmosis: Toxoplasmosis is caused by a protozoan parasite. Cats are known to spread the disease, so keep them away from sheep and feed. Do not allow cats to defecate in feedstuffs for sheep, as this is a primary means of infection and can cause major abortion outbreaks within a flock of sheep.

Blue Tongue: Blue tongue is an insect-borne, viral, noncontagious disease that occurs in some areas of New Mexico. It is transmitted from infected animals to susceptible sheep by the bites of a small insect commonly referred to as a gnat. The disease normally occurs from midsummer until frost. Early symptoms usually include excessive salivation, reddening of the lips and mouth, and progressive darkening of the vascular areas of the mouth. Furthermore, the muzzle, lips, tongue, throat, and sometimes the ears and neck become swollen. Occasionally, sheep suffer from severe lameness as well. Not all signs of blue tongue appear in a single sheep or even in a single outbreak. Best control methods involve controlling the gnat. Since this insect breeds in the mud along the edges of slow-moving streams or water tank overflow, try to eliminate these breeding sites. Breeding sites also can be sprayed with insecticides. A modified live-virus type of vaccine is available, but it is estimated that six to seven different viruses cause blue tongue. Occasionally, the vaccine may cause a reaction that is nearly as bad as the disease itself. Pregnant ewes, particularly in the first 50 days of gestation, should not be vaccinated. No satisfactory medical treatment has been found for animals with blue tongue. Generally, with proper care, most animals recover naturally within 14 days, although severely affected animals may recover more slowly. Isolate affected animals in a shaded area with palatable feed and fresh water. Antibiotics are of no value in the treatment of blue tongue, but they are helpful in preventing secondary infections.
(<https://aces.nmsu.edu/newmexicosheep/sheep-health.html>)

Q Fever: Q fever is an infectious disease of animals and humans caused by a species of bacteria called *Coxiella burnetii*. This organism is very durable – it can survive for months in the environment. Sheep, goats, and cattle can carry the organism. The bacteria can be shed by these animals in feces, urine, milk, and in the birthing fluids and

membranes. Animals that carry this organism and shed it into the environment usually do not show any signs of disease. Occasionally, infection does result in visible signs of disease, usually in sheep and goats. Infected ewes may abort or give birth to weak offspring, and Q fever should be considered as a possible cause of outbreaks of abortion in flocks. When ewes abort because of Q fever, the causative organism is present in extremely high numbers in the uterine fluids, placenta, and aborted fetuses. Aborted fetuses lack any characteristic findings, but the placenta may be visibly thickened in cases of Q fever abortion. Diagnosis of Q fever abortion requires testing of the fetuses and placentas from aborted animals. Veterinary diagnosticians typically identify the organism by the use of special stains applied to microscopic sections of these tissues, and/or through the use of tests to detect the presence of the organism's DNA. Abortions caused by Q fever typically do not recur in sheep. There is currently not a licensed vaccine to prevent Q fever in livestock in the United States. Once Q fever is confirmed as a cause of abortion in a herd or flock, treatment of pregnant animals with tetracycline may reduce the risk of further abortions, but is unlikely to eliminate the problem entirely.

(<http://extension.colostate.edu/docs/pubs/livestk/08022.pdf>)

Bloat and Choking: Bloating and choking is common in sheep due to sheep having a higher nutrient requirement during the last trimester of pregnancy. Also, sheep that are kept in a confinement situation or that are fed twice a day and not allowed to graze tend to get pushy and gorge their selves causing choke. Legume hay like alfalfa can be cause bloat and if sheep gorge their selves they may get hay compacted in their throat preventing rumen gas to be expelled, resulting in

Flock Health Timeline

60 Days before breeding

-Deworm Rams

30 days before breeding

-Vaccinate breeding ewes against Vibriosis and Chlamydia if problems are present

-Deworm ewes

60 to 90 days after start of breeding

-Administer booster shot for Vibrio and Chlamydia

30 days before lambing

-Vaccinate pregnant ewes with clostridium C & D toxoid and tetanus toxoid

-Deworm ewes

Lambing time

-Soremouth vaccine if problem on farm

-2 to 4 week old lambs receive 1st C & D and T booster

3 weeks after start of grazing

-Deworm all sheep on pasture

During grazing season

-Deworm as needed

bloat and death. Sheep will also do this on grain as they eat too fast and the grain is compacted in their throat, resulting in suffocation or bloat.

