



Shepherding 101 Getting Started



This publication is available to view or download online at <http://www.ablamb.ca>

Alberta Lamb Producers
Agriculture Centre,
97 East Lake Ramp NE
Airdrie, AB T4A 0C3
Phone: 403-948-8533
Fax: 403-912-1455
Email: info@ablamb.ca



Lorna Gibson

Alberta Sheep Producer for 25 years
Meat Sensory Science Biologist, retired 2011
Lacombe Research Centre, Agriculture and Agri-Food Canada
Vet and Animal Science Technician, Lacombe, AB

Acknowledgements

Susan Hosford, Alberta Ag, Food and Rural Development, for information and background on Alberta's Sheep Industry and the Alberta Lamb Traceability Pilot Project.

Tracy Hagedorn, for her wonderful pictures of lambs, ewes, rams, facilities, tagging, pastures, guardian dogs, and carcasses.

Alberta Lamb Producers

Alberta sheep producers

Saskatchewan Sheep Development Board

© 2013 Alberta Lamb Producers. All rights reserved. No part of this publication may be reproduced in any form, or by any means whatsoever, without the prior written consent of Alberta Lamb Producers. No part of this publication can be used or reproduced without acknowledging that Alberta Lamb Producers is the author of this publication and is the owner of the copyright. For further information contact Alberta Lamb Producers at (403) 948-8533.

The Parties further agree that any reproduction, publication or distribution of the Resource Manual by the Parties or any licensee of the Parties shall contain the following legal disclaimer:

This document is provided by Alberta Lamb Producers and may be used for informational and resource purposes only. In developing this document Alberta Lamb Producers has compiled the information in good faith, has used the most current information available and has taken reasonable efforts to ensure that the contents are accurate and reliable. Alberta Lamb Producers does not, however, warrant the quality, timeliness, adequacy, accuracy, suitability or completeness of the contents of this document. Alberta Lamb Producers shall not be liable or responsible for any claim or damage, direct or indirect, arising out of the interpretation, reliance upon or other use of this information. This document is not intended to be a definitive statement of small ruminant business practices. The information in this document should not be used as a substitute for obtaining suitable professional advice.

Publisher

Alberta Lamb Producers

This publication has been made possible by funding from the Alberta Livestock and Meat Agency.

© 2013, Alberta Lamb Producers



Contents

1. Introduction to Shepherding	1
The History of Sheep.....	1
Sheep Today.....	1
2. Why Get into the Sheep Business?.....	4
Why Do People Get Out of Sheep? (Or, Why Isn't Everyone Raising Sheep?).....	4
3. What Type of Sheep Operation is Right for You?	6
Extensive Sheep Production.....	6
Intensive Sheep Production.....	7
Farm Flocks.....	8
Feedlot Production.....	8
Other Considerations.....	9
Terminal Sires.....	9
Hair, Heritage, and Fine Wool Sheep.....	10
4. Breeding Programs.....	11
Pure Breeding.....	11
Two-way Cross.....	11
Three-way Cross.....	12
Four-way Cross.....	12
5. Facilities and Equipment.....	13
Sheep Housing Recommendations.....	14
Facilities for Winter and Early Spring Lambing.....	14
Lambing Jugs.....	15
Hardening Pens.....	15
Handling Areas.....	16
Sheep Instincts and Behaviour.....	18
Fencing.....	19
High Tensile Electric Fencing.....	19
Temporary Electric Fencing.....	20
High Tensile Fencing without Electricity.....	20
Field Fencing (Predator Fence).....	21
6. Predators	21
7. Sheep Nutrition.....	22
Basic Nutritional Needs.....	23
Energy.....	23
Crude Protein.....	23
Minerals and Vitamins.....	24

Feed Testing and Other Considerations.....	25
The Importance of Proper Nutrition.....	26
8. Body Condition Scoring	27
Steps for Body Condition Scoring Your Sheep.....	27
Score of 1.....	28
Score of 2.....	28
Score of 3.....	28
Score of 4.....	29
Score of 5.....	29
9. Flock Health.....	29
Steps to a Physical Exam	30
Health Problems of Rams.....	31
Epididymitis (<i>Brucella ovis</i>).....	31
Health Problems of Rams, Ewes and Lambs	31
Caseous Lymphadenitis	31
Footrot.....	32
Orf/Soremouth	32
Malignant Catarrhal Fever.....	33
Health Problems of Pregnant Ewes.....	33
Pregnancy Toxaemia (Twin Lamb Disease)	33
Hypocalcaemia (Milk Fever).....	33
Vaginal Prolapse	34
Abortion	34
10. Antibiotics	35
11. Reproduction	35
The Ram.....	35
The Ewe	36
Parturition: The Stages of Lambing	36
Signs of a Normal Birth	37
Signs of Dystocia (Difficult Birth)	39
Lambing Presentations	40
Basic Lambing Supplies.....	41
12. Processing and Care of Newborn Lambs	41
Care of Orphans	43
Health Problems of Young Lambs	44
Hypothermia.....	44
Starvation and Colostrum Deprivation	44
Scours	44
Pneumonia	44
Joint Ill.....	45

Entropion (Inverted Eyelids)	45
White Muscle Disease	45
Health Problems of Older Lambs	45
Enterotoxaemia (Pulpy Kidney)	45
Worms (Roundworms, Tapeworms, and Flukes)	45
Coccidiosis	46
Rumen Acidosis (Grain Overload)	46
Urinary Calculi (Bladder Stones / Water Belly)	46
13. Markets	47
Dairy Products	47
Wool	47
Meat	48
Breeding Stock / Genetics	50
14. Why Keep Records?	50
Electronic Data Collection	52
Electronic Tags (RFID)	52
Farm Works	53
Flock Snapshot	53
Mandatory Programs	54
Premises Identification	54
Alberta Livestock Manifest	54
Canadian Sheep Identification Program (CSIP)	55
15. In Conclusion	55
Review: Top Ten Most Frequently Asked Questions:	56
Sheep Terminology	59
References	69
Breeds of Sheep	69
Consumer Studies	69
Health and Diseases	69
Lambing	70
Marketing	70
Nutrition	70
Predators	70
Reproduction	70
Sheep Housing	70
Statistics	71
Additional Resources	71
Alberta Lamb Producers Website and Links	71
Animal Handling	71

History of Sheep	71
Industry Websites	71
Resources to Assist in Raising Sheep	72

1. Introduction to Shepherding

The History of Sheep

Sheep have been domesticated for about 7000 years. They are most likely descended from the wild mouflon of Europe and Asia. The first animals known to have been domesticated as a source of food are sheep in the Middle East. The proof is the high proportion of bones of one-year-old sheep discarded in a settlement at Shanidar, in what is now northern Iraq. Goats followed soon after, and these two become the standard animals of the nomadic pastoralists—tribes which move all year long with their flocks, guided by the availability of fresh grass. The first reason for herding sheep was to secure a regular supply of fresh meat. The herdsmen had a living larder always at hand and a supply of dairy products as well. Sheep have been milked for thousands of years and were milked long before the first cow was milked. These animals also provided for almost every other need of early man. While alive, they produced dung to fertilize the crops or provide heat when burned. When dead, their bodies provided leather and wool are used for making garments, horns and bones for the sharp points of needles or arrows, fat for tallow candles, and hooves for making glue.

Sheep meat and milk were two of the earliest staple proteins consumed by human civilization after the transition from hunting and gathering to agriculture. Sheep meat prepared for food is known as either mutton or lamb. "Mutton" is derived from the Old French *moton*, which was the word for sheep used by the Anglo-Norman rulers of much of the British Isles in the Middle Ages. This became the name for sheep meat in English, while the Old English word *sceap* was kept for the live animal. Throughout modern history, "mutton" has been limited to the meat of mature sheep, usually at least two years of age; "lamb" is used for that of immature sheep less than a year of age.

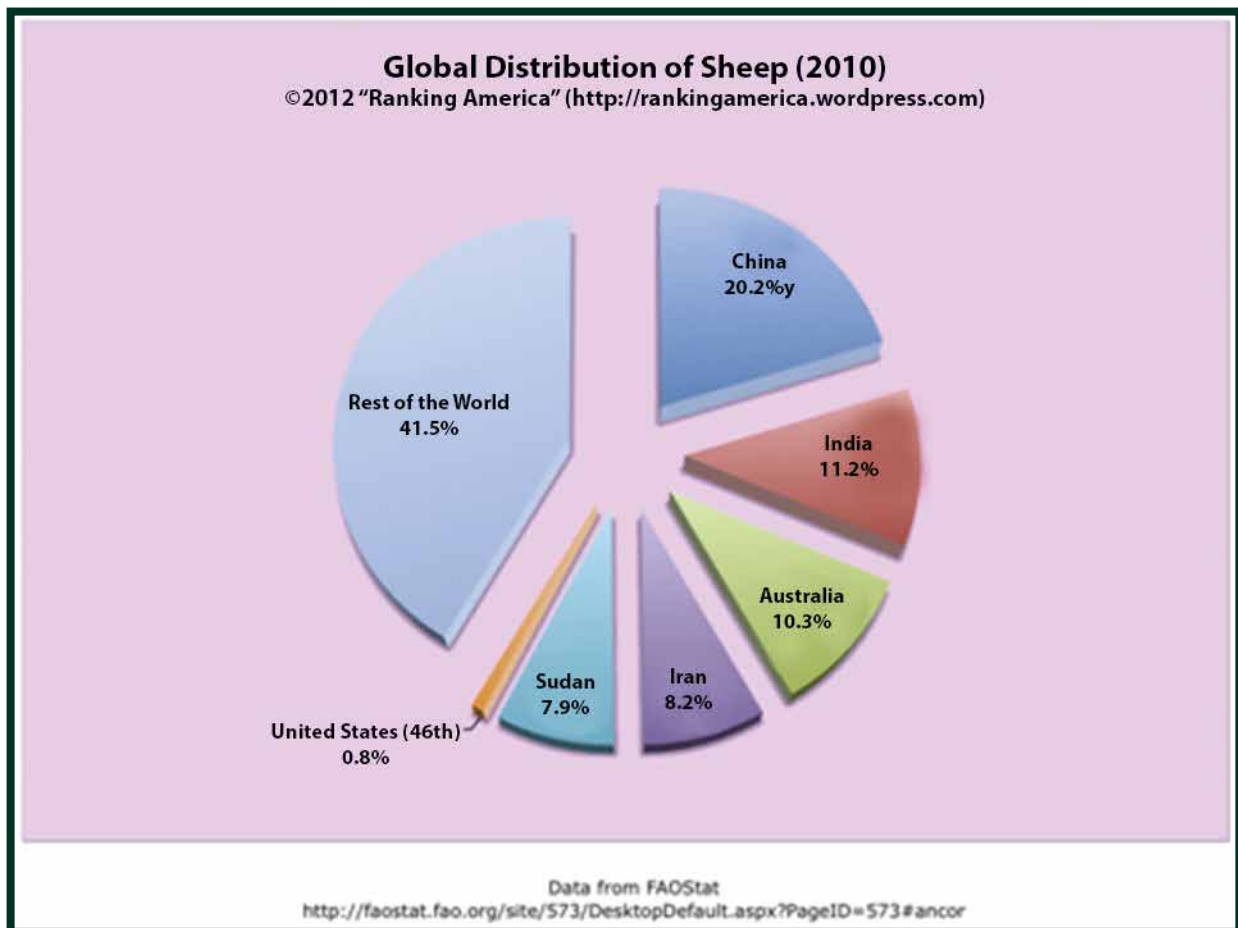
As a key animal in the history of farming, sheep have a deeply entrenched place in human culture, and find representation in much modern language and symbology. As livestock, sheep are most often associated with pastoral, Arcadian imagery. Sheep figure in many mythologies, in such stories as the Golden Fleece, and in major religions and traditions. In both ancient and modern religious ritual, sheep have been used as sacrificial animals.

Sheep Today

Sheep have followed man all over the world from the northern climates of Europe, to the dry heat of deserts, to the wide open spaces of Australia. There are more breeds of sheep than breeds of any other livestock species. Worldwide, there are more than one thousand distinct sheep breeds. Breeds are classified according to their primary purpose (meat, milk, or wool), the type of fibres they grow (fine, medium, long or carpet wool, or hair), the colour of their faces (black, white, red or mottled), and/or by specific physical or production characteristics. Over the centuries, breeds have been selected and bred for specific attributes. For example, the Merino, one of the oldest established breed in the world, is well known for its fine wool quality. Today the

world's commercial dairy sheep industry is concentrated in Europe and the countries on or near the Mediterranean Sea.

Recent figures show the world sheep population to be approximately 1,202,920,000, with the People's Republic of China raising the largest number, with 134,021,213 head of sheep or 20.2% of the world's total. According to the Food and Agricultural Organization of the United Nations, in 2010 the United States had a total stock of 5,620,000 head of sheep, or 8% of the world's total sheep stock (*rankingamerica.wordpress.com*, June 2012). Flock size in the world has been declining over the past 25 years. New Zealand now has fewer than 35 million sheep, whereas in the early 1980s they had 70 million. Australia had 150 million about 20 years ago, but now stands at 71.6 million, the lowest in 100 years. This trend is also seen in Argentina, Uruguay, Britain, France, Spain, Italy, Turkey and South Africa. In the 1940s the USA had about 50 million sheep, but by 2010 they had fewer than six million and numbers are still declining. A fundamental reason for this decline is that the international wool industry has been in decline, with drought, flooding, increased price of grain and economic pressure as contributing factors.



The number of sheep on Canadian farms has increased to 828,600 head as of January 1, 2012, an increase of 2.0% from the same date in 2011. In Canada, Ontario has the highest number of sheep followed by Quebec, with Alberta third. The Canadian sheep flock is showing signs of re-

building in parts of the country, with the number of ewes and lambs kept for breeding increasing, by 0.6% and 4.1% respectively, from a year ago. All provinces except Quebec and Newfoundland and Labrador reported increases in the ewe and ewe lambs kept for breeding. The total number of sheep and lambs slaughtered in Canada decreased to 698,800 head in 2011, a decline of 2.1% from 2010 (Statistics Canada, Sheep Statistics 2012 Catalogue No. 23-011-X).

On Alberta farms, the total number of sheep and lambs increased to 136,000 head, an increase of 2.3%, with approximately 1800 Alberta lamb producers. (Statistics Canada, Sheep Statistics - 2012). The majority of sheep flocks in Alberta are quite small (< 50 – 62%). These flocks, however, only produce a small portion of the lamb in the province (9.6%) (Alberta Lamb Producers *N'ewesletter*, Sept 2010). The medium (approximately 150 ewes), large (approximately 350 head) and very large flocks (over 800 head) (ALP *N'ewesletter*, February 2011) which account for 13% of the Alberta sheep flock that produce 68% of the total Alberta lamb (ALP *N'ewesletter*, September 2010).

The consumption of lamb in Canada has been on a steady rise over the last few years, and research reports give a strong indication that consumption will continue to rise at a steady and predictable rate over the next few years. Sales of lamb and goat products, such as cheeses, milk, ground meat, and paté, have also seen a major increase over the last few years. This increase in lamb consumption in Canada can be attributed to Canada's increasingly diverse population, with growing ethnic communities. Lamb and goat are considered to be the alternatives to beef for those who do not consume beef products, as they both have the same great protein content, which is highly recommended for good health. Also, the post-war generation of Canada has a higher disposable income, is eating out more and consuming more gourmet meals, organic or natural healthy food.

The Canadian food service and retailers have been buying more lamb products to better serve their customers. Canadians love Canadian lamb, but over 50% of the lamb eaten is imported. In part, the domestic supply of lamb cannot satisfy the demand, and additionally, imported lamb is cheaper and available year round. Canadian consumer studies have reported that Canadian consumers are willing to pay more for domestic lamb, but it has to be a consistent great eating experience (The Canadian Consumer, May 2010. http://www.gov.mb.ca/agriculture/statistics/food/canada_consumer_report_en.pdf).

It is estimated that Canadian domestic production only supplies approximately 40% of the demand for sheep and lamb in this country. With the per capita consumption of lamb increasing, there is a great potential for growth within the sheep industry.

The goal of this manual is to provide basic information on sheep production to producers interested in increasing their small flocks or just entering into the sheep industry in Alberta.

2. Why Get into the Sheep Business?

Some people start out by getting sheep for training dogs, to mow their lawns, or raise as 4-H projects. With the strong market demand for lamb, some have decided they can also use their sheep for income. Others are diversifying, or leaving one form of agricultural business on their farm and looking for another type of livestock that can be raised using existing buildings and facilities.