Epididymitis: Epididymitis is a disease that affects one or both testicles of the ram and may cause complete or partial infertility. The primary symptom is the development of a lump in a portion of the epididymis. The lump or lesion most commonly affects the tail of the epididymis and may be detected by palpation of the scrotum. The testicle itself usually is not involved. Rams with epididymitis produce semen of poor quality; the use of such rams is a major cause of poor conception rates. Examine all rams in the flock before the breeding season and again at shearing time. Immediately separate any affected ram from other rams and mark for slaughter only. Epididymitis can be transmitted by homosexual contact.

Urinary Calculi (water belly): Rams and wethers in feedlots or on high-grain rations are most often affected by urinary calculi, but the condition can occur in sheep on succulent pastures or on grain stubble. Rations high in phosphorus or rations with a phosphorus-calcium imbalance are most often associated with a high incidence of urinary calculi in feedlot lambs. Urinary calculi occurs when salts that are normally excreted in the urine precipitate and form stones. The stones then lodge in the kidney, ureters, bladder, or urethra. Generally, affected animals stand with an arched back and strain to pass urine. An animal may kick at its belly, prefer to lie down, and become dull and disinterested in feed or water. Preventing the disease by proper management is essential because treatment often is ineffective. Sheep must have a clean, constant source of water. Avoid excess phosphorus in the ration. When high-concentrate rations (which are high in phosphorus) are fed, feed-grade limestone can be added to the ration to increase the calcium level above the phosphorus level. Adding ammonium chloride to a ration at the rate of 0.5 percent (8 to 10 pounds per ton), or about 0.25 ounces per head per day, is one of the most effective methods of controlling urinary calculi. Ammonium chloride can be included in pelleted or ground concentrate rations during the entire feeding period, but it cannot be effectively mixed with whole-grain rations because it settles out and is not consumed. Ammonium chloride also can be used as a drench for affected animals. Use up to 1.5 ounces per head, but administer only once at that level. Smooth-muscle relaxants may aid in passage of lodged calculi stones. Calculi also can be removed by surgery, but this is not practical for commercial sheep.

Veterinarians

Currently in the United States the livestock industry is facing a shortage of large animal veterinarians. According to the American Veterinary Medicine Association, the U.S. Department of Agriculture's National Institute of Food and Agriculture (NIFA) announced that 187 regions in the United States currently suffer from shortages of livestock and public health veterinarians. These shortages threaten animal health, public health and the livelihoods of farmers and ranchers. Not only is there a shortage of large animal veterinarians, but it is becoming very difficult to find veterinarians that have sheep experience or that are willing to treat sheep. Having a vet that understands sheep and that is willing to treat them will have a dramatic affect on the success of your flock. It is crucial to have a vet that understands sheep sickness and disease and

how to treat sheep. Research in your area will need to be done prior to becoming a sheep producer to find out if there is a veterinarian that has sheep experience and if they are willing to work with your operation. The American Sheep Industry Association web site offers a great Extension Veterinarians contact list for producers to contact their local state veterinarians to receive assistance in finding veterinarians in their area that have sheep experience. (https://www.sheepusa.org/Contacts_State_ExtensionVeterinarians)

Nutrition

A sound nutrition plan provided to sheep at the correct production stage is essential to be profitable and stay in production. Nutrition is the backbone of your operation and will dictate herd health, reproductive rates and longevity of the sheep flock. The ideal nutrition program needs to be efficient and economical.

Sheppard's should know basic animal nutrition and be familiar with common nutrition terms, and understand nutritional requirements at different production stages for the sheep flock. Understanding essential nutrient requirements of sheep will allow you to build and understand rations and feed programs that will set your flock up for success. The essential nutrients sheep require are: energy (fat and carbohydrates), protein, vitamins, minerals, water, and fiber. These 6 essential nutrients are key in the roles of growth, production, and reproduction.

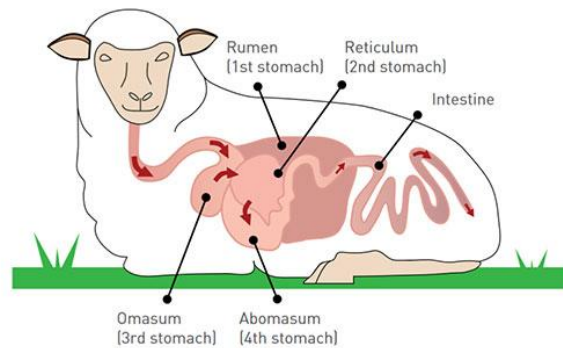


Image Source: learnaboutwool.com

Sheep are a ruminant animal (4 Stomachs) where they are extremely efficient at consuming roughages and converting it to meat, milk and fiber.