The question is, why should they consider sheep? Some of the advantages of entering the sheep business are that the entry cost for the individual animals and facilities is lower, when compared to the dairy industry, or the price of buying a herd of beef cattle. Also, the financial returns can be quicker than with other livestock, when you can lamb out your ewes in the spring and have the offspring sold in less than a year.

Another advantage is that existing buildings and structures can be adapted to house sheep. Several hog facilities have converted barns to lambing facilities that work very well.

Sheep are more efficient grazers than cattle, and you can graze five sheep for every one cow. Sheep also adapt well to multispecies grazing, foraging on different plant species than cattle when pastured together, and helping to improve pastures and marginal land by controlling weeds and unwanted vegetation.

Another common reason for keeping sheep is that their size and temperament make them somewhat easier to handle for all members of the family. Many women feel more comfortable working around sheep than with cattle, especially at birthing time. Lambs are excellent 4-H projects for children because of their size and ease of handling.

And of course, with the shortage of lamb, there is demand for the product, both for market lambs and breeding stock. There are different avenues for selling your meat animals, such as private sales, niche markets, auction marts, feedlots, or direct to slaughter. The demand has never been higher.

Why Do People Get Out of Sheep? (Or, Why Isn't Everyone Raising Sheep?)

It is important to know why people get out of sheep so you can anticipate and solve these problems before they occur, or be prepared if faced with a difficult situation. Fencing is a major problem that deters people from starting or staying in the sheep business. Only a few strands of electric fence are required to keep cattle in, but with sheep you need good fencing, both to keep them in and to try to keep predators out. This may consist of six strand electric fence, page wire, wood corrals, or a combination of some or all of them.

Animal loss due to predators is one of the most frustrating and discouraging problems shepherds may be faced with. Coyotes are smart, adaptable animals that can bring financial and emotional distress to a sheep business. In some areas of Alberta shepherds also work to protect their flock

from bears, cougars, wolves, and domestic dogs. They use guardian animals, good fencing, trapping, hunting, and or a combination of all of these to prevent or minimize the loss to predators, but sometimes the frustration, time, work and financial loss can force people out of the sheep business.

Depending on the standard of living you desire, if you want to make a living from raising sheep, without an off farm income, you will need a large number of sheep. Generally, with once a year lambing you will need 600 to 1000 ewes or more for a full time income. What is more important than the number of ewes is the net income per lamb and number of lambs marketed. When people find out that raising sheep is more work and time intensive than they had expected, especially at lambing time, many leave the business. There is a lack of knowledgeable, experienced help available here in Canada when it comes to sheep. This includes nutrition experts, veterinarians, or lambing time help.

It is important to understand the financial costs specific to the sheep industry and plan your operation accordingly. Depending on where you live in the province, shipping costs can be a significant expense. The cost of fuel to haul animals to markets or slaughter plants, or to sell your product at farmers markets, can be very high. Another expense is renovating or building barns or handling facilities. If you decide to switch to winter lambing, barns need to be insulated, and more shelter provided. Most sheep need to be shorn yearly. Shearing can be labour intensive and finding skilled shearers at the desired time can be difficult. At one time, the sale of the wool would pay for the cost of shearing, but with the increase in synthetics, the current return on wool is low. As a result, more hair sheep have been introduced into the country. Finding breeding stock can be another obstacle if you are trying to purchase a flock or to expand. With the demand of breeding stock high, many producers are keeping back their own breeding stock, or have ewe lambs spoken for even before they are born. As a result, purchasing breeding stock may be too costly for producers attempting to increase their flocks to the size they require to remain in the business.

One area of concern that must be addressed, but which is often overlooked, is knowledge on how to take care of a flock. Entering the industry with knowledge of the animals you are planning to raise can mean the difference between disaster and success. The care and requirements to enable these animals to grow, develop and reproduce to their optimum potential may be very different from other species. Sheep are not small cattle, and cannot be raised as such. However, a lot of information on raising sheep is available on the internet, in books, and in courses. Nutrition is particularly important. Many lambing disasters and lamb losses are caused by people not using the right or enough salt or minerals. Lack of salt can cause goitre, too much copper can cause copper poisoning, and lack of mineral and vitamins can result in weak, deformed or dead lambs. Additionally, many people have left the sheep business because they jumped in with too many animals for their facilities, manpower, and knowledge. By starting small and building up your flock, you can determine your problems and remedy them without a large loss of animal life and financial loss.

Being prepared with the information to help prevent or minimize these problems that have caused others to leave the sheep business will help prevent the same problems from happening to you. Be motivated to be a self-learner by attending courses and conferences, and visiting other sheep operations. Talk, listen and learn from successful sheep producers. Everything you learn will help you to build a successful sheep business plan and provide tools for your future sheep enterprise.

3. What Type of Sheep Operation is Right for You?

There are four different types of sheep operations common in Alberta: extensive sheep production, intensive sheep production, farm flocks and feedlot production. The type of operation you choose will dictate which breed or breeds of sheep are best fitted to your plans.

Extensive Sheep Production

This type of farm practice involves large flocks on a large land base. Animals are kept outdoors year round, on pasture. Lambs are born on pasture in the spring, raised on grass in large grazing sites, and weaned in the fall and shipped at eight to 10 months of age. This is an excellent forage management system, often exploiting different forages at different times of the year to make the



most efficient use of forage and crops available during the summer and after harvest of grains, sugar beets, and peas. Range ewes selected for this type of operation are typically large wool type sheep which are extremely hardy, with lower lambing percentages and excellent flocking instincts. The ewes need to be able to lamb easily without assistance and require minimal management. Sheep breeds often selected for range extensive production are, Rambouillet, Targhee, and less commonly in Alberta, Columbia, and Meat Merino. These purebred and crossbred range ewes are often bred to terminal rams, such as Hampshire, Dorset, or Suffolk, to improve the meat characteristics while preserving the hardiness and flocking instinct.



Intensive Sheep Production

Intensive sheep production operations focus on efficiencies in reproduction, lamb management, and finishing. Often this type of system raises lambs year round indoors. As a result, extensive investment is required in facilities and labour. The advantage is that lambs can be marketed year round with lambs shipped at finished weight sooner, at three to six months of age.



Maternal productive breeds of ewes are selected for use in intensive sheep operations to produce vigorous multiple litters, with an extended breeding season. Some maternal ewe breeds raised in Alberta are Rideau Arcott (250% lambing), Romanov (270%), Finnish Landrace (265%), East Friesian (230%), and Polypay (190%). These prolific ewes mature early, often breed out of season, have increased milk production and are known for their mothering ability. Lambs from these purebred breeds are less muscled, grow more slowly and mature at a smaller size. Therefore, ewes are often bred to terminal sires to produce lambs that grow faster and make excellent market lambs. The disadvantage of using these highly prolific breeds is that more enclosed facilities are required for lambing and housing, and supplementation of orphans is required. Otherwise, lamb mortality can be high.



Farm Flocks

Farm Flocks combine elements of both intensive and extensive operations. Lambs are born in barns or sheds, pasture grazed during the summer months, weaned and either sold in the fall to feedlots, or corralled or kept in a feedlot in the winter until market, being shipped at six to eight months of age. Ewes for farm flocks are selected for ease of handling, minimal help at lambing, and their ability to provide ample amount of colostrum for their lambs and to raise them well on pasture until weaning. Farm flock ewes are often selected from the prolific maternal breeds and are often crossed with another maternal ewe breed with a lower lambing percentage to produce a maternal cross ewe which can produce the number of lambs best suited for raising on pasture. Some of these breeds include Dorsets (175%) for their mother traits, Cheviots (170%) for easy of birth of vigorous lambs and strong protective instinct, or Clun Forest (180%) which are hardy and easy keepers on a pasture-based management system.



Lambing in a barn

Pasture raised

Winter corralled

Lambs finished in a feedlot

Feedlot Production

Feedlot buyers purchase light lambs directly from farmers or auctions to put into their feedlots. The lambs are gradually introduced to grain, then fed on high-energy diets until finished. Weight gains are monitored to achieve optimum finish for market. Contracts are often set in advance with slaughter facilities. Disease and health issues can be serious problems, as a result of purchasing many lambs from multiple sources. Monitoring the health of the lambs, treating sick animals and keeping accurate records regarding drug withdrawal are essential. A feedlot producer has no need to maintain a breeding flock if the primary business is finishing lambs.



Feedlot lambs

Other Considerations

Terminal Sires

Terminal or meat breeds are known for their fast growth rates and larger mature size, and produce quality market lambs. Lamb carcasses are well muscled in shoulder, loin and leg with a lean fat cover. Ewes of meat breeds tend to have lower lambing percentage, with higher birth weights, which may cause lambing problems, especially in ewe lambs. A terminal sire is one whose offspring are all marketed for slaughter. The Suffolk is the most common terminal sire in North America. Because all of the offspring are slaughtered, terminal sire breeds are selected primarily for growth and carcass traits. Mothering traits such as less milk production and lamb bonding are not as strong in these ewes as in the maternal ewe breeds. Well known terminal sire breeds in Alberta are Suffolk (180% lamb production), Hampshire (160%), Canadian Arcott (180%), Charollais (175%), Texel (150%), and Ile de France (180%). Using a terminal sire produces better market lamb carcasses, resulting in the high quality food product consumers want. Retail stores and restaurants require consistent cuts of lamb with consistently low fat to keep Canadian lamb consumers coming back for more. Consumers expect consistent size and quality when they buy meat, especially premium meats like lamb.



Suffolk



Charollais



Hampshire



Canadian Arcott



Texel



Ile de France

Well known terminal sire breeds in Alberta

Hair, Heritage, and Fine Wool Sheep

With the cost of shearing and the low return on wool, more breeds of hair sheep have been introduced into the country. Dorpers are a meat breed developed for dry areas. They have a mixture of hair and wool which drops off if not shorn. Ewes breed out of season, producing lambs (150%) that convert feed efficiently in intensive systems. The Katahdin is a medium sized, lean breed of meat sheep. They were first developed in Maine, USA. Katahdins shed their coat in the spring, and so require no shearing or tail-docking. Small at birth, lambs grow and mature rapidly to an acceptable market weight with good forage based management or with grain supplementation. The Dorper and the Katahdin are the two most common hair breeds in Canada. Often the two breeds are crossed. The Barbados Blackbelly is probably the third most common and the remaining three breeds, Wiltshire, Royal White, and St. Croix, are very uncommon. The disadvantage of these breeds is their slower growth rate, lower finish weight, and fat distribution on their carcasses.



Dorper

Katahdin

Barbados Blackbelly

Most common breeds of hair sheep in Canada

Several heritage and fine wool sheep are raised in Alberta. There is always a specialty market for heritage breeds for collectors of rare breeds such as Karakul, Jacob, Shetland, and Scottish Blackface. Jacob, Corriedale, Cotswold, and Icelandic fine wool is in demand with hand spinners, weavers, and crafters, who will pay a premium for their fleece.



Jacob

Karakul

Scottish Blackface

Several heritage and fine wool sheep are raised in Alberta

4. Breeding Programs

Purebred breeders rely on selection to improve traits in their flocks, while commercial breeders take advantage of the selection practised by purebred breeders when they purchase rams from them. Selection can be defined as choosing some animals to be parents of the next generation, while denying others through castration, culling, or shipping to slaughter. Generally the animals that display the traits desired by the breeder are the ones that get selected (e.g. high lambing percentage, or growth rate).

Pure Breeding

Pure breeding is the simplest breeding system. Rams and ewes are of the same breed, as are the lambs produced. The advantages of pure breeding include the uniformity of the flock, the requirements for only one breed of ram, and the potential need for only one pen at breeding time. The disadvantage of pure breeding is the lower productivity of purebred sheep.



Purebred ewe x Purebred ram of the same breed as the ewe = Purebred offspring

Two-way Cross

In a two-way cross system, rams of one breed are mated to ewes of a second breed to produce crossbred lambs. The crossbred animal that results from mating of a ram of one breed to a ewe of a completely different breed is usually referred to as an F1 cross. For example, a producer with a Dorset ewe flock might breed the ewe flock to a Suffolk ram to improve the growth rate and size of the lambs for market.

The advantages of the two-way cross system are the same as those of the purebred system, as the flock owner still has only one breed of ewes and one breed of ram to contend with. Additional benefits include the improved vigour and survivability of the crossbred lambs (hybrid vigour) as well as the faster growth rate of the Suffolk-sired lambs.

The disadvantages of the two-way cross system include the lower productivity of the purebred ewe flock, and the inconvenience of having to buy female replacements, as a result of all lambs being half-terminal crosses to be sold for meat.



Purebred ewe of a maternal breed x Ram of a different breed (Terminal) = Crossbred F1 offspring

Three-way Cross

In a three-way cross system, crossbred ewes are mated with rams of a third breed, for example, mating ewes that are half Rideau Arcott and half Dorset with Suffolk rams. This system has all of the advantages described above for the two-way cross system, with the significant advantage of the improved reproductive performance of crossbred ewes, resulting in greatly improved productivity of the entire flock. Studies have shown that the three-way cross system can produce 32% more pounds of lamb weaned per ewe exposed, compared to the average of the three pure breeds making up the cross.

The disadvantage of this system is the inconvenience of having to buy female replacements, since all lambs will be half-Suffolk (terminal) crosses.



2-way crossbred maternal ewe x Ram of a different breed (Terminal) = 3-way crossbred offspring

Four-way Cross

Used less often than the three-way, the four-way cross can be used to take advantage of the hybrid vigour of your crossbred rams. As in the three-way cross, crossbred ewes are kept as the main breeding flock, but are mated with a crossbred ram—for example, mating crossbred ewes that are half Rideau Arcott and half Dorset with a crossbred ram of half Suffolk and half Ile De France. Again there is the inconvenience of having to buy female replacements, since all lambs will be half terminal genetically.



2-way crossbred maternal ewe x 2-way crossbred terminal sire = 4-way crossbred offspring

Note

- for more information on genetics, crossbreeding and hybrid vigour, refer to The Western Canadian Sheep Production Manual. 1999. Pages 12-15.

5. Facilities and Equipment

The type of facilities you have or build will be closely related to the type of sheep operation you plan to manage. It is important to remember that having modest equipment and a good working plan will work better than expensive equipment and poor working planning. Have a good understanding of what is required for the operation before you start building or remodelling. Know the standard square footage that ewes, ewes with lambs, or finishing lambs require. It is a good idea to visit several different sheep operations of various types and sizes, including operations that lamb in the winter, spring, or use confined housing year round. Make a rough drawing of your farm site, including existing buildings, corrals, water lines, power lines, dugouts, creeks or other waterways. Then plan what can be used and what will be required. How many ewes do you plan to have, how will they be housed in the winter and what type of buildings will be required? Where will you lamb them out? Will you need insulated barns, claiming pens or will you do pasture lambing? Will you feed your sheep and lambs from fence line feed bunks, in-pen troughs, or self-feeders? How will you remove the manure from the buildings, and where will it be put? Where will you situate the handling and sorting chutes to be easily accessible to other pens or alleys? Remember to include a sick pen and isolation pen away from the main flock. Try to see your barns, chutes, gates and feeders from the sheep's eye view. Especially consider sheep behaviour and instinct when designing all your working areas. Make your plans flexible for growth or operation changes. Then have at least one experienced shepherd analyze it and advise you on improvements or changes.

Sheep Housing Recommendations

Sheep housing guidelines and building plans for facilities can be found in a variety of sources, on-line and in print. The Recommended Code of Practice for the Care and Handling of Farm Animals: Sheep, which is currently under revision, provides basic housing guidelines (<http://www.nfacc.ca/codes-of-practice/sheep>). A variety of building plans can be obtained through Canada Plan Service (<http://www.cps.gov.on.ca/english/frameindex.htm>). These are guidelines only, and actual space requirements of your animals will depend on breed, size and prolificacy of your ewes. For more detailed Alberta specific housing information, an Infrastructure module will be available from Alberta Lamb Producers in 2013.



Facilities for Winter and Early Spring Lambing

If planning to lamb in winter or early spring, insulated barns or sections of barns should be provided. Spring lambing operations should have at minimum, a pole or tarp shed, lots of bedding and wind breaks. Drop pens are areas where ewes close to lambing are fed, bedded and watched closely. The ewes usually lamb in this area; the ewe and lambs are then moved into lambing jugs. In cold weather ewes may need to be moved into an insulated area with jugs as soon as labour has started or soon after the first lamb has been born, to prevent lamb loss to hypothermia.