Energy: Because so much of the diet can depend on grass and forage that is either sparse or of poor quality, the provision of adequate energy is important. Poor-quality forage, even in abundance, may not provide sufficient available energy for maintenance and production. The energy requirement of ewes is greatest during the first 8–10 wk of lactation. Because milk production declines after this period and the lambs have begun foraging, the requirement of the ewe is then reduced to pre-lambing levels. The easiest way to assess energy adequacy in sheep is to perform and record body condition using an objective 1–5 scoring system, with 1 being extremely thin and 5 being extremely obese. The body condition score is determined by palpating the amount of fat covering on the spinous processes and transverse processes in the lumbar region. Most healthy productive ewes will have a score of 2–3.5. Sheep with a score of 1–2 should be examined and fed to attain a higher score, whereas those with a score >3.5 should be fed less. Dietary changes should be done slowly, and abrupt reduction in total energy intake should always be avoided, particularly in middle to late gestation.

Protein: Good-quality forage and pasture generally provide adequate protein for mature sheep. However, sheep do not digest poor-quality protein as efficiently as do cattle, and there are instances when a protein supplement should be fed with mature grass and hay, or when on winter range. Therefore, a minimum of 7% dietary crude protein is needed for maintenance in most sheep. Protein requirements depend on the stage of production (growth, gestation, lactation, etc) and the presence of certain diseases (internal nematode parasites, dental disease, etc). If available forages are unable to supply adequate dietary crude protein, protein supplements, such as oilseed meals (cottonseed meal, soybean meal) or commercially blended supplements should be fed to meet nutrient requirements. Protein should be fed to meet, but not exceed, requirements. Excess protein feeding can be beneficial in cases of excessive internal parasite burdens but result in increased production costs and may result in higher incidences of diseases (eg, heat stress, pizzle rot).

Sheep can convert nonprotein nitrogen (such as urea, ammonium phosphate, and biuret) into protein in the rumen but possibly less efficiently than beef cattle. This source of nitrogen can provide at least a part of the necessary supplemental nitrogen in high-energy diets with a nitrogen:sulfur ratio of 10:1. In lamb-finishing diets, the inclusion of alfalfa, approved growth stimulants, and a source of fermentable carbohydrates (eg, ground corn, ground milo) enhance nitrogen utilization.

Minerals: Sheep require the major minerals sodium, chlorine, calcium, phosphorus, magnesium, sulfur, potassium, and trace minerals, including cobalt, copper, iodine, iron, manganese, molybdenum, zinc, and selenium. Trace mineralized salt provides an economical way to prevent deficiencies of sodium, chlorine, iodine, manganese, cobalt, copper, iron, and zinc. Selenium should be included in rations, mineral mixtures, or other supplements in deficient areas. Sheep diets usually contain sufficient potassium, iron, magnesium, sulfur, and manganese. Of the trace minerals, iodine, cobalt, and copper status in ewes are best assessed via analysis of liver biopsy tissue. Zinc adequacy can be assessed from the careful collection of nonhemolyzed blood placed in trace element-free collection tubes. Selenium status is easily assessed by collection of whole, preferably heparinized, blood.

All sheep producers need to be aware that sheep can become toxic to lower levels of copper than compared to other livestock species. Dependent on the breed of sheep copper nutrition can be quite complicated. It is a required mineral for sheep, yet highly toxic. Copper status of sheep is influenced by breed, age of animal, health status of animal, levels of other minerals consumed, and even levels of some feed additives in the diet. Proper evaluation of copper levels in any forage or feed is a must with sheep.

Salt: In the USA, except on certain alkaline areas of the western range and along the seacoast, sheep should be provided with ad lib salt (sodium chloride). Sheep need salt to remain thrifty, make economical gains, lactate, and reproduce. Mature sheep will consume ~0.02 lb (9 g) of salt daily, and lambs half this amount. Range operators commonly provide 0.5–0.75 lb (225–350 g) of salt/ewe/mo. Salt as 0.2%–0.5% of the dietary dry matter is usually adequate.

Calcium and Phosphorus: In plants, generally the leafy parts are relatively high in calcium and low in phosphorus, whereas the reverse is true of the seeds. Legumes, in general, have a

higher calcium content than grasses. As grasses mature, phosphorus is transferred to the seed (grain). Furthermore, the phosphorus content of the plant is influenced markedly by the availability of phosphorus in the soil. Therefore, low-quality pasture devoid of legumes and range plants tends to be naturally low in phosphorus, particularly as the forage matures and the seeds fall.

Sheep subsisting on mature, brown, summer forage and winter range sometimes develop a phosphorus deficiency. Sheep kept on such forages or fed low-quality hay with no grain should be provided a phosphorus supplement (ie, defluorinated rock phosphate) added to a salt-trace mineral mixture. Because most forages have a relatively high calcium content, particularly if there is a mixture of legumes, diets usually meet maintenance requirements for this element. However, when corn silage or other feeds from the cereal grains are fed exclusively, ground limestone should be fed daily at the rate of 0.02–0.03 lb (9–14 g). Sheep seem to be able to tolerate wide calcium:phosphorus ratios as long as their diets contain more calcium than phosphorus. However, an excess of phosphorus may be conducive to development of urinary calculi or osteodystrophy. A calcium:phosphorus ratio of 1.5:1 is appropriate for feedlot lambs. For pregnant ewes, the diet should contain $\geq 0.18\%$ and, for lactating ewes, $\geq 0.27\%$. A content of 0.2%–0.4% calcium is considered adequate, as long as the ratio is maintained between 1:1 and 2:1.



Iodine: Occasionally, the iodine requirements of sheep are not met in the natural diet and thus iodine supplements must be fed. Goitrogenic substances are found in many types of plants (eg, *Brassica* spp) and interfere with the use of iodine by the thyroid. Regions naturally deficient are found throughout the western USA, in the Great Lakes area, and in other parts of the world. A deficiency of iodine (manifested as goiter in the adult and as lack of wool and/or goiter in lambs) can be prevented by feeding stabilized iodized salt to pregnant ewes. The young of iodine-deficient ewes may be aborted, stillborn, or born with goiters. Diets containing iodine at 0.2%–0.8% ppm are usually sufficient, depending on the animals' level of production (maintenance/growth, lactation, etc).

Cobalt: Sheep require ~ 0.1 ppm of cobalt in their diet. Cobalt-deficient soils are found in North America but are relatively rare compared with other parts of the world. Normally, legumes have a higher content than grasses. Because cobalt levels of the feedstuffs are seldom known, a good practice is to feed trace mineralized salt that contains cobalt.

Copper: Pregnant ewes require ~ 5 mg of copper (Cu) daily, which is the amount provided when the forage contains ≥ 5 ppm. However, the amount of copper in the diet necessary to prevent copper deficiency is influenced by the intake of other dietary constituents, notably molybdenum (Mo), inorganic sulfate, and iron. High intake of molybdenum in the presence of adequate sulfate increases copper requirements. Because sheep are more susceptible than cattle to copper toxicity, care must be taken to avoid excessive copper intake. Toxicity may be

produced in lambs being fed diets with 10–20 ppm of copper, particularly if the Cu:Mo ratio is >10:1. The Cu:Mo ratio should be maintained between 5:1 and 10:1.

Selenium: Selenium is effective in at least partially controlling nutritional muscular dystrophy. Areas east of the Mississippi River and in the northwestern USA appear to be low in selenium. The dietary requirement is ~0.3 ppm. Providing selenium-containing mineral mixture may prevent selenium deficiency if animals are allowed free access. Levels of 7–10 ppm or higher may be toxic.

Zinc: Growing lambs require ~30 ppm of zinc in the diet on a dry-matter basis. The requirement for normal testicular development is somewhat higher. Classic zinc deficiency (parakeratosis) is more common in other small ruminants (goats), but is occasionally encountered in sheep, particularly if fed excessive quantities of dietary calcium (legumes).

Vitamins: Sheep diets usually contain an ample supply of vitamins A (provitamin A), D, and E. Under certain circumstances, however, supplements may be needed. The B vitamins and vitamin K are synthesized by the rumen microorganisms and, under practical conditions, supplements are unnecessary. However, polioencephalomalacia can be seen and is due to aberrations in ruminal thiamine metabolism, secondary to altered ruminal pH and/or microflora content. Vitamin C is synthesized in the tissues of sheep. On diets rich in carotene, such as high-quality pasture or green hays, sheep can store large quantities of vitamin A in the liver, often sufficient to meet their requirements for as long as 6 mo.