Lambing Jugs

Lambing jugs are small pens used for holding individual ewes and their lambs soon after birth. These pens help to keep the lambs safe with their mother until a strong bond has developed. It also gives the shepherd time to observe that the ewe has accepted her lambs, is providing milk, and that all lambs are healthy. This small pen makes it easier to check the ewe for any udder problems such as mastitis, damaged teats, or lack of milk. Lambing jugs can be constructed out of wood or metal, minimum five feet by five for ewes with twins, larger for ewes with more lambs or for larger ewe breeds. The time while the ewes are in the jugs also provides an opportunity to administer selenium or vitamins ADE, castrate, dock tails, paint brand and tag the lambs. The shepherd can also deworm the ewe, if needed, and record any lambing problems, milk deficiencies, and mothering and health problems. Time spent in the jug will depend on the number of jugs available and the rate which ewes are lambing. Ewes and lambs that are doing well are kept in the jugs 24 to 36 hours for singles, up to 48 hours for twins. Ewes with triplets, small or sick lambs, or if the weather is poor, may need to stay in the jug up to three days before being moved into the hardening pens.



Lambing jugs- small pens for ewes and new lambs to bond

Hardening Pens

After lambs have bonded, suckled well and been processed, ewes and lambs are moved into larger areas where they can be observed. Depending on the size of the hardening pen, four to 10 ewes and their lambs are provided with clean bedding, good shelter, room for creep feeders for the lambs, hay, grain and water for the ewes. These groups may be kept together for various lengths of time (one to four weeks) depending on the weather, size of flock and type of sheep operation. Then they are merged together with others of similar age and size and moved to larger paddocks or to pastures.



Hardening pens

Handling Areas

With a well-planned and constructed handling area, fewer people can move more animals in less time, with less effort, and with lower risk of injury to the animals or handler. Properly designed scales and handling equipment incorporate animal behaviour and instinct into their design. This aids in the movement of animals through the races/chutes, sorting gates and pens, thus making treatment, deworming, sorting and tagging safer and easier. Sheep are prey animals by nature, so they seek to put distance between themselves and possible threat, including humans and dogs. They prefer to move from smaller areas to larger open areas, following each other when threatened, even if they can't see where the "herd leader" is leading them. Constructing gathering and holding pens with bars or wire panels allows the sheep to see each other. The animals will move more easily into these areas as they feel safer seeing other animals. Well-designed force pens are a "bugle" design with curving, funnel-shaped, solid walls to force animals to move forward into the treatment chute. Treatment chutes should be built to accommodate the size and height of your sheep. Having a guillotine or quick closing gate at each end of the working chute is useful for entrapping animals safely. Many chutes have solid panels that block peripheral vision, which encourages the sheep to move forward through the system towards openings that they see ahead of them. A combination of solid and removable walls with anti-backup bars allows handlers to squeeze animals in, reducing movement for tagging, drenching, weighing and other procedures. Incorporating a two- or three-way sorting gate at the end of the chute aids in the speed and ease of sorting and moving animals into sorting pens. Before you build or buy a handling system, check out other producers' systems, and ask what they like or don't like about them and what they would change. Find a system that will work best for your size and type of operation. Remember the most expensive system isn't always the best!



Two different types of chutes/races, both with solid sides for ease of movement and handling



Electronic weigh scale



Sheep tipping table for hoof trimming

- They have no depth perception.

FACTSHEET

ISSN 1198-712X ©Queen's Printer for Ontario

Agdex#: 430/20

Publication Date: 09/02

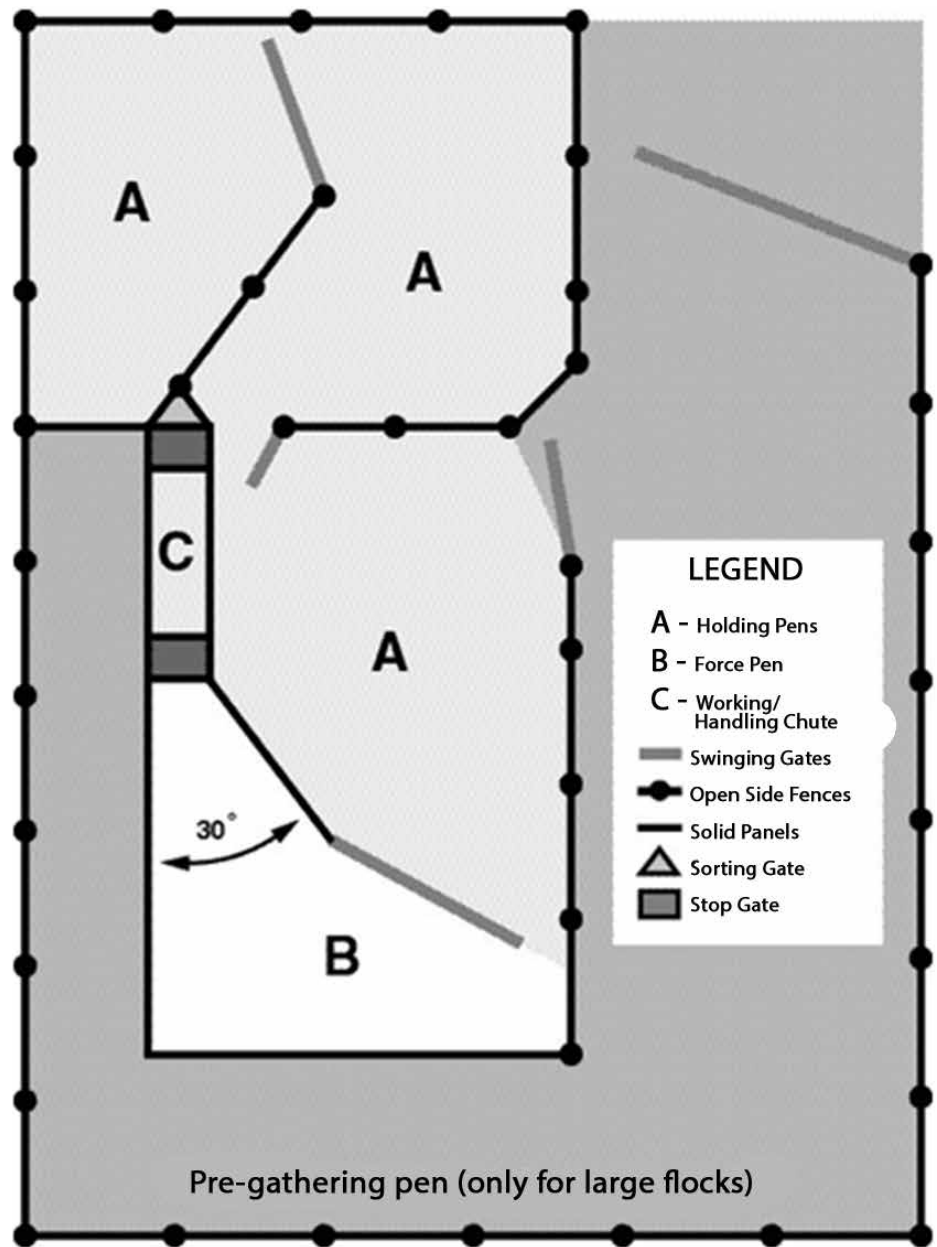
Order#: 02-057

Last Reviewed: 9 April 2010

History: Original Factsheet

Written by: Anita O'Brien - Sheep and Goat Specialist/

OMAFRA



Basic handling facility layout for sheep flocks.

Facility	Yard Dimensions		Comments
	Range (inches)	Range (cm)	
Working Race (Chute)			
Length	235 - 475	600 - 1,200	Open or closed-in sides.
Width with fixed sides	24 - 30	60 - 75	
Width with adjustable sides	18 - 32	45 - 80	
Height	32 - 35	82 - 90	Keep low if sheep are worked from outside the race.
End gate height	43	110	Sheep usually jump gates rather than sides.
Drafting Race (Chute)			
Length	118 - 138	300 - 350	Closed-in (solid) sides.
Width	17 - 19	42 - 48	Can be tapered at the bottom or of variable width.
Height	34 - 39	85 - 100	
Fence Heights			
Perimeter fence	37 - 43	95 - 110	
Internal fence	35 - 41	90 - 105	
Gates			
Perimeter	118 - 157	300 - 400	
Internal	79 - 118	200 - 300	
Draft	47 - 59	120 - 150	Open sides (see-through).
Loading Ramp to Truck			
Width	28 - 39	70 - 100	Slope not steeper than 1:3.
Length	118 - 197	300 - 500	
Height (fixed)	47	120	
Height (variable)	28 - 83	70 - 210	

Yard dimensions in centimetres (100 centimetres = 1 metre)

Adapted from Sheepyard and Shearing Shed Design. F. Conroy and P. Hanrahan. 1994

Sheep Instincts and Behaviour

When handling sheep, remember:

- Sheep are prey animals—with their eyes on the sides of their head, they see only 270°.
- They do not like shadows.
- They do not like to move into darkness.
- They move better on the flat or uphill.
- They move better through long narrow pens than through square ones.
- They move better away from handler.
- They like routine.
- Sheep have good memories.

- They don't like changes in floor surfaces.
- They have a well-developed sense of hearing, so don't yell.
- Sheep have a flight zone.
- Sheep are social animals.
- Sheep move better as a group than by themselves; they are natural followers.
- They move better towards other sheep.
- Frightened sheep **do not** move better!



Fencing

Various types of fencing material can be used to hold and pasture sheep. Electric, high tensile, field fence, planks, and hog panels are commonly used in Alberta. Fencing costs will vary on the type of fencing material used, size of the farm, distance between posts, the terrain to cover, and the use of the enclosures.



Plank force pen



Feeding pens of electric fence and hog panels

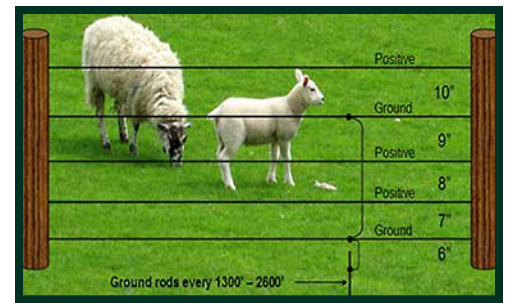
High Tensile Electric Fencing

For electric fences, five or six strands of galvanized 12.5 gauge single high tensile wire are used for outside perimeter fences, and three or four strands for interior paddocks. Insulators fasted by nails or staples are used to secure the electric fence to the posts. Ground or non powered strands can be fastened by staples and do not require insulators. Corner post insulators and in-line tighteners ensure the electric fence is not grounded out on adjacent lines. Six foot posts with 3-4 inch (7.5-10 cm) (tops can be spaced further apart than other fence types, with approximately 48 foot (14.5 metre) spacing. Heavier 4-5 (10-13 cm) inch top posts, eight feet (2.5 metres) long are recommended for corner and



Electric fence used in pastures

gate posts. It is recommended to put in lots of ground rods and connect them with heavy duty wire to the charger. To help keep coyotes out and sheep in, purchase a strong charger! Spraying under fences to control vegetation every spring will help keep the power up. For a highly functional electric fence, it is important to remove any downed trees or branches and repair any wash out spots.



Guidelines for electric fences

Temporary Electric Fencing

Temporary electric fencing is a lightweight electric fence meant to be rolled up and stored after use. These fences are portable and used to control access to temporary pastures. They are also used to increase forage utilization in pastures. Poly wire is most commonly used material in temporary fencing. It is very lightweight and easy to transport, using only two or four wires, with or without interwoven wire mesh. Plastic, nylon, or homemade rebar posts are often used to maintain these fences. Watch that animals do not get their heads and bodies wrapped in the mesh wire as it can be fatal.



Temporary electric fencing

High Tensile Fencing without Electricity

A single galvanized 12.5-gauge high tensile smooth wire is used for high tensile smooth wire fences. Staples are used to attach the wire. (Insulators are not required as in the use of electric fences.) However, fence posts are more closely spaced, at 18 feet (5.5 metres) apart. Five strands are recommended for perimeter fences, and three for interior fences.



High tensile smooth wire fences



Field Fencing (Predator Fence)

Field fence (page wire) is sold in 330 foot (100 metre) rolls. It comes in different weights and heights, however 47 inches (1.2 metres) tall is recommended for sheep. For added predator protection, three extra strands of high tensile wire can be added, two above the page wire and one offset away from the base on the outside perimeter of the fence. A charger, ground rods and insulators will be required to electrify the high tensile strands. It is recommended that all six or seven foot line posts have a spacing of 20 feet (six metres) apart. Corner, brace, and gate posts should be eight feet (2.5 metres) long. A complete plan for this fence is found in Agdex 684-7 on Alberta Agriculture and Food Website (www.agric.gov.ab.ca).



6. Predators

One of the greatest problems plaguing sheep farmers in Alberta is predation. There are coyotes, cougars, wolves, and bears, which all view sheep as a potential food source. Predators must be dealt with in order to keep your lambs alive and to stay in business. Preventing these predators from getting a taste of lamb is important, as once they start killing your livestock they can be very difficult to stop. Dispose of your deads by deep burial, burning, or well enclosed compost, so that predators cannot get at them. Well-constructed electric or predator fences are required but not always 100% effective. In the past 25 years, the use of guardian animals such as llamas, donkeys, and guardian dogs has been very beneficial in protecting farm flocks. Unfortunately, some predators, especially coyotes, have learned how to “trick” some of the guard animals and as a result more guardians per head of sheep are now required to efficiently cover flocks. The use of noise makers, radios, and flashing lights can help deter coyotes for a while. Also, confining your sheep at night in well-lit, secure pens helps deter some predators, but again, not all of them. Trappers and hunters are available and can be hired to help with the problem. In some counties, county



Field fencing (Predator fence)

field men will help with providing snares and, as a last resort, poisons. For the best results, use all methods possible to prevent predation from starting and if it does start, the killers must be found and disposed of as they will teach their young and your problem will intensify.

Purchase guardian animals that have been raised with sheep or goats and have strong bonding instincts. Male donkeys and llamas must be castrated to prevent mauling. Stop teenage guardian animals from roughhousing and playing with sheep and lambs as soon as you see any signs of it starting. With guardian dogs, the use of drags or muzzles can be helpful until they outgrow their teenage stage. Feed your guardians close to the sheep, but do not allow the sheep to eat any dog food. Remember to routinely deworm all dogs on your farm for *C. ovis*, also referred to as sheep measles. *C. ovis* has cost the industry thousands of dollars from carcasses condemned due to the cysts that result. It is a dog tapeworm that must infect sheep to complete its life cycle; it is not a sheep tapeworm. To continue the parasite's life cycle, affected sheep must be eaten by a member of the canine family. Do not allow any scavenging of your dead sheep or lambs. Consult your veterinarian to determine the most effective deworming agent to administer to your dogs and the frequency of its administration.



Guardian dog



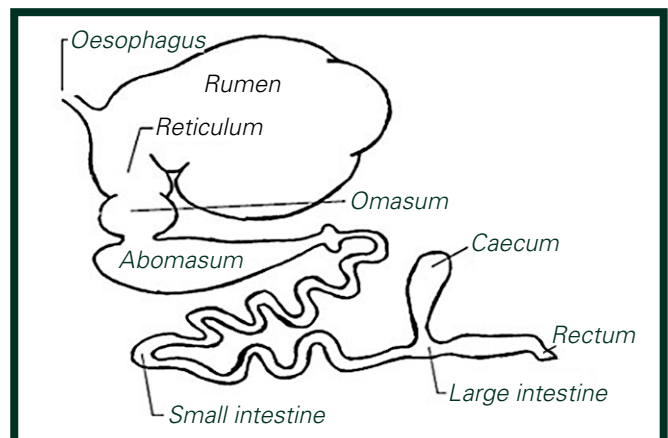
Guardian donkey



Guardian llama

7. Sheep Nutrition

Sheep are ruminants, having four stomach compartments, the rumen, reticulum, omasum, and abomasum. The large rumen allows the animal to consume plant material and retain it long enough to allow bacteria, protozoa and fungi to break down and digest the material. The abomasum is the ruminant's true stomach, and is very similar to the mono-gastric stomach of animals such as the dog or cat.



A stomach of a ruminant

Basic Nutritional Needs

All animals require basic nutrients to survive. These nutrients are water, energy, protein, and vitamins and minerals. How much of each will depend on where an animal is in its life cycle; these nutrients are used for body maintenance, growth, reproduction, pregnancy and to produce by-products (meat, wool, milk). Below is a brief overview of each nutrient.

Note

- for more detailed information, please refer to the *Sheep and Goat Management in Alberta–Nutrition Module* (http://www.ablamb.ca/documents/sgma/sgma_nutrition_module.pdf).

Water

Water is the single most important nutrient for any mammal. Limitation of water intake reduces animal performance more quickly and dramatically than any other nutrient deficiency. Livestock should be given all the water they can drink. Sheep and goats can be expected to consume two to three gallons (eight to 12 litres) of water a day.

Water quality is as important to livestock as water quantity. Water quality may affect feed consumption and animal health since poor quality water can result in reduction of water and feed consumption. Water often contains dissolved minerals, pollutants, micro-organisms, suspended solids, organic and inorganic compounds. It is recommended that at least once a year water samples should be collected from where your animals drink and sent to a certified laboratory for analysis. Water sampling and handling procedures should be followed carefully for the most reliable results. Additionally, clean stock waterers regularly to prevent growth of algae.

Energy

Energy in feedstuffs is used by the animal for metabolic processes, body heat, physical activity, growth, fat deposits, and lactation. Energy requirements for sheep are commonly measured as Total Digestible Nutrients (TDN) or Net Energy (NE). These requirements change as the environment changes (e.g. cold weather), as the animal grows and matures, and through gestation and lactation. Insufficient energy or carbohydrate intake is the number one cause of malnutrition in sheep.

Crude Protein

Crude protein in the diet supplies animals with needed amino acids (building blocks of protein) and more importantly, it supplies the nitrogen required by the micro-organisms in the rumen. These microbes utilize the nitrogen from the feed to form microbial protein which is eventually digested by the animal. This microbial protein supplies 50% or more of the absorbable amino acids when rations are balanced properly. It is important to provide the appropriate quantities and balance of amino acids to the intestine for absorption and optimal utilization; therefore the quality

and the quantity of the protein in the feed are important. The crude protein of feed is determined by analyzing the nitrogen (N) content of the feed tested and multiplying it by 6.25.

Minerals and Vitamins

Many minerals are required in a sheep's diet. These are divided into macrominerals and micro or trace minerals. Macrominerals are required in larger amounts than trace minerals. Mineral requirements are dependent upon the age, sex, and stage of production, and can vary between breeds. Sufficient quantities of some may be found in forages, so supplementation is not necessary. Others may not be present in adequate amounts, so they must be supplemented. Have your forage analyzed at a certified forage laboratory to find out the levels in your feed. Most naturally occurring mineral deficiencies are associated with specific geographic areas and are directly related to soil characteristics. As plants mature, mineral content declines due to natural dilution processes and translocation of nutrients from the leaves to the root system.

The following is a brief list of some of the functions of the major macro and microminerals in sheep.

Calcium (Ca)—the most abundant mineral in the body, 98% of it is found in the bones and teeth. Required for blood clotting, muscle contraction, nerve function, cardiac regulation and enzyme activation. Requires Vitamin D for proper absorption. Cereal grains are low in calcium.

Phosphorus (P)—80% is found in bones and teeth. Functions with calcium in bone formation, cell growth, energy utilization, and acid-base balance. Supplementation is beneficial, but palatability is low. It is generally recommended that the dietary calcium-phosphorus ratio be at least 2:1.

Potassium (K)—essential for the maintenance of fluid balance in the body. Cereal grains and mature, weathered forages are low in potassium. Oilseed meals and green growing forages are excellent sources.

Magnesium (Mg)—70% is found in the skeleton. Functions in carbohydrate and fat metabolism. Bitter tasting.

Sodium (Na) and Chlorine (Cl), Salt (NaCl)—critical electrolytes in body fluids. Added with cobalt in the blue salt block, and trace minerals in the red block.

Copper (Cu)—functions in haemoglobin (red blood cell) formation, enzyme systems, nervous and immune system. Sheep are very susceptible to copper poisoning as dietary levels approach or exceed 20 ppm.

Iodine (I)—involved with thyroid hormones. Deficiency causes goiter. Use of iodized salt can eliminate iodine deficiency problems.

Iron (Fe)—involved with oxygen transportation via haemoglobin. Iron can inhibit copper and zinc availability.

Zinc (Zn)—important in stress management, immune response, enzyme systems and protein synthesis.

Selenium (Se)—involved in the prevention of white muscle disease. The requirement for selenium is very close to its toxicity level.

Manganese (Mn)—involved in several enzyme systems.

Cobalt (Co)—a component of vitamin B12.

The following is a brief list of some of the functions of the major vitamins in sheep.

B-Complex—involved in the body's metabolic pathways. Sheep, as ruminants, are capable of producing these vitamins, and supplementation is not required unless the animal is experiencing extreme stress.

Vitamins A and E—found in green forage. Supplementation may be required if animals are eating old, weathered, or mature forage. Vitamin E and selenium are closely interrelated.

Vitamin D—made by the body when exposed to sunshine. Animals raised in confinement should have Vitamin D included in their diet. Required for proper calcium absorption.

Vitamin A—essential for normal growth, formation of strong teeth and bones, normal vision and healthy skin.

Feed Testing and Other Considerations

As stated earlier, accounting for forage quality is important in feeding sheep. Many factors affect forage quality prior to the time it is fed, such as variety, maturity, growing conditions and dry matter measurement changes (especially during harvest and storage). It is important to know the nutritional content of the feed you are providing to your animals as poor quality forage limits the ability of the animal to ingest sufficient nutrients. The forage takes up a large amount of the space in the rumen and when the quality is poor, the animal cannot consume enough to meet its nutrient requirements.

Feeding more grain is a good practice when feeding poorer quality forage. The use of grain increases the energy content of your rations, especially desirable during flushing, late gestation, during lactation and in rations for feedlot lambs. Barley is the most commonly used grain as oats are lower in energy than barley. Sheep digest whole grains without the need for rolling or cracking. Watch for copper content if using pelleted grain or screenings in your ration.

A proper feed test is used to evaluate the quality and nutritional content of your feed. The resulting analysis will help you to design and prepare effective rations and efficiently utilize feeds and supplements. When formulating your ration, take into consideration the feeds you have available, the requirement of the flock as to its age, average body condition score, gestation stage, and weather conditions. There are several computer programs available online, but take care to

use programs where you agree with the developer's nutritional assumptions. SheepBytes is a sheep specific ration building program available online at www.sheepbytes.ca. If you lack the understanding of basic ruminant nutrition, it might be better to leave the ration balancing up to a feed professional. Contact your local feed mill for assistance.

Baleage, also known as round bale silage, is baled at a higher moisture content than dry hay and stored in sealed plastic wrap. The biggest concern with spoiled or poorly ensiled silage, haylage or baleage is the risk of listeriosis. Listeriosis is caused by bacteria that will survive in silage where the pH is higher than 5.6. The bacteria will grow in pockets of spoiled haylage, such as at the bag closure and around punctures in the plastic. Clinical signs include depression, weakness, paralysis of the tongue and jaw, blindness and drooling. Animals lack coordination, often walk in circles and push their heads against fences. Death may occur before any or all the symptoms appear.

The Importance of Proper Nutrition

Proper nutrition is the number one component of a successful sheep operation. Feed costs are the single largest expense in a sheep operation, however don't be tempted to cut corners. Cutting corners on feed costs can result in lamb loss, as a poorly fed ewe produces weak lambs and often she can't feed the lambs she has. Providing a good quality feed is just as important as feeding adequate amounts as feed quality affects fertility, reproductive ability, milk production, and overall flock health. Additionally, providing inadequate feed amount or quality can be detrimental to lamb growth and carcass quality. Ensuring your sheep are fed properly will help reduce or prevent many production problems from occurring.

There are key times during the production year to adjust nutritional intake of your breeding flock. They are:

- Two weeks before breeding, begin flushing the ewes by starting or increasing their grain intake or moving them onto better pasture. This will help increase ovulation rates at mating time.
- One week before breeding introduce your rams to grain, check feet, legs, teeth, and testicles for size, shape and soundness.
- Two weeks after breeding has been completed, start tapering off grain, reducing the level to a maintenance diet through to mid gestation.
- At late gestation, four to six weeks prior to lambing, start increasing the energy level (grain) and decreasing roughage bulk to make room in the ewe's body cavity for the developing lambs. This is important as 70% of the developing lambs' growth occurs in the last six weeks of gestation. Additionally, this development of the lambs and preparation for milk production creates a tremendous demand on the ewe's body for calcium, and calcium intake at this time must be sufficient to meet the increased demand.

During lactation, adjust quantity of grain to maintain the ewe's body condition. Adjust according to the number of lambs she is feeding. Have separate pens for ewes with singles, twins and triplets to make feeding easier.



A healthy well fed ewe with her twins



A poor conditioned ewe trying to feed twins

Note

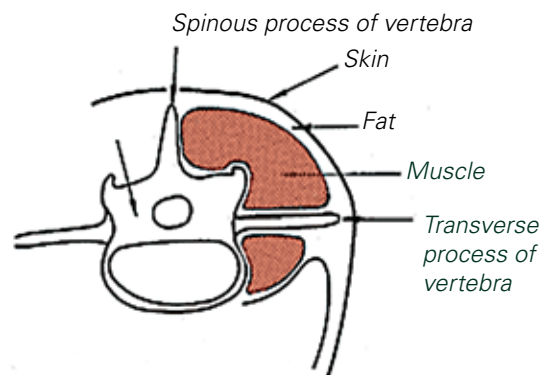
- for more complete information on feeding your breeding ewe, refer to the *Sheep and Goat Management in Alberta—Nutrition module* (http://www.ablamb.ca/producer_mgmt/sheep_mgmt.html).

8. Body Condition Scoring

To feed your flock to optimal efficiency, body condition score your flock at least three times a year and adjust their feed intake accordingly. Ewes should be condition scored in the fall prior to flushing, providing enough time to adjust thin ewes’ diets to enable her to increase her body condition score up to 2.5 for breeding. Condition score again at mid-gestation and just before lambing so diets can be adjusted and the ewes can achieve body scores greater than 2.5 at the beginning of lactation in order to meet the ewes’ potential milk production. The ewe’s nutrient requirements in the last six weeks of pregnancy, increase greatly due to fetal growth, mammary development, colostrum development, and body maintenance. Nutrient requirements are higher during lactation than any other time in the ewe’s production cycle. The ewe will utilize body reserves to supply as much as 25 to 30% of her energy requirements during the first month of lactation. Heavy lactation cannot be sustained if adequate resources have not been maintained. Watch and check body condition of ewes feeding twins and triplets, and feed to maintain condition.

Steps for Body Condition Scoring Your Sheep

1. Feel for the spine in the centre of the sheep’s back, behind the last rib and in front of the hips.
2. Feel the tips of the transverse process.
3. Feel for fullness and fat cover.



Anatomy of a Loin

Score of 1

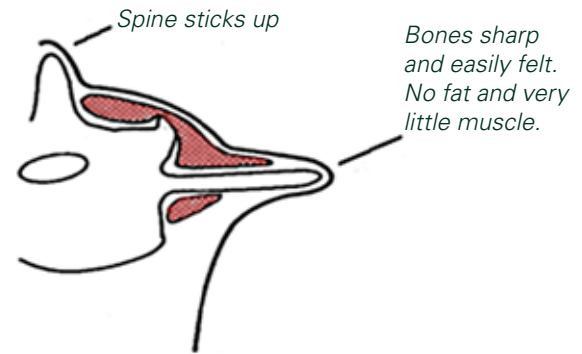
Extremely Lean—all individual vertebrae can be felt easily. There is no muscle or fat covering the bones. Although the animal is very thin, extremely good management could return the animal to a better condition, if it is able to derive the full nutrient benefit from the good feed provided. If the condition score does not improve with good nutrition and care, then the animal may have a serious health problem and should be culled.

Score of 2

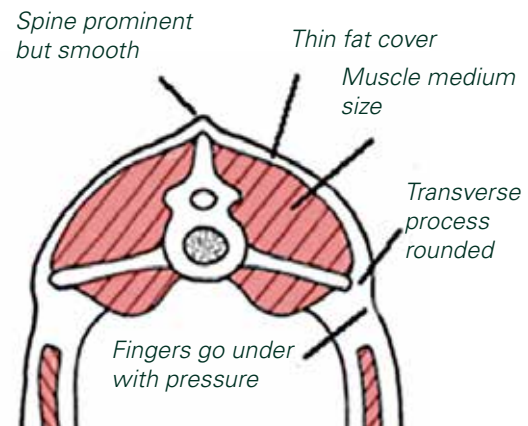
Lean—individual bones can be felt, but they are rounded rather than sharp. There is some muscle covering the bones, but this feels concave rather than convex. A strong thrifty animal, although thin, should be able to digest nutrients provided in good feed, but nutrient intake needs to improve to increase condition score to a 3.0 before breeding or lambing.

Score of 3

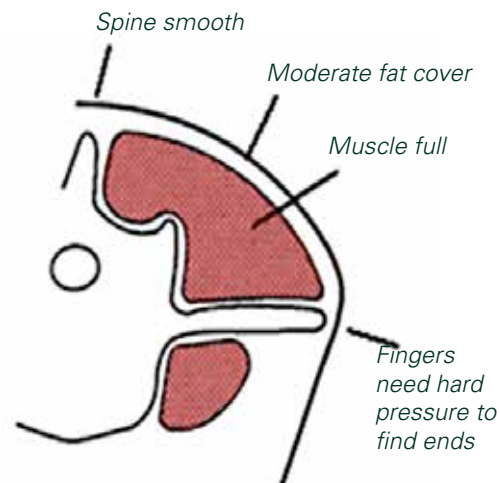
Good Condition—the ends of the transverse processes of the vertebrae can be felt only with firm pressure. There is good full muscle with some fat covering the bones, and this feels convex rather than concave. Although body condition score is good, it is still recommended to flush (raise the plane of nutrition) before breeding.



Condition Score 1 - Extremely Lean



Condition Score 2 - Lean



Condition Score 3 - Good

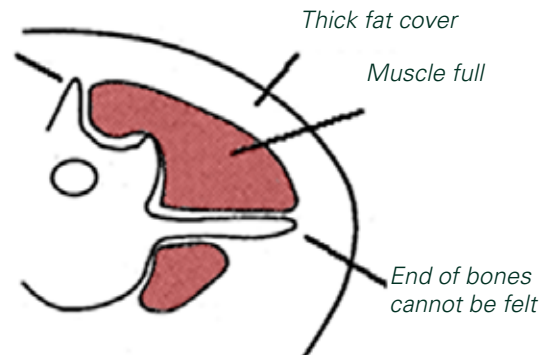
Score of 4

Fat—the ends of the bones are not detectable, but their position can just be made out with very firm pressure. There is a thick covering of fat over the muscle covering the vertebrae. Fat deposits are evident over the tail head and brisket areas. This condition score is usually considered fat for breeding and does not require flushing.

Score of 5

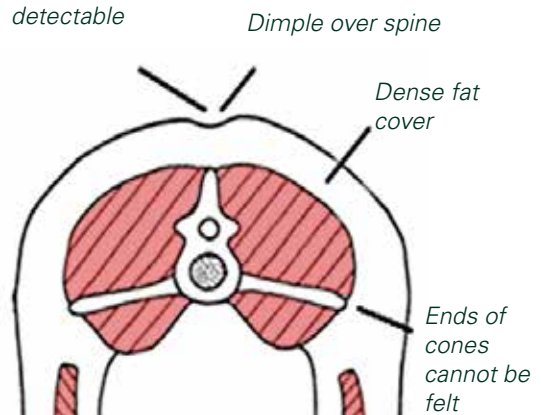
Grossly Fat or Obese—nothing can be detected under a thick layer of fat covering the loin; even the tips of the spinous processes of the backbone are buried in fat. There is a depression where the spine would normally be felt. The brisket, tail head and flank are thickly covered and jiggle when the animal walks. At this level, sheep are over-fat and may have problems conceiving or lambing. Increase exercise and adjust nutrient intake.

Spine only just detectable



Condition Score 4 – Fat

Spine not detectable



Condition Score 5 - Grossly fat

9. Flock Health

Animals with appropriate levels of nutrition have a stronger immune system than animals with a low level of nutrition, but well fed animals also need good health care to continue to thrive, grow and develop. It is important to have a scheduled deworming and vaccination program for your rams, ewes and lambs throughout the year. For pastured flocks, July is a high worm infestation month, and fecal worm counts should be analyzed by your veterinarian to determine the proper dewormer to be used. Regularly clean all waterers, feed bunks, and salt containers to reduce contamination. Reduce the chances of infections and illnesses in your animals by providing clean, adequate bedding in sheds, barns and windbreak areas. When housing your animals in barns, provide good ventilation, and avoid over-crowding.