Vitamin D₂ is derived from sun-cured forage, and vitamin D₃ from exposure of the skin to ultraviolet light. When exposure of the skin to sunshine is reduced by prolonged cloudy weather or confinement rearing, and when the vitamin D₂ content of the diet is low, the amount supplied may be inadequate. The requirement for vitamin D is increased when the amounts of either calcium or phosphorus in the diet are low or when the ratio between them is wide. But such dietary modification should be done cautiously, because vitamin D toxicity is a severe syndrome. Fast-growing lambs kept in sheds away from direct sunlight or maintained on green feeds (high carotene) during the winter months (low irradiation) may have impaired bone formation and show other signs of vitamin D deficiency. Normally, sheep on pasture seldom need vitamin D supplements.

The major sources of vitamin E in the natural diet of sheep are green feeds and the germ of seeds. Because vitamin E is poorly stored in the body, a daily intake is needed. When ewes are being fed poor-quality hay or forage, supplemental vitamin E may result in improved production, lamb weaning weights, and colostrum quality. Vitamin E deficiency in young lambs may contribute to nutritional muscular dystrophy if selenium intake is low.

Water: A clean, fresh, easily accessible source of water should be available at all times. As a minimum requirement in temperate environments, the usual recommendations are ~1 gal. (3.8 L) of water/day for ewes on dry feed in winter, 1½ gal./day for ewes nursing lambs, and ½ gal./day for finishing lambs. In many range areas, water is the limiting nutrient; even when present, it may be unpotable because of filth or high mineral content. For best production, all sheep should have their water availability monitored daily during all weather conditions. However, the cost of

supplying water often makes it economical to water range sheep every other day. When soft snow is available, range sheep do not need additional water except when dry feeds such as alfalfa hay and pellets are fed. If the snow is crusted with ice, the crust should be broken to allow access. Still, when possible, sheep should have unlimited access to fresh, clean water.

Fiber: Adequate fiber and/or quality forage promotes good health and better performance. Fiber adds bulk to the diet and keeps the rumen properly functioning, as it increases rumination and salivation. The rumen functions best when the daily diet includes a high concentration of slowly degradable fiber ingredients known as roughage. Extended chewing of the fibrous material helps to keep the acidity in the rumen within a range that benefits the fiber-digesting microbes. This is commonly known as the cud-chewing process. The digestive interaction of fiber stimulates the muscles in the wall of the rumen to contract and expand, which essentially stirs up the material in the rumen. These forage products include any type of hay, silage, or fresh forage. Cottonseed and soybean hulls often are utilized as a form of fiber in feed rations.

David G. Pugh, DVM, MS, MAg, DACT, DACVN, DACVM, Department of Pathobiology, College of Veterinary Medicine, Auburn University Nutritional Requirements of Sheep.



Nutrient Requirements of Sheep

Nutrient Requirements of Sheep											
				Energy Requirements		Protein Requirements		Mineral Requirements		Vit. Requirements	
Class/Age/Other	Relative Size lb	Body Weight Gain lb/d	Daily Dry Matter Intake lb	TDN lb/d	TDN %DM	CP lb/d	CP %DM	Ca g/d	P g/d	VitA RE/d	Vit E IU/d
Mature Ewes Maintenance											
	Sm	0	2.6	1.37	53	0.2	7.6	2.4	2	2198	371
	Med	0	3.13	1.65	53	0.24	7.5	2.8	2.5	2826	477
	Lg	0	3.88	2.07	53	0.29	7.6	3.3	3.1	3768	636
Breeding											
	Sm	0.06	2.86	1.52	53	0.23	8	2.9	2.4	2198	371
	Med	0.08	3.44	1.83	53	0.28	8.1	3.4	2.9	2826	477
	Lg	0.1	4.27	2.27	53	0.35	8.1	4	3.7	3768	636
Late Gestation											
Twin Lambs	Sm	0.4	4.03	2.67	66	0.42	10.5	8.8	5.3	3185	392
	Med	0.48	5.9	3.13	53	0.53	9	10.7	7.2	4095	504
	Lg	0.6	7.14	3.79	53	0.64	9	12.5	8.6	5460	672
Early Lactation											
Twin Lambs	Sm	-0.07	4.36	2.89	66	0.67	15.4	7.9	6.9	3745	392
	Med	-0.08	5.11	3.39	66	0.78	15.2	9	8	4815	504
	Lg	-0.09	7.64	4.05	53	0.97	12.7	11.3	10.7	6420	672
Ewe Lambs											