Healthy animals are bright, alert, with a good appetite, and have solid pelleted manure. Know the signs of sick animals, and quarantine any ill animals in a sick pen, treat for the illness, and do not return to the main flock until fully recovered. Knowing how to perform a good physical exam will allow you to make a diagnosis or help you to inform your veterinarian about the problem so he or she can advise you on what to do.

Steps to a Physical Exam

1. Define the problem—what is wrong with the animal? Is it eating normally, what is the body condition score, what is the condition of the skin and fleece, are there any unusual lumps or sores, is it coughing or breathing rapidly or does it have a snotty nose, does it walk normally, have diarrhea, does its abdomen look normal or bloated?
2. Check rectal body temperature. Normal is 101.3°F (38.6°C) to 103.3°F (39.7°C). Check colour around the eyes and gums. Are the eyes bright and ears up and alert?
3. Find the problem area; examine more closely. If the animal is lame, look more closely at the feet and legs. Make the animal move around, and observe what happens: does it cough or breathe harder, does it stagger?
4. Check the rest of the flock—are any others affected?
5. Is the animal suffering? Administer a proper method of euthanasia if required.
6. Before contacting your veterinarian, consider how significant the problem is. Is there potential to affect the health of your whole flock, and what will be the economic loss? Consult a veterinarian if you are unsure.
7. Samples may need to be submitted for lab analysis. It is better to get the correct information than to waste time and money on treatment that won't work.
8. Use appropriate medicine, in the right amount, at the right time, using the correct application method, and note withdrawal times.
9. Perform post-mortems when sudden or suspicious deaths occur.
10. Dispose of dead animals properly.

Note

- for more information on flock health, consult *Sheep and Goat Management in Alberta—Health Module* (http://ablamb.ca/producer_mgmt/sheep_goat_mgmt.html).

Health Problems of Rams

Epididymitis (*Brucella ovis*)

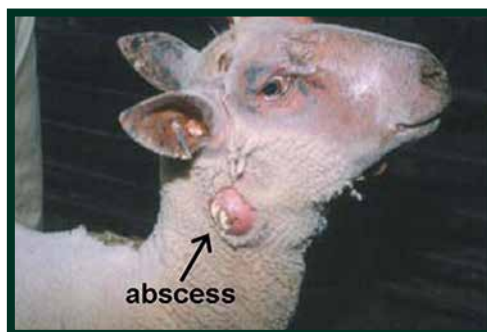
- Number one ram fertility problem seen in the sheep industry;
- Venereal disease of rams caused by the bacterium *Brucella ovis*;
- Inflammation of the epididymitis, the tubular portion of the testicle;
- Severely affected rams will often have at least one enlarged epididymis and may show pain when the testicle is manipulated;
- May cause infertility by affecting the ram's ability to produce viable sperm;
- Is contagious and transmitted during homosexual activity or during the breeding season;
- Poor response to antibiotic treatment.
- Damage is usually permanent. Cull affected rams.



Health Problems of Rams, Ewes and Lambs

Caseous Lymphadenitis

- Abscesses on jaw, neck, front of shoulder or back leg;
- Often spread during shearing;
- Pus is thick and hard, cheesy;
- May become systemic;
- No real treatment;
- Vaccinate replacement ewe and ram lambs.



Footrot

- Bacterial infection of the foot;
- Painful, debilitating infection, sheep are often seen on their knees;
- Infected hooves are often encased in manure, where the bacteria grows;
- Avoid purchasing any sheep with infected, misshapen feet with a foul odour, or who are lame;
- Treatment is time-consuming, expensive and backbreaking;
- Vaccines may help, when used with a comprehensive trimming and soaking program.



Orf/Soremouth

- Viral disease causing scabby lesions on nose, mouth of young lambs;
- Can be passed onto teats of ewe through sucking;
- No treatment, will clear up on its own;
- Easily transmitted to humans.



Malignant Catarrhal Fever

While this disease does not create health problems in sheep, they can be carriers and if your operation is near other ruminants, especially bison, it may become a health concern for your neighbours.

- Infectious viral disease of many ruminants, including bison;
- Infected sheep show no ill effects but bison are very susceptible, and deaths are frequent;
- Most MCF outbreaks in bison are associated with exposure to sheep;
- There is no effective treatment;
- Contact between bison and sheep is not recommended.

Health Problems of Pregnant Ewes

Know the signs and symptoms and what to do.

Pregnancy Toxaemia (Twin Lamb Disease)

- Occurs in last trimester of gestation;
- Prevention—increase energy in diet;
- Thin ewes (<2.5 body condition score), smallest in group or older are affected;
- Triggered by stress from bad weather or shearing, lack of feeder space;
- Signs: ewe goes off feed, becomes weak, goes down;
- Test for ketones in urine.



Hypocalcaemia (Milk Fever)

- Occurs one to two weeks before lambing;
- Caused by inadequate calcium in ration – cereal hays;
- Triggered by stress close to lambing;
- Looks like Pregnancy Toxaemia;
- Signs: ewe goes down, cold, bloated, legs extended out behind.



Vaginal Prolapse

- Occurs last three weeks prior to lambing;
- Signs: Red bulge from vagina;
- Caused by poor quality hay (the bulkiness of the hay in the rumen places pressure on the reproductive tract), red clover, crowding at feeders, very fat ewes, genetic factors, short tails;
- Prevention: feed good quality hay, increase energy, at first sign can use vaginal spoon and harness.
- Creates high risk of future lambing problems;
- Cull ewe.



Abortion

- May occur at any stage of pregnancy;
- Those at end of pregnancy are most important and can be highly contagious. Separate from flock;
- Diagnosis: submit lambs and afterbirth for lab testing;
- Use disposable gloves to remove fetus and membranes. **Any contact is extremely dangerous to pregnant women.**
- Consult veterinarian for appropriate help;
- Causes include *Chlamydia*, *Campylobacter*, *Toxoplasma*, Border Disease, iodine deficiency, or rough handling.



10. Antibiotics

There are very few antibiotics licensed for sheep in Canada. Use only the licensed products for sheep unless you have direct instructions from your veterinarian (a written or verbal prescription). Remember, antibiotics only treat bacterial diseases, not viral diseases, the same as in humans.

Note

- when using the drugs, follow the described use that is on the label and use the correct amount for weight of animal. Administer the drug as directed;

IM- intramuscular, SQ- subcutaneous,

IP- intraperitoneal,

IV- intravenous)

for the length of time stated, and always observe the correct withdrawal time.

11. Reproduction

The Ram

A healthy ram is key to accomplishing your production goals. Before the start of each breeding season, check your rams for body condition score and any health problems: eyes, teeth, feet, legs, and testicles. It is also a good idea to semen test your rams to ensure they are fertile. These steps together are known as a breeding soundness evaluation. Check far enough ahead in advance of breeding to allow for treatment or replacement of your ram. You want your rams in top form for breeding. A well cared for ram can last many years before replacement.

Start feeding grain to your rams one to two weeks prior to breeding so they are in good body condition (body condition score 3), and they will be on the same ration as the ewes during mating. Use young rams with older ewes, about 20 ewes per ram lamb, and use experienced rams with ewe lambs, between 25 to 30 ewe lambs per ram for best conception. Take care to avoid line breeding of daughters with their fathers or grandfathers, and mothers with sons.

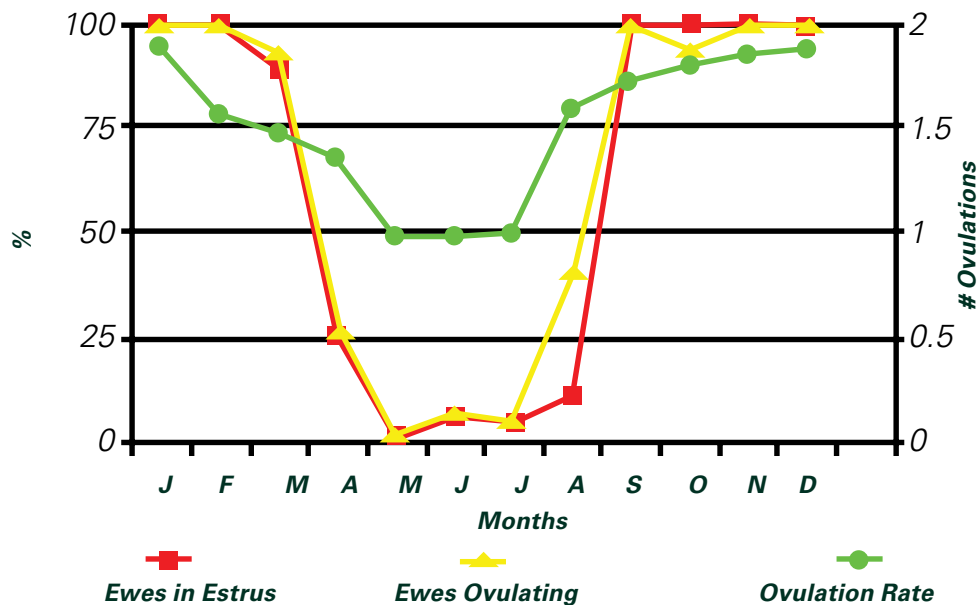
If your rams are servicing a large flock of ewes or ewes that are synchronized, switch rams frequently, so they can rest and feed. In large flocks, use an odd number of rams; for example, if you use three rams, two will fight and one will do the mating.

If you are using only one ram, put a marking harness on him, using one colour for the first 17 days, then replace the first ram with a clean-up ram with a different coloured marker for an additional 17 days. Record the ewe's number if she is marked a second or third time as she may not be fertile. Mark on your calendar the date of the first breeding and the last breeding.

The Ewe

Ewe lambs are generally six months old when they start their first estrus, or two thirds of their adult weight. The length of estrus is on average 17 days, with standing heat of about 30 hours. Ovulation occurs 28 hours after start of estrus. The length of gestation is on average 147 days, but can start as early as day 143 or last as long as 153 days, depending on breed, age, and number of lambs the ewe is carrying.

Most sheep breeds in Canada are natural seasonal breeders with a breeding season starting in August and ending in February. Ovulation and conception rates increase as daylight decreases, with the peak at the shortest day of the year in December. Then estrous and ovulation rates start to decrease as daylight starts to increase in January and February, with the lowest estrous rates in May, June and July. There are some breeds that are not affected by seasonal change as much as others. If you plan on breeding out of season, purchase ewe breeds with known extended breeding cycles or who come from flocks that are out of season producers.



Effect of daylight on estrous and ovulation rates

Montana Farm Flock Sheep Production Handbook

Reproduction - Section 4 of 7

Parturition: The Stages of Lambing

There are three stages to parturition:

1. Dilation of the cervix.
2. Expulsion of the lambs.
3. Expulsion of the placenta (afterbirth).

Signs of a Normal Birth

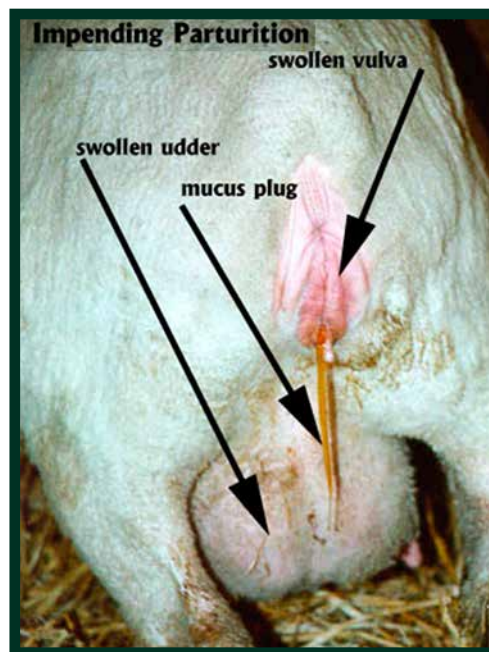
Please note

- the timing below is a general guideline only and will vary between breeds and individual ewes. It is important to know what is normal for your flock, and recognize the signs of distress, so appropriate action can be taken when required.

1. The ewe often separates from flock, starts to nest by pawing the ground or straw and often makes nickering noises. A mucus plug will appear.
2. After two to three hours the amniotic sac (water bag) appears.
3. In about another 30 to 60 minutes, the lamb's nose and front feet begins to emerge.
4. Ewe has steady, strong contractions until lamb is expelled.
5. Multiples take approximately 20 to 30 minutes per lamb.
6. If labour takes over one hour, be prepared and have lambing supplies ready as assistance may be required.
7. After birth, ewe will lick, nuzzle and begin to bond with the lambs.
8. Lamb starts looking for the udder.
9. The placenta is passed two to three hours after the last lamb is born. It is recommended to remove it from the pen, and not let the ewe eat it as it can make the ewe sick.



1. Starting labour



2. Mucus plug



3. Water bag is out



4. Nose and feet showing



5. Lamb being pushed out



6. Ewe and lamb bonding

Signs of Dystocia (Difficult Birth)

It is important to be very sure there is a problem before assisting in a birth. Generally, if the ewe is making progress, intervention is not required. Shepherds should also refrain from prolonged manipulation of lambs as too much interference can cause health problems for the ewe. Both novice and experienced shepherds should know their limitations, and call the veterinarian when in doubt about proper procedures.

1. If there is no lamb visible after 45 minutes to one hour from the time the water bag appeared and hard labour has begun, or 30 minutes with the lamb showing, but not progressing, it's time to check the ewe.
2. Have supplies ready.
3. Restrain the ewe (don't tie too high up as she may lie down).
4. Wash back end of ewe, your arms and hands (gloves) with iodine scrub. Place a liberal amount of lubricant on your arm to prevent injury to the ewe.
5. Gently insert your hand
6. Figure out the presentation and position of lamb(s). Try to be gentle as possible to the ewe and lamb.
7. Is there more than one lamb coming at once? Try to bring the most direct one first; you may need to push one back in to manoeuvre the first one out. Make sure you have the feet and head of the same lamb.
8. Is it forwards or backwards? Check for back or front feet (look at the position of the hooves). Is there a nose or a tail?
9. Head and both feet coming normally? If only one foot or no feet, try to push back in and carefully scoop one or both of the legs into place.
10. Correct feet with the correct lamb? Follow head, then the neck down the body to find both legs of the lamb. Put pulls on the legs and guide the head out.
11. Is there only a tail? In a breech birth, you need to push the lamb forward and grasp one of the rear legs gently pulling it into the birth canal. Follow with the second leg. Be careful not to puncture the uterine lining with the toes. Pull the back legs in a steady downward curved motion until the lamb is out. Swing the lamb by its back legs to clear airway or quickly clean off the nose and mouth.
12. Feet and no head? Is the lamb backwards or is the head flipped back? If the head is back, you may need to place a lamb snare over the lamb's head after you have brought it around; this helps guide it out and to keep it from flipping backwards again.
13. Is it really **big**? If the head and shoulders are coming into the ewe's pelvis, it is usually ok to continue pulling. If the head will not come through into the pelvis even with a snare on, then it is probably very big; contact your vet. If you pull a huge lamb part way out, you can't stuff it back in while you consider a C-section.

Lambing Presentations

Assisting the Ewe at Lambing

FACTSHEET, Agdex# 433/22



Normal presentation



Breech presentation



One leg back



Hind legs only



Head back



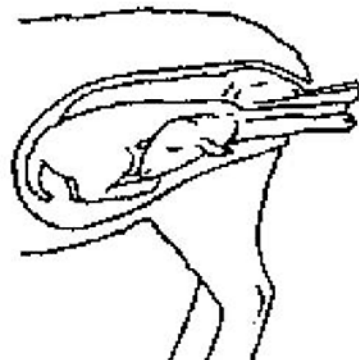
Both forelegs back



Elbow lock



Twins - front and back



Four legs - one head

Basic Lambing Supplies

- Halter
- Pail
- Disinfectant scrub
- Lubricant
- Disposable gloves
- Lamb snare
- Lamb pullers
- Towels
- Iodine for navels
- Ear tags
- Barn records
- Rubber rings for tails and castration
- Ring applicator
- Stomach tube
- Syringes/needles
- Weigh scale
- Vitamin and mineral for injection
- Hot box
- Colostrum



Note

- for more information on reproduction in sheep, refer to *Sheep and Goat Management in Alberta— Reproduction Module* (http://www.ablamb.ca/producer_mgmt/sheep_mgmt.html).