Late Gestation											
Twin Lambs	Sm	0.49	4.21	3.35	80	0.46	10.9	11	6.4	2730	336
	Med	0.62	5.24	4.16	79	0.57	10.9	13.1	7.9	3640	448
	Lg	0.74	6.23	4.96	80	0.68	10.8	15.3	9.3	4550	560
Early Lactation											
Twin lambs	Sm	-0.06	5.11	2.71	53	0.66	12.8	8	7.3	3210	336
	Med	-0.07	6.1	3.24	53	0.77	12.7	9.3	8.6	4280	448
	Lg	-0.08	7.03	3.72	53	0.88	12.5	10.4	9.8	5350	560

Source: NRC.2007. Nutrient Requirements of Small Ruminants, Sheep, Goats, Cervids and new World Camelids, National Academy Press

Washington D.C.

Refer to source for specific weights and additional parameters

Mature Ewes: Sm=150 lb Med=200 lb Lg= 260 lb

Ewe Lambs: Sm= 130 lb Med= 175 lb Lg= 220 lb

Refer to source for expressions of energy, protein, calcium, phosphorus, minerals and vitamins

Handling and Facilities

Knowing how to handle sheep and having the proper facilities will pay for its self in a hurry. Not all people know how to handle sheep. Sheep are a natural herding or flocking animal. Sheep will follow their counterparts into any situation even if it's dangerous or life threatening to them.

Sheep are imprinted with this natural flocking instinct where it is very difficult to get a single

sheep to do anything. Sheep like other livestock have a flight zone and prefer to work away from pressure. How you set up and operate your facilities will play a major role in how your sheep will work and go through your facilities. You will be required to move sheep from pastures and bring them to corrals or working chutes to administer vaccinations or perform regular management practices such as shearing, hoof trimming etc.

Lambing, shearing, processing and corral facilities need to be designed specifically for sheep. This also holds true with fencing in pastures. Three strand barb wire fence is not going to



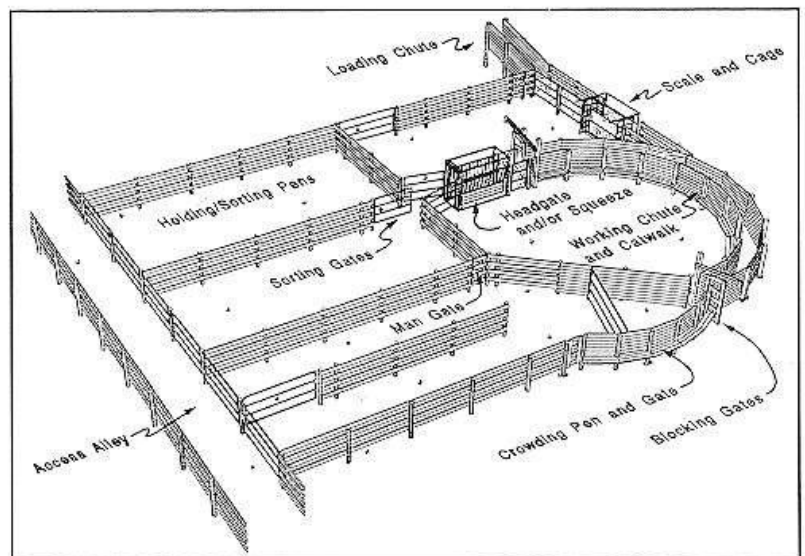
hold sheep in. Woven wire fencing or electric netting is the best to keep sheep in the areas they are supposed to be in.

There are multiple ways to set up your sheep operation and what works for one operation may not work for you. Visiting other operations and seeing how sheep work through working systems is highly recommended. It will take some trial and error in order for you to find the right system for you operation. When building sheep facilities, wood structures are highly recommended, wood is quite and generally safe to sheep when they are being worked through the system. There are many manufactures of steel equipment that are very good as well. It really depends on your financial situation and particular set up of what will work best for you. This holds true for lambing jugs as well. It is important to remember that lambing facilities need to be able to sanitized and cleaned, so metal equipment is best suited for this but wood also works well. Corrals and loafing areas should be kept as dry as possible and allowed to drain so that mud and moisture does not accumulate in these areas.



Shearing facilities will also be dictated by the facilities you have available. Many shearers will provide their own shearing trailer where sheep will go through the shears trailer to be sheared. Shearing facilities should be in side and kept draft free. Your operation should have a barn where freshly shorn sheep can be kept in case of a weather event to protect them from cold, wind and moisture.

Examples of sheep corrals, lambing facilities and herding sheep: Blue equipment is manufactured by Sydell Sheep Equipment





Predator Control and Management

Predation in the sheep industry accounts for one of the most significant portion of sheep and lamb losses in the United States. The severity of predation problems varies by farm and geographic region. For some producers, predator losses can be so overwhelming that they decide to liquidate their flocks. Other producers may never experience a loss due to predators. Range sheep flocks are at more of a risk for predation than farm flocks but predation can happen in any type of operation. Regardless of your perceived predator threat, all sheep operations and owners of sheep should implement steps to prevent and control predation.

Sheep have many natural predators:

- Coyotes
- Wolves
- Bear
- Bobcats
- Mountain Lions
- Eagles
- Domestic Dogs



Predator-caused death losses:

In total, 1.2 percent of the January 1, 2011, adult- sheep inventory and 4.9 percent of lambs born were lost to predators. The majority of sheep and lamb predator losses were due to coyotes (51.8 and 60.8 percent, respectively). On very small operations, dogs accounted for 39.3 percent of adult-sheep death losses, but overall dogs accounted for just 13.0 percent of adult sheep lost to predators during 2010. Smaller operations are often housed close to urban areas, making it more likely that they will have contact with dogs, especially dogs that do not commonly interact with sheep and lambs. Of the 1.2 percent of sheep and 4.9 percent of lambs lost to predators in 2010, the following percentages account for loss to all predators. (NAHMS Sheep 2011)

Sheep and Lamb Death Loss in the United States, 2011

<u>Predator</u>	<u>Percent sheep losses</u>	<u>Percent lamb losses</u>
Bears	9.1	3.3
Bobcats	3.4	8.3
Coyotes	51.8	60.8
Dogs	13.0	4.7
Mountain Lions	6.7	2.7
Foxes	0.9	3.9
Wolves	2.1	0.9
Eagles	0.7	5.8
Other	4.4	4.7
Unknown	8.0	4.9

Sourced from: NAHMS Sheep 2011

There are various strategies for dealing with predators. The first would be non lethal control of predators. Fencing is the first step in controlling predators. If predators cannot get to the sheep they will not threaten or kill them. Woven wire fencing is the first defense for predators. The use of barb wire or high tensile electric wire on the bottom of the fence is further protection from predators going underneath the fence. For farm flocks, sheep can be locked into corrals at night in high predator areas. Yard lights in corral areas also detour predators from coming in at night.

The next step in defense and probably the most common is the use of guardian animals for the flock. Guardian Dogs are the most commonly used to help protect shepherds flocks. Common breeds of Guardian Dogs are Great Pyrenees, Anatolian Shepherd, Akbash, and Maremma Sheepdog. The use of guardian dogs has dramatically reduced predation in sheep herds across the country. However, Guardian Dogs have to be managed properly and not turned into the family pet. These dogs have a job and they need to spend their whole life with the flock. It is also important to remember that these dogs can be quite intimidating, and if your sheep are grazing on public lands or near areas with close human contact controversy can occur.

The use of Llamas and Donkey's has been effect as well. These animals have a natural instinct to protect



and guard the herd from predators. They are also less intimidating to the public and can be used in grazing areas and farms that are close to human interaction.

Many western range flock utilize herders to stay with the sheep at all time to help manage predators and to protect the flock. This is not normally justified in the small farm flock, shepherds and mangers will have to take the protection of the flock in their own hands when dealing with predators. Each operation needs to be aware and educated on your states predator control laws and work closely with state trappers and your local divisions of wildlife.

Wool Management

Wool production and management is part of the overall total income from your operation unless you are raising hair sheep. How you manage the wool when it is on and off the sheep will dictate the overall quality of the fleece as well as the price you receive for your wool. Quality wool starts with selection of ewes and rams for uniformity in grade, length of staple and density. Nutrition plays just as vital of a role as genetics when it comes to producing quality wool. Sheep kept in proper nutritional status will produce higher quality fleeces. Another area that tends to get overlooked with wool quality is the cleanliness of the wool and how it is managed prior to it being sheared. Depending on how a flock of sheep is managed can dictate how clean the wool is on the sheep. Sheep in a pasture setting where they are grazing tend to have cleaner fleeces. Sheep that are kept in confinement and fed hay in hay feeders tend to get more vegetable matter in their wool due to hay being thrown over them and sheep having to eat out of feeders. Cleaner wool means more money for the producer, particularly if you are paid on a clean basis.