12. Processing and Care of Newborn Lambs

Ewes and their newborn lambs should be kept in a lambing jug on average 36 to 48 hours after birth. Watch to see if the lambs are bonding to their mother and sucking well and that they have had a good belly full of colostrum. A noisy lamb is a hungry lamb. If a new born lamb does not look full (round belly), immediately check the ewe for any udder or teat problems that may affect nursing or reduce the amount of milk available. It is important to actually feel the udder and milk each quarter. Does the ewe have a hard bag? The udder might appear normal in size and shape and not be hot to the touch, but be hard, with very little or no milk being produced. If a newborn, less than 12 hours old, has not nursed, it must be given colostrum by stomach tube or by bottle. Keep a bank of frozen colostrum in small (3.5 ounce or 100 ml) containers in a chest freezer (not a refrigerator freezer). Often if the dam does not have colostrum, there is a poor chance she will have milk. If there isn't enough milk for the lambs, try supplementing them for one to three days to see if milk production increases. If she has twins or triplets, remove one for fostering or to be bottle/bucket fed, and watch to see if she can feed the remaining lamb. Record the ewe's num-

ber and information on lambing ease, mothering, amount of milk, medical treatment, or need for culling.

Twenty-four hours after birth, ear tag the lamb, weigh it, tail ring and castrate the ram lambs you want as wethers. This is also an excellent time to inject the lambs with vitamins and minerals if required. Record lamb weight, vigour, gender, and overall health. You can also paint brand the lambs and the ewe so the pairs can be easily spotted. After 36 to 72 hours (dependent on the ewe and lambs), move the healthy well bonded family units into single, twin, or triplet hardening pens. Check the hardening pens frequently watching for mismothering, starving lambs or those not getting enough milk, lambs with navel or joint ill, scours, or chilling. Watch for sick ewes, with mastitis, retained afterbirth, or injury from hard births. Have lamb milk replacer on hand to supplement poor doing lambs, and be prepared for orphans.



Tagging lamb



Weighing, using a lamb cradle



Ring castration



Vitamins and minerals



Tail docking, proper placement

Care of Orphans

If the lamb is less than 12 hours old, feed the lamb colostrum, as newborns need as much colostrum as they will drink. Once they are over the 12 hours, their intestines cannot absorb the antibodies from colostrum and they can be fed milk replacer. When providing milk replacer for your orphan lambs, it is very important to follow the milk replacer label instructions, keep all equipment as clean as possible, and feed the milk chilled to prevent losses from bloat. All containers, bottles, pails and nipples must be kept clean to reduce the growth of bacteria, which is the major cause of bloat and death. Milk replacer should be well mixed in hot water, then chilled before feeding. Bottle feeding each individual orphan lamb can become very time consuming if you are feeding them at a minimum of four times a day.

Train your orphan on nipple bottles then onto a self-feeding bucket if you have more than a couple of orphan lambs. Always keep the milk fresh in the buckets and avoid letting it run dry or lambs will be hungry when you refill it and will over eat. Keep the milk chilled by placing a block of frozen milk replacer mixture or ice cubes into the bucket of milk. It is especially important to keep it chilled in the warm weather months as bacteria will grow rapidly in warm milk. You can freeze milk replacer in 500 ml or 750 ml yogurt containers which are easy to pop out into the bucket of chilled milk. The chilled milk prevents the lambs from over eating as they will start to feel chilled as they consume the milk and will stop. This simulates the length of time the dam would allow the lamb to drink before she kicks them off the teat. In cold weather, provide a heat lamp for the orphans to gather under to warm up. If you are feeding a large number of orphan lambs, you may consider the use of an automatic milk feeder, which can reduce workload required for feeding and mixing. Some systems offer milk warm on a restricted basis. The machine should be cleaned daily and calibrated regularly. In the orphan pen, provide fresh water, creep feed and green leafy grass hay. By the time they are seven to 10 days old, they will start nibbling at feed and hay. Orphan lambs should be weaned at three to four weeks of age, providing they have adapted well to eating a good quality creep feed.



Lambs fed on a bucket feeder



Starving lamb needs supplementation

Health Problems of Young Lambs

Hypothermia

Hypothermia is the number one cause of death in young lambs. Hypothermia is made worse by inclement weather. When an animal is chilled, it uses energy to keep warm. When energy runs out, the body temperature starts to drop and the body's organs begin to shut down, the lamb becomes depressed, falls into a coma and dies.

Note

- for information on hypothermic lamb treatment and building a hot box, refer to Chapter 23 in *Sheep and Goat Management in Alberta—Health, Treatment Protocols for Disease* (http://www.ablamb.ca/producer_mgmt/sheep_mgmt.html).

Starvation and Colostrum Deprivation

This is due to mismothering, the dam not producing any milk, the lamb too weak to nurse, or the ewe not allowing the lamb to drink. Newborns must have colostrum within the first 12 hours of life to survive. After 12 hours the intestine cannot absorb the antibodies, and chances of survival are poor. Every newborn should get as much colostrum as possible as soon as possible. Older nursing lambs that stand hunched and look thin are lacking adequate milk intake. Check the ewe for the reason for poor milk production, to determine if she has abandoned the lamb or if the lamb has gotten separated from its mother. Supplement the lamb or remove to bucket care. Contact your veterinarian for instructions on stomach tube feeding and intraperitoneal dextrose injections.

Scours

There are several different causes of diarrhea in lambs, and all should be taken seriously, although, a single healthy lamb on a heavy milking dam is not a serious problem. Diarrhea from infections entering the gut and damaging the intestine lining is serious. A lab test is required to identify the exact cause, and only bacterial scours will respond to antibiotics. Electrolytes need to be given to prevent death from dehydration. Contact a veterinarian for the appropriate treatment.

Pneumonia

Noisy breathing, sneezing and nasal discharge often signal a disease of the upper airway. Faster breathing, coughing and a fever are often caused by disease of the lower airways and lungs. Sudden changes in weather, especially temperature, can predispose an animal's lungs to infections. Combinations of stresses such as weaning, weighing, mixing, vaccinations, and transportation can result in pneumonia. Ensure barns are well ventilated if animals are housed indoors. Most cases of pneumonia are treated with antibiotics. If the cause is viral, the antibiotics may help control secondary bacterial infections. Consult with your veterinarian for the recommended antibiotic and dosage.

Joint Ill

This disease is caused by bacteria entering the bloodstream through the navel of a newborn. The bacteria may settle in the joints, causing infectious arthritis. The lamb becomes lame, its joints swollen. Consult veterinarian for treatment.

Entropion (Inverted Eyelids)

Entropion linked to genetics, but has been seen in hard births. Lower eyelids are rolled in so the eye lashes are rubbing on the surface of the eye, causing irritation and watering. Left untreated, severe ulceration and infection can lead to blindness. In mild cases, pinching the lower eye lid and pulling it down will remedy the problem. If that doesn't work, try taping it down with strong electrician tape applied under the lid and around the head. Severe cases may require a stitch placed in the lower lid to anchor it down. The stitch should be removed in one week. Also administering 1 cc penicillin subcutaneously under the lower eyelid has been known to work. Before putting in stitches or injecting penicillin, it is important to consult your veterinarian for instructions.

White Muscle Disease

White Muscle Disease can be caused by a lack of vitamin E or selenium, altering the normal metabolism in the muscles. Animals appear weak in the back end, and walk with stiff legs and "bunny hops." Inject affected animals with vitamin E / selenium supplement, as per directions on the bottle. Be careful not to fatally overdose with treatment.

Health Problems of Older Lambs

Enterotoxaemia (Pulpy Kidney)

This disease is caused by the bacterium *Clostridium perfringens* type D. The bacteria release toxins which are absorbed into the bloodstream and result in rapid death. A high grain diet can produce an environment in the intestines allowing the bacteria to grow. Vaccination for pulpy kidney is highly effective. Treatment is nearly always impossible as death is very rapid.

Worms (Roundworms, Tapeworms, and Flukes)

Lambs infected with often have diarrhoea, rough wool, are poor doers, and in severe cases will die. Have your veterinarian perform a fecal egg count to determine the type of worm and implement a management system.



Lamb with a heavy worm load

Coccidiosis

Coccidiosis is an infection of the intestine caused by a microscopic protozoan parasite. The eggs are shed by adult sheep and ingested by the lambs which do not have immunity to the protozoa. The parasite attacks the lining of the intestine, destroying the lining cells. This can result in severe diarrhea (often containing blood and or mucus), reduced growth rates, and if untreated, death. There are drugs available for prevention, but these will not help animals already infected with coccidiosis. There are drugs for treating it, but these drugs are not licensed for sheep, and require a veterinarian prescription.

Rumen Acidosis (Grain Overload)

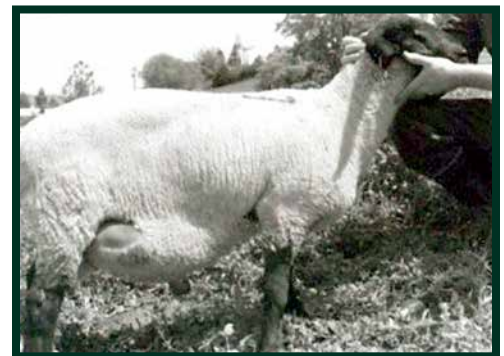
When animals are fed a diet that is low in forage and high in grain, fermentation occurs, producing large amounts of acid in the rumen, killing the normal bacteria, and damaging the stomach wall lining. Toxic compounds then pass into the blood stream causing damage to the organs, and the animal goes into shock, and may die. Depending on the amount of grain the animal consumes, about 12 to 36 hours later they will go off feed, have a staggered gait, and tend to lie down. They often appear bloated and have diarrhea. If you suspect grain overload, remove access to water, and administer oral antacids to neutralize the rumen. In very severe causes, contact your veterinarian for advice. Try to keep animals away from grain storage bins, and keep a continuous supply of an antacid such as sodium bicarbonate (baking soda) available to all grain fed animals.



Sheep with bloat

Urinary Calculi (Bladder Stones / Water Belly)

Urinary Calculi can occur in young male lambs being finished on a high grain, low forage diet for market. High levels of dissolved salts crystals in the urine travel down the urethra and larger stones may become lodged at the end of the penis, causing a blockage. The animal will strain to urinate, dribble urine, and cry out in pain. Animals should be examined to see if a stone can be felt at the end of the penis. Contact your veterinarian to learn how to detect and correct the problem. All animals should have free access to clean water and balanced amount of salt in their diet.



Ram with Urinary Calculi

13. Markets

Dairy Products

We are fortunate in Alberta to have several different market opportunities for lambs and sheep products. Sheep milk products such as cheese, yogurt, and ice cream are sold in specialty grocery stores and restaurants; the demand is increasing and these products are appearing in more regular stores. Many famous cheeses are made from sheep milk. Certain breeds of sheep are better suited for milking, as they produce more milk, with a longer lactation. East Friesians and Lacaune are both large framed dairy sheep that produce more milk than many other breeds. Sheep have a limited lactation cycle, from three to eight months, depending on the breed. Today, large numbers of sheep are milked in the Mediterranean, the Middle East and Europe. Sheep dairies are not common in North America, but the numbers have been increasing. Before investing in a milking parlour and milking equipment, investigate your potential market and demand for your sheep dairy products.



Wool

Wool has been an important fibre since the domestication of early sheep. With the introduction of a wide variety of synthetic materials to make cloth, the demand and price of wool, however, has decreased world-wide. The price per pound of wool varies from market to market and with wool quality. Wool is categorized as "fine," "medium," or "coarse." Different breeds of sheep produce different qualities of wool. Merino, Rambouillet, and Blueface Leicester are well known for growing the best quality of fleece. Columbia, Corriedale, and Romney also produce a fleece that is excellent for hand spinning. There are different options to market your wool in Western Canada. These include the Canadian Cooperative Wool Growers, private woollen mills, spinners and weaver groups. You can also prepare your own fleece for spinning, knitting and weaving, and create your own products to be sold at farmers' markets and stores.



Meat

The majority of lambs sold are for meat sales. There are several different options for selling your lambs here in Western Canada.

- Commodity market–feedlots, auction markets, and buyers in Alberta and Ontario
- Market ready–Sungold Meats in Innisfail (federal inspection), auction markets, or buyers
- Farm direct–Alberta Lamb, farmers’ markets, freezer trade, organic and niche markets

When marketing your own lambs, you must consider which type of processing facility you use. If you plan to sell your lamb privately as a boxed meat product, the animals must be processed at a federal or provincially inspected abattoir. It is illegal to sell any meat that has not been inspected. However, you can use it for your own consumption. Building better market lambs should be a goal of all lamb producers as there is no market for poor lambs.

Some key points to consider:

- Use the best ration for the job.
- Use your scale to monitor lamb growth.
- Use body condition score to assess ration and finish/fat levels of your lambs.
- Lamb growth is slowed by poor feed intake due to:
 - lack of (good) water,
 - heat/cold/rain/mud,
 - high fibre, poor quality forage,
 - ration changes, missing nutrients,
 - mixing lambs/pens.



Carcasses with different finishes

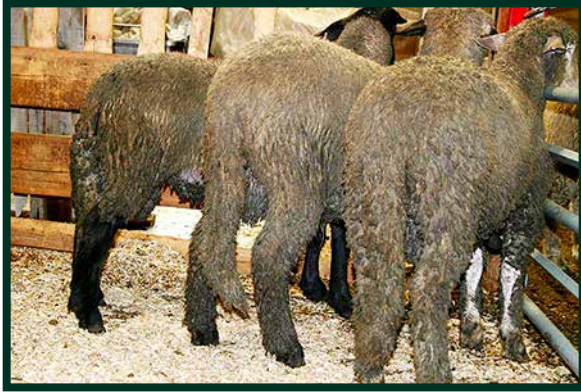


Body condition scoring for finish

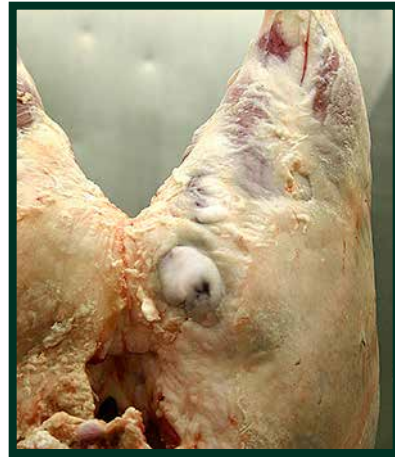


Weighing lambs

Proper handling your market lambs is critical to reduce stress and to improve animal welfare and meat quality. To avoid abscesses in the carcass muscle, use clean needles and inject in areas of lower quality cuts such as the shoulder and neck region. These improved management techniques will reduce the amount of carcass bruising, discounts, and the number of condemned lambs.



Dirty lambs



Abscess from needles

The time of the year you sell your lambs could have a major effect on the cost of production and the price per lamb sold. The early spring market usually has higher, stronger prices, as supply is low and the demand is high. Lambs produced during this time may be for general domestic consumption or for the specialty Easter market, which has specific ethnic requirements. To have lambs ready for early spring requires winter lambing with:

- Higher feed costs
- Higher lamb losses due to the cold
- Increased housing cost
- More labour.

By the time April and May born lambs come off grass, and are ready for market, the price usually softens. As spring lambing is the most common time of year to lamb in Alberta, there are more lambs available, so the supply is up and the pressure of demand drops. Although the income may be lower, there are some of the major advantages of spring lambing. They are:

- Higher lambing percentages as the majority of sheep raised in Alberta are seasonal breeders.
- Lower feed costs as fresh grass is available.
- Less lamb mortality caused by cold weather.
- Pasture lambing is possible.
- Reduced housing is required.
- This method can be less labour intensive.

Some disadvantages of spring lambing are:

- Deworming costs are higher as more frequent worming is required.
- There is a higher chance of loss by predation.
- If facilities to shelter young lambs are lacking, severe spring storms can be a problem.

Before you change your flock production to a prime marketing month, you need to know how much it will cost you to produce your lambs, as winter born lambs and spring born lambs each have a very different cost.

Breeding Stock / Genetics

Sheep operations may produce and sell is breeding stock or genetics. Breeding stock can be purebred or crossbred and income potential is tied to market demand. Breeding stock tends to sell for higher prices than lambs for meat. At the same time, production costs are higher, and more record keeping is required. Market options include:

- Ewes / ewe lambs
- Rams / ram lambs
- Semen / embryos for domestic sale or export

14. Why Keep Records?

How do you know your sheep business is financially successful if you don't keep records? The answer is, you don't. By knowing your cost of production you can see areas where you can reduce the amount spent, and areas that have the largest return.