A well managed fleece on the sheep can be ruined easily at shearing time, so proper section of a shearer and wool management after the wool has been sheared is crucial. Shearers should be able to shear a fleece in one piece with minimal second cuts and skin cuts. Shearers should also handle sheep carefully; especially pregnant ewes close to lambing.

When shearing follow these suggestions:

- Shear only when fleeces are dry
- Keep shearing facility and floor clean
- Make sure shears separate belly wool from the rest of the fleece
- Keep all dark fibered wool separate from clean white wool
- If shearing multiple breeds, (Suffolk and Colombia) keep breed wool separate from each other
- Properly pack and store wool in appropriate wool bags and store it in a cool, dry place.

When you shear your sheep will depend on your production cycle. Many producers will shear just prior to lambing which is normally in the early spring. However, due to the lack of shearers in the county, you may be forced to shear your flock when sheep shearer's are in your area. There are sheep shearing schools available to producers to learn to shear their own sheep. Visit with your local Extension Office, State Sheep Extension Specialists or State Sheep Associations to get contacts for shearers.

For more information

Colorado State University Extension fact sheets and publications can be viewed and downloaded from the CSU Extension Website at:

<http://extension.colostate.edu>



**COLORADO STATE UNIVERSITY
EXTENSION**

Extension programs are available to all without discrimination. Colorado State University Extension, US Department of Agriculture and Colorado counties cooperating.

References

- Jones G. Keithly. (2004, January) USDA: Trends in the U.S. Sheep Industry. Pg. 1-4
- National Agriculture Statistics Service (NASS) USDA. (2011, August) Overview of the United States Sheep and Goat Industry ISSN:
- Mathis P. Clay, Ross, Tim. (2005, January) New Mexico State University Cooperative Extension Service. Sheep Production and Management, Circular 604
- Thompson M. James (2006, November) Oregon State University Extension Service. Sheep Production Guide.
- National Agriculture Statistics Service (NASS) USDA. (2018, January) Sheep and Goats ISSN: 1949-1611
- American Sheep Industry Association, Inc. (2015) Volume 8 Sheep Production Handbook
- David G. Pugh, DVM, MS, MAg, DACT, DACVN, DACVM, Department of Pathobiology, College of Veterinary Medicine, Auburn University Nutritional Requirements of Sheep.
- Armstrong M. David, Medina Lauren, Vespa Jonathan, (2018, March) Demographic Turning Points for the United States: Population Projections for 2020 to 2060. United States Census Bureau. Retrieved from:
https://www.census.gov/content/dam/Census/library/publications/2018/demo/P25_1144.pdf
- Breeds of Livestock. Sheep Breeds (2018) Oklahoma State University, Department of Animal Science. Retrieved from: <http://afs.okstate.edu/breeds/sheep>
- Holcomb B. George, Howard W. "Bud" Kerr, Jr. (1993, July) Sheep: A Small-Scale Agriculture Alternative, University of California: Small Farm Program: Retrieved from:
<http://sfp.ucdavis.edu/pubs/brochures/sheep/>
- Dr. S. John Martin - Veterinary Scientist, Sheep, Goat and Swine (2010, April) Assisting the Ewe at Lambing. Fact Sheet, ISSN: 1198-712X
- Van Metre D. (2014, December) Q Fever, Livestock Series Health Fact Sheet No. 8.022 Colorado State University Extension

New Mexico State University College of Agriculture, Consumer, and Environmental Sciences. Sheep Production and Management. Retrieved from: <https://aces.nmsu.edu/newmexicosheep/sheep-health.html>)

Schoenian Susan (2017, December) Sheep 201, A Beginners Guide to raising Sheep. Retrieved from: <http://www.sheep101.info/201/>

USDA Sheep 2011 Part 1: Reference of Sheep Management Practices in the United States, 2011 NAHMS

Gifford, Craig. Ward, Marcy (2017, April) Sheep Nutrition, New Mexico State University Extension Service, Circular 685

The Center for Food Security and Public Health (2011, November) Blue Tongue, Iowa State University

Spencer, Robert (2018, January) Nutrient Requirements of Sheep and Goats, Alabama A&M and Auburn Universities Extension

San Filippo, Michael (2018, January) Press Release, AVMA Urges Congressional Action on Veterinary Shortages. American Veterinarian Medical Association. Retrieved from: <https://www.avma.org/News/PressRoom/Pages/AVMA-urges-congressional-action-on-veterinary-shortages.aspx>