Every ewe costs you money to keep her through the year. Keeping records helps you identify which are your best performing ewes and allows you to cull the poor performers. Culling by productivity history, rather than culling just on age, will retain your best ewes and remove your poor ones, and save you the cost of purchasing or retaining ewe lambs as replacements. Keeping ewe lambs from your best performing, older ewes helps improve flock reproductive performance. By keeping flock records, you can see where you can improve your flock lambing percentage. Can this number be improved by:

- Flushing (increasing the nutrition) of the ewes prior to breeding?
- Maintaining or improving the nutrition level longer after breeding?
- Changing your breeding season? Is the time of year affecting conception rates? November and December have the highest conception rates.
- Identifying the poor producers, culling and replacing with more prolific ewes?
- Changing the ram to ewe ratio? Was your ram over worked, getting too old, having health problems? Should he be culled and replaced or do you need more rams for the number of ewes to be covered?

Is there a difference between your flock birth and weaning percentage? If you see a large difference between these two percentages, find the reasons for the loss and improve your flock management. These may include:

- Ewes with poor milk production—are they in poor body condition? Do they need better quality feed or larger amounts of it? Do they have udder problems or are they just poor mothers and should be culled?
- High losses from disease—what can be done to prevent or reduce?
- Losses from predators—what do you need to do to reduce or prevent this loss?
- High variation in weaning weights—some lambs gain better than others. Is this ewe effect (feeding) or ram influence (genetics)?



Ewe in poor body condition can't feed lambs



Cull ewes with poor udders



A ewe in good condition feeding her triplets

The number one production cost on many sheep operations is feed, followed by facilities, equipment and labour. By keeping records of your feed costs, including the type, where (source) and when purchased, will help you decide if you can reduce the cost by using alternate feed types or suppliers. Be careful not to cut back on feed quality and quantity when the demand on the ewe is high. Health and lambing problems can cost you more than the reduction in the feed costs.

Keep records on your lamb sales and calculate your net income. Could you improve the quality of your market lambs, resulting in higher prices at these markets? You can calculate your economics of lamb production by using this formula:

(Number of lambs produced x Sale price per lamb) - Cost of production = Net income

You can influence both these factors by producing lambs from more prolific ewes bred to terminal rams selected for efficiency of lean meat gain. Could lambing your ewes at a different time of the year reduce your costs? Is there a niche market for your lambs: organic, Kosher, or Halal?

Electronic Data Collection

Keeping records can be as simple as writing notes on papers or can entail keeping detailed records on every animal in the flock by use of electronic tags and computer based record keeping programs. The method you choose will depend on your operation and the information you require.

Electronic Tags (RFID)

One way of recording and calculating your flock production and expenses is by using electronic identification. By applying electronic tags (RFID) to your flock, and using a management software and compatible tag reader, you can collect and analyze data on every ewe, ram and lamb. This record system can save you time and increase your data accuracy by the rapid reading of tags, less than one minute per lamb, with 100% accuracy with tag numbers and weights. Data can be analyzed for ram performance, ewe productivity, lamb growth rates and much other beneficial information. You can use this data to select ewe lambs from your most productive ewes, and cull your unproductive ewes.

Note

- more detailed information on electronic data collection can be found in the *Business of Sheep* module, available through the Alberta Lamb Producers website www.ablamb.ca.



Allflex RFID button tag



Shearwell RFID loop tag



Using a electronic reader to read ear tags

Farm Works

Farm Works™ software provides solutions for managing a variety of farm data.

Number of animals selected in grid: 0 out of 111

Type	Flock No.	Ear Tag	Mgt Tag	Breed	Sex	Date of Birth
Ewe	ENT	89N		Border Leicester	Ewe	12/02/09
Ewe Lamb	ENT	99W		Blackface	Ewe	12/02/09
Breeding	ENT	109S		Border Leicester	Ewe	12/02/09
Non-Breeding	FDG	38T		Blackface	Ewe	12/02/09
	FDG	92W		Blackface	Ewe	12/02/09
	FDG	93W		Blackface	Ewe	12/02/09
	FDG	94W		Blackface	Ewe	12/02/09
	FDG	95W		Blackface	Ewe	12/02/09
	FDG	96W		Blackface	Ewe	12/02/09
	FDG	97W		Blackface	Ewe	12/02/09

Report type: Females put to rest, All lambs still born or aborted, Include lambs that died before tagging

FarmWorks report on ewes that have not lambing

Flock Snapshot

With the use of the Flock Snapshot program, you can analyze your complete flock finances. The Flock Snapshot can provide a one page picture of your flock's financial status, your target performance and progress.

Flock Snapshot - December 31 2010					
Name	Pat & Darren Lamb				
Farm Model	Commercial, once per year lambing				
Operations Summary					
	Ewes	Rams	Lambs	Guardians	
Number of animals	381	8	657	3	
Average value of animals	\$225.00	\$400.00	\$120.00	\$541.67	
Sheep enterprise growth	-4%				
Sheep enterprise land base	155				
Sales Information					
	Number	Amount/hd	Dollar amount	Percent lambs	
Market & feeder lamb sales	509	\$159.53	\$81,200.00	95.68%	
Direct to consumer sales	6	\$200.00	\$1,200.00	1.13%	
Breeding ewe & ram lamb sales	17	\$235.29	\$4,000.00	3.20%	
Breeding ewe & ram sales	0	\$0.00	\$0.00		
Financial Summary					
	Amount (\$)	\$/Ewe	\$/Lamb Mar	\$/Lamb born	\$/lbs
Gross expenses	\$96,378.00	\$248.40	\$181.16	\$166.74	\$1.40
Gross income	\$96,100.00	\$247.68	\$180.64	\$166.26	\$1.40

Flock Snapshot report

Note

- more detailed information on the Flock Snapshot can be found in the Business of Sheep module and a downloadable version is available at (http://www.ablamb.ca/producer_mgmt/sheep_mgmt.html).

Mandatory Programs

There are a number of programs in Alberta that are mandatory for sheep producers. These programs are intended to address concerns about sheep health, meet consumer expectations for quality assurance and food safety, and in some cases, provide valuable management feedback to producers. Alberta sheep producers lead the country in being ready for lamb traceability and food safety.

Premises Identification

This has been established in order to track the location of animals in case of a reportable disease outbreak, a public health related emergency, or an emergency such as a natural disaster affecting animals and people. Regulations requiring premises identification became law January 1, 2009 as part of the Animal Health Act. All premises containing a "recordable" animal must have a premises identification number.

Note

- for further information on the Premises Identification Program, contact the Ag-Info Centre at 310-FARM (3276) or your nearest hub office.

Alberta Livestock Manifest

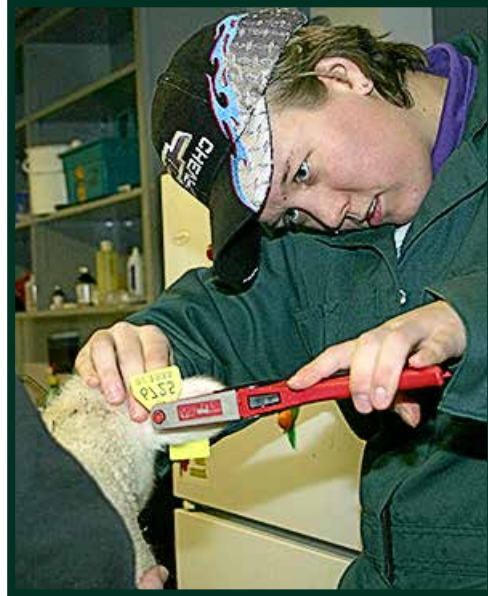
Sheep producers are required to complete an Alberta Livestock Manifest when shipping their animals. A Premises ID must be on the form when animals leave the farm. Also include owner name, address, the number and description of animals being shipped, destination name and the address and name of person transporting the animals.

Part A - Purpose of Manifest						
<input type="checkbox"/> Transport Only	<input type="checkbox"/> Transport for Sale by	<input checked="" type="checkbox"/> Owner	<input type="checkbox"/> Dealer on Behalf of Owner			
Check if Livestock Security Interest Declaration is by Separate Document <input type="checkbox"/>						
Part B - Transportation and Sale Details						
Pen or Lot Number		Date				
		2009/01/01				
Owner or Dealer Name <i>John Smith</i>		(Print Clearly & Press Hard)		Phone # 403-222-3333		
Owner or Dealer Address <i>Box 123 Anadara, Alberta, T1A 1A1</i>						
On Account Of						
Pay To (If Other Than Owner)			Address			
Transport From Address <i>Somewhere, Alberta</i>			Premises ID			
Transport To Name <i>Alberta Auction Market</i>						
Transport To Address <i>Somewhere, Alberta</i>						
Description of Livestock						
Number	Colour	Kind	Brand(s) / Identifier(s)	Loc.	AV	Other Information
4	RWF	Cow	A-A	RR	N	
10	MIX	Calves	NVB		Y	
					YN	
					YN	
					YN	
					YN	
					YN	
Total	Part C - Parts A and B Certification					
14	I CERTIFY THAT PARTS "A" AND "B" ARE TRUE					
	X <i>John Smith</i> of Owner or (if Permitted) Owner's Agent					
Part D - Inspector						
Ad) Total	Inspector Signature		Inspector #	Client #		
Inspection Site #	Assur. Fund #	Check-off #	Livestock Permit #			
	Eligible	Eligible				
Part E - Transporter						
Transporter's Name (Print)			Trucking Charges			
<i>Acme Trucking Company</i>			AAA-123			
Transporter's Signature			Phone #			
<i>Bob Doe</i>						
Part F - Livestock Security Interest Declaration (If Sale by Owner)						
Address of Livestock Security Interest			Date			
<i>Alberta Banking Company 123-A Street SE Calgary, Alberta T2T 3T3</i>			2009/01/01			
I CERTIFY THAT THIS DECLARATION IS TRUE						
X <i>John Smith</i> Owner						
Part G - Destination						
Date and Time Received		Count	Placed in Pen #			
2009/01/01 11:00 AM		14 hd	123			
Received and Counted By: (Print Name) / Signature			Premises ID			
<i>SA Taylor</i>			AB111AYOT			

Livestock manifest

Canadian Sheep Identification Program (CSIP)

This has been mandatory since January 1, 2004. All sheep in Canada must be tagged with CSIP approved tags before the animal leaves the farm of origin. In Alberta, CSIP tags can only be purchased from Canadian Co-operative Woolgrowers.



Note

- for information on current approved tags, visit http://www.cansheep.ca/cms/en/Programs/CSIPPrograms_new/CSIP/CSIP.aspx.

15. In Conclusion

Raising sheep can be a rewarding experience, regardless of size of your operation. New shepherds should start with a small number of sheep and build up along with your experience. Although there are over a thousand different breeds of sheep, there is no "perfect" breed. Each breed or type offers various characteristics and attributes along with advantages and disadvantages; select the type that will work the best for your operation and experience. The best place to purchase breeding stock is from a reputable individual breeder where you can visit the farm, inspect the animals and view their records. You can also purchase sheep from consignment or production sales. Health risks increase when mixing sheep from different sources, so the fewer the sources the better. Crossbreds tend to be hardier, with hybrid vigour, and can be more productive than purebred animals. Healthy mature ewes are more experienced moms and usually have fewer lambing problems than ewe lambs. It is often easier to find ewe lambs for sale rather than mature ewes that are problem free. Don't buy other people's problems!

There is a lot to learn when entering into the sheep business and it is important to gain as much information and experience as you can. Visit various successful sheep producers; seek out their expertise and advice. If possible spend a week during lambing at a well-established sheep operation similar to the operation you plan to develop. Find a veterinarian who is knowledgeable in

sheep health, diseases and medications, and establish a good working relationship. Attending workshops, shepherd meetings and conferences in your area is always beneficial. The internet is a valuable link to a world of sheep knowledge, and it's at the tips of your fingers. Ideally the information compiled in this module has provided an insight into the wonderful business and livelihood of shepherding. The satisfaction and joy one feels from raising a healthy thriving sheep flock is well worth the time and energy it takes to become a successful shepherd.

Review: Top Ten Most Frequently Asked Questions:

1. Where do I go to buy sheep?

- From reputable producers
- Open or closed flocks
- Dispersal sales
- Reduction sales
- Designated auction sales

Remember, there are no disease-free sheep.

2. How much land is required?

The answer to this is dependent upon:

- Intention to grow or buy winter feed
- Productivity of the land
- Cost of land
- Intention to graze or feedlot all or part of the flock
- Long range plans for expansion
- Type of farm operation

3. How much time and labour is involved?

This depends on:

- Type of farm operation: the more intensive the system, the greater the daily input.
- Lambing season. Weather conditions and facilities will have an impact.
- Time spent monitoring lamb growth rates for marketing.
- Time spent maintaining flock records: health, lambing ease and percentage, ewes for culling, selection of ewe lambs.

The more time spent with health and management of your flock (pen checking, deworming and vaccination), the greater your chances of success.

4. When is the best time to sell lambs?

There is no simple answer to this question.

- Prices fluctuate from year to year, season to season, even week to week.
- Timing is based on supply and demand.

- You must schedule lambing to meet your chosen market:
 - Early spring market. Usually higher prices but requires winter lambing with its higher feed costs, higher lamb losses, increased housing cost, more labour.
 - Fall sales. Usually lower prices but spring lambing has a higher lambing percentage, lower feed costs, lower lamb losses from cold, reduced housing required, higher deworming costs, is less labour intensive. Most common.

5. What is the optimum flock size?

Again, there is no simple answer. First, consider these questions:

- What is your standard of living?
- What are your expectations?
- Is your operation a hobby or business?
- Do you have off farm income? Generally, 600 to 1000 ewes with once a year lambing are necessary for a full time living.

Remember that net dollars per lamb and number of lambs marketed are more critical than the number of ewes.

Advice to new producers: start small (30 to 50) and build up.

6. What is biosecurity?

There are different levels of biosecurity (A, B, and C). The overall aim is to eradicate specific diseases from your flock and then keep them out. To do this:

- Keep a closed flock.
- Ensure that sheep do not come in contact with other sheep. If they leave the farm, they don't return.
- Document health status for selling breeding stock.
- Designate specific steps for people visiting farms.

7. What are the different types of sheep operations?

Types include:

- Extensive or pasture-based
- Intensive or total confinement
- Farm flock– combination of intensive and extensive
- Feedlot lamb production

8. What breed or type of sheep should I purchase?

Choose from over 1000 breeds of sheep world-wide, over 40 breeds available in Alberta.

Choose the type of sheep that fits:

- Your farm facility and land size
- Your farm operation (intensive versus extensive)
- Your labour and time availability

Don't buy the sheep then adapt your operation!

9. What sheep should I avoid?

Stay away from sheep with:

- Missing teeth
- Lumpy udders, abnormal shape
- Untrimmed feet, limping sheep
- Eye problems
- Rough condition wool
- Very thin, poor condition
- Signs of vaginal prolapse or Caesareans
- Abscesses or sores
- Signs of worms

10. What facilities and equipment are needed?

Things to remember when you make your plans:

- Modest equipment and good planning will work better than expensive equipment and poor planning.
- Understand what is required before you begin.
- Visit a few sheep farms before you start.
- Think about sheep behaviour when planning.
- Consider your lambing season—winter, spring, fall.
- Consider your type of farm operation.
- Good equipment makes handling safer, easier and faster with less stress on animal and operator. Find what works best for you.

Sheep Terminology

A

AAFC: Agriculture and Agri-Food Canada.

AAFRD: Alberta Agriculture, Food and Rural Development.

Abattoir: a facility where farm animals are slaughtered and processed into meat products.

Abomasum: the fourth compartment (stomach) of a ruminant, where digestion occurs.

Abortion: premature loss of pregnancy.

Accelerated lambing: when a ewe lambs more often than once a year.

AFAC: Alberta Farm Animal Care.

Afterbirth: the placenta and fetal membranes that are expelled from the uterus after giving birth.

ALP: Alberta Lamb Producers

Amino acid: one of the building blocks of protein.

Anaemia: a lower than normal number of red blood cells.

Anthelmintic: a medicine which kills certain types of intestinal worms.

Antibiotic: a drug that kills bacteria and other germs.

Antibodies: proteins produced by the immune system to fight specific bacteria or viruses.

Antitoxin: an antibody that can neutralize a specific toxin.

B

Bloat: excessive accumulation of gases in the rumen.

Body Condition: an assessment of muscle/fat/tissue on the animal over the loin region. Scored 1-5, 1 being very thin, 5 being very fat.

Bottle jaw: edema or fluid accumulation under the jaw. Often a sign of infection with Haemonchosis worms in sheep.

Bottle lamb: an orphan lamb raised on a bottle.

Breech birth: a birth where the lamb is presented backwards with its rear legs tucked under and only its tail is near the opening.

Broken mouth: a sheep which has lost or broken some of its incisor teeth, usually six years old or more.

Bummer: slang term for an orphan lamb.

C

Carding: a process involving the movement of wool fibres between two surfaces (carders) covered with wire pins in order to detangle and align fibres for spinning.

Cast: a sheep upside down on its back, unable to regain its footing. May be lying on a hill or hollow or can't get up because of heavy and or wet fleece.

Castrate: remove testicles, making reproduction impossible.

CCWG: Canadian Cooperative Wool Growers

Cervix: the lower section between the uterus and the vagina which dilates during labour to allow the passage of the fetus to be born.

CFIA: Canadian Food Inspection Agency.

Chronic disease: a condition that can't be cured.

Cryptorchid: failure of one or both testicles to descend.

Coccidiostat: chemical agents mixed in feed or drinking water to control coccidiosis (a microscopic protozoa parasite) in animals.

Colostrum: first milk a ewe produces after lambing. High in antibodies, this milk protects newborn lambs against diseases.

Composting: process whereby organic waste decomposes naturally.

Conception: in reproduction, the point at which the sperm fertilizes an egg.

Creep feeding: method used to provide supplemental feed to nursing lambs.

Crossbreeding: the mating of animals of different breeds.

Crutching: the removal of wool from around the tail and between the rear legs of a ewe before lambing.

CSBA: Canadian Sheep Breeders Association.

CSF: Canadian Sheep Federation.

CSIP: Canadian Sheep Identification Program, a mandatory trace back system. All sheep and lambs must bear an approved ear tag before they leave the farm of origin.

Cubic centimetre (cc): Same as millilitre (ml).

Cud: food of a ruminant to be chewed again.

Cull ewe: a ewe no longer fit for breeding and sold for meat.

Culling: removing an animal, especially a sick or poor performing one, from the flock.

D

Dags: wool contaminated by feces, which adhere to the posterior of a sheep.

Dam: mother sheep.

DE: digestible energy

Diarrhea: thin watery feces, usually a symptom of gastrointestinal upset or infection.

Distress: a condition in which an animal experiences excessive fear, pain, or anxiety.

Drench: a medicine administered orally, usually by a drenching gun.

Dock: to remove the tail, or the shortened tail of a sheep.

Downer: an animal that cannot rise, stand or walk without assistance.

Dystocia: difficulty in giving birth or being born.

E

Ear tag: a metal or plastic tag clipped permanently in the ear, carrying an ID number or an electronic chip.

Elastrator: instrument used to apply heavy rubber bands (elastator rings/bands) to the tail and scrotum of newborn lambs for docking and castration.

Embryo: an animal at the very early stages of development before birth.

Epididymitis: tiny tubes where sperm collect after leaving the testis.

Estrogen: female sex hormone produced by the ovaries. Responsible for the estrous (heat) cycle.

Estrus: the period when the female is fertile and receptive to the male.

Estrous Cycle: the reproductive cycle of the female.

Euthanasia: the human termination of the life of an animal.

Ewe: female sheep.

F

Fat-soluble vitamins: vitamins that dissolve in liquid fat, oils, or water. Vitamins A, D, E and K.

Fecal egg counts: number of worm eggs.

Feedlot: an area where lambs are confined and fed mixed, high-concentrate feed to fatten them for market.

Fertilizer: a natural or synthetic material, including manure, nitrogen, phosphorus and potassium, spread onto soil to increase fertility.

Fleece: the wool from a single sheep in the shorn grease state.

Flushing: providing improved nutrition in the few weeks prior to breeding to improve fertility.

Fly strike: infestation of wool, skin and eventually flesh by the maggots of the blowfly.

Footrot: contagious disease of sheep caused by specific bacteria.

Forage: grasses, small shrubs, and other plant material that can be fed to livestock. Edible parts of plants.

G

Gestation: the length of pregnancy. In sheep, 147 days on average.

Grade: a measurement of quality in a carcass.

Graft: transfer a lamb to a ewe that is not its mother.

Grain: the seed part of cereal crops such as barley, oats, and wheat.

Grass: plants having narrow leaves with jointed stems, small flowers.

Grass-based: pasture or grassland play a significant role in the diet of the animal.

H

Haemonchosis: infestation with, or disease caused by, *Haemonchus* nematode worms .

Hardening pens: larger pens where four to 10 ewes and their young lambs are held so they can be feed and observed. Usually used after ewe and lambs have bonded well in individual jugs (pens).

Hay: grass mowed and cured for the use animal feed.

Haylage- grass silage.

Heat: estrus. The period when the female is fertile and receptive to the male.

Hectare: metric unit of area equal to 10,000 square metres, or 2,471 acres.

Heterosis: an increase in the performance of hybrids (crossbreds) over that of purebreds, most noticeable in traits such as fertility and survivability (also known as hybrid vigor).

Heritability: the extent to which a trait is influenced by its genetic makeup.

Hogget: a British term for a yearling sheep.

Hoof trimmers/shears: tools for trimming hooves.

Hormone: a chemical secreted by a gland in one part of the body that regulates the function of a specific tissue or organ in another part of the body.

Hybrid vigor: an increase in the performance of hybrids (crossbreds) over purebreds, most noticeable in traits such as fertility and survivability.

Hypothermia: lower than normal body temperature, often caused by exposure to cold.

I

Immunity: a natural or acquired resistance to a specific disease.

Inbreeding: mating of closely related members of a species or breed.

In lamb: pregnant.

Intramuscular (IM): injection into the muscle.

Intraperitoneal (IP): injection or withdrawal (of fluid) from the abdominal cavity.

Intravenous (IV): injection into the vein.

J

Jug: a pen where a ewe and her newborn lambs are put to bond.

Jugular: vein in the neck that returns blood from the head.

K

Ked: wingless fly that is an external parasite on sheep.

Ketone: acidic substance produced when the body uses fat instead of sugar for energy.

Ketosis: metabolic disorder in which ketones build up in the body.

L

Lactation: the production of milk. The period of time the ewe gives milk.

Lamb: a young sheep. The meat from a sheep less than one year old.

Lambing: giving birth to a lamb.

Lambing percentage: a measure of the number of lambs weaned in a flock compared to the number of ewes mated. This takes account of ewe and lamb mortality.

Lame: obvious limping when moving, or favouring a leg when standing.

Lanolin: wool "grease."

Larva (plural: larvae): the immature worm-like form of many insects that develops into a pupa or chrysalis before becoming an adult insect.

Legume: a plant whose roots form an association with soil borne bacteria that can capture atmospheric nitrogen.

Libido: sexual desire.

Linebreeding: the mating of individuals within a particular bloodline.

M

Macromineral: an element essential in large quantities. Ca, Mg, P, Na, Cl, and K.

Manifest (Livestock): a list giving details of the livestock being transported, farm origin, destination, etc..

Mastitis: Inflammation of the mammary glands.

ME: metabolizable energy.

Meat: the rendered product from animal tissues.

Micromineral: an element needed in very small quantities. Also known as trace mineral. Fe, Co, Cr, Cu, I, Mn, Se, Zn, and Mo.

Millilitre (ml): , a unit of liquid volume in the metric system.

Mixed grazing: grazing by two or more species of grazing animals on the same pasture. Also known as multi-species grazing.

Mob: a group of sheep that run under the same conditions for the entire growing season.

Motility: the ability of sperm to move by themselves.

Mottled-faced: having spots or patches of colour on the face.

Mutton: the meat from an older sheep.

N

Necropsy: a post mortem examination

Notifiable Disease: a disease which, by law, livestock producers are obliged to bring to the immediate attention of Animal Health or a local veterinarian.

O

Off-label: use of a drug in a manner for which it was not labeled.

Omasum: the third stomach compartment of a ruminant.

Orf: a viral skin disease affecting sheep and goats. Can be passed to humans.

Ovine: related to or resembling a sheep.

Ovis: a taxonomic genus within the sub family Caprinae – the sheep.

Ovulation: the release of mature eggs from the ovary.

Oxytocin: a naturally secreted hormone that is important in milk letdown and the contraction of the uterine muscles during the birthing process.

P

Paddock: an enclosed area for grazing animals.

Parturition: the act of giving birth.

Pedigree: line of descent of a purebred animal.

Pelt: the skin of a sheep with the wool on.

Perennial plant: a plant that lasts three seasons or more.

Periparturient: around the time of giving birth .

pH: a value that indicates the acidity of something (e.g. rumen, soil).

Pizzle: the penis of an animal.

Placenta: the organ that nourishes the fetus(es) in the uterus.

Pneumonia: an infection of the lungs.

Polled: the absence of horns.

Pour-on: an external medicine applied along the backline, usually to prevent external parasites.

Predator: an animal that lives by killing and eating other animals.

Progeny: the offspring of an individual.

Progesterone: a female hormone secreted by the ovary. Produced in large quantities by the placenta during pregnancy.

Prolific: producing offspring in abundance.

Purebred: wholly of one breed or line (as opposed to crossbred).

R

Ram: uncastrated adult male sheep

Ram effect: stimulating non-cycling ewes to ovulate by the sudden introduction of a ram or teaser ram.

Reticulum: the second stomach chamber of a ruminant.

RFID: radio frequency identification.

Ringwomb: failure of the cervix to dilate during parturition.

Rotational grazing: a grazing system where animals are moved from one pasture to another.

Roughage: feed that is high in fibre, and low in digestible nutrients, and low in energy (e.g. hay, straw, silage, pasture).

Roundworms: unsegmented worms with elongated round bodies pointed at both ends.

Rumen: the first stomach compartment of ruminants.

Ruminant: an animal with a compartmentalized stomach that is able to digest cellulose.

S

Scours: diarrhea in livestock.

Scrapie: a fatal brain disease of sheep and goats.

Scrotum: pouch in which the male's testicles are suspended outside the body.

Scurs: little horns that have broken the skin, but not grown.

Selection: choosing of favourable offspring to be parents of future generations.

Semen: the combination of sperm, seminal fluid, and other male reproductive secretions.

Sharps: needles, syringes, scalpel blades, and anything else that can puncture the skin.

Shear: the act of cutting off wool from a sheep.

Shed lambing: housing ewes and newborns in pens or sheds to provide food, shelter, and care during and immediately after birth.

Shepherd's crook: a staff with a hook at one end for catching sheep by the neck or leg.

Silage: livestock feed prepared by storing and fermenting green forage in a silo.

Sire: father.

Sperm: male reproductive cells.

Spin: work natural fibres into thread or yarn.

Staple: refers to the length of a lock of shorn wool.

STAR System: accelerated lambing system in which ewes produce five lamb crops in a three year period.

Stillborn: showing no sign of life at birth.

Stocking density: the relationship between the number of animals and the land at any one time.

Stocking rate: the number of specific kinds and classes of animals grazing a unit of land for a specific period of time.

Stockpiled forage: forage that is allowed to accumulate for later grazing.

Straw: the stems of wheat, barley, or oat plants which are cut and baled and often used for animal bedding, and sometimes fed to animals.

Strip grazing: confining animals to an area of grazing land to be grazed in a short period of time.

Subcutaneous (Sub-Q, SQ): under the skin, often referring to an injection.

Sustainable agriculture: an approach to growing food and fibre which is profitable, uses on-farm resources efficiently to minimize adverse effects on the environment and people, preserves the natural productivity and quality of land and water, and sustains vibrant rural communities.

T

Tapeworm: parasitic ribbon-like flatworm in the intestine of animals.

Teaser ram: a ram that has been surgically altered in a way that prevents him from reproducing.

Terminal sire: a ram breed known for producing market lambs that are well muscled, lean and fast growing.

Testosterone: a hormone that promotes the development and maintenance of male sex characteristics.

Total Digestible Nutrients (TDN): standard system for expressing the energy value of feeds.

Tup: British term for an uncastrated adult male sheep.

U

Udder: the milk secreting organ of a cow or sheep.

Ultrasound: a procedure in which high-energy sound waves (ultrasound) are bounced off internal tissue or organs and make echoes. Can be used for measuring loin and fat density or number of lambs.

Uterus: the organ in the female in which the fetuses develop. The womb.

V

Vaccines: injections given to animals to prevent disease.

Vagina: the canal that forms the passageway from the uterus to the outside of the body. The birth canal.

Vegetable matter: any material of plant origin found in fleece, e.g. burrs, straw, seed heads.

Vegetative: in the developmental parts of plant growth, leaf and stem rather than its reproductive plant parts.

W

Weaning: removal of a young animal from its source of milk.

Weed: a plant that is growing where it is unwanted.

Wether: a castrated male sheep.

Withdrawal period: the time when a drug must not be administered prior to marketing to insure that no residue remains in the meat or milk.

Wool blindness: when excessive wool growth interferes with a sheep's ability to see normally.

Woollen: yarn made from fibres that are one to three inches in length and that have been carded only, often being fuzzy, thick, and bulky.

Y

Yarn: a continuous twisted strand of wool.

Yearling: an animal between one and two years of age.

Z

Zoonosis: a disease that can be transmitted from animals to humans, e.g., ringworm or orf.

References

Breeds of Sheep

1. Canadian Sheep Breeders Association. *Canadian Sheep: An Investment in the Future*.

Consumer Studies

1. Agriculture and Agri-Food Canada. The Canadian Consumer. Behaviour, Attitudes and Perceptions Towards Food Products. Market Analysis Report May 2010. http://www.gov.mb.ca/agriculture/statistics/food/canada_consumer_report_en.pdf
2. Agriculture and Agri-Food Canada. Consumer Perceptions of Food Safety and Quality: Further Analysis and Information Development. 2008.
3. Agriculture and Agri-Food Canada. Canadian Food Trends to 2020. A Long Range Consumer Outlook. 2007. www4.agr.gc.ca/index_e.php, Agri-Industries section.

Health and Diseases

1. Canadian Agri-Food Research Council. *Recommended Code of Practice for the Care and Handling of Sheep*. 1995.
2. Canadian Food Inspection Agency. Animal Health Starts on the Farm: Biosecurity. Canada's Scrapie Eradication. www.scrapiecanada.ca. 2012.
3. Canadian Sheep Federation. *Canadian Sheep Identification Program*. Agriculture and Agri-Food Canada.
4. Canadian Sheep Federation. *Food-Safe Farm Practices*. Agriculture and Agri-Food Canada.
5. Clark, C. Diagnosis, Treatment, and Prevention of Diseases of Sheep.
6. Clark, C. Keeping Lambs Alive. 2009 Alberta Sheep Symposium presentation. 2009.
7. Clark, C., Parker, K., and Woods, J. *Sheep and Goat Management in Alberta—Health*. 2009.
8. Eales F. A., and Small J. *Practical Lambing*. Longman Group. 1985.
9. Euthanasia guidelines. For information on current Provincial and Federal Laws on Livestock Disease Act, Destruction and Disposal of Dead Animals Regulation: www.qp.alberta.ca/574.cfm?page=2000_229.cfm&legtype=Regs&isbncln=9780779726066 or contact Ag-Info Centre at 310-FARM (3276)
10. Henderson, David C. *The Veterinary Book for Sheep Farmers*. Farming Press. 2002.
11. *Malignant Catarrhal Fever in Bison and Sheep*. Agri-Facts. Agdex 663-44. June, 2002.
12. Menzies, P. *Improving Lamb Survival*. 2001 Alberta Sheep Symposium. 2001
13. Parker, K. *C. ovis: the Problem with "Spots"*. Alberta Lamb Producers N'ewesletter, April 2012.
14. Pugh, D.G. *Sheep and Goat Medicine*. W.B. Saunders Co. 2001.
15. Simmons, P. *Raising Sheep the Modern Way*. Garden Way Publishing. 1981.
16. *Storey's Barn Guide to Sheep*. Storey Publishing, LLC. 2006.
17. Wenger, I. *Guide to Footrot in Sheep*. Alberta Sheep & Wool Commission. 2007.
18. Wenger, I. *Guide to Parasites in Sheep*. Alberta Sheep & Wool Commission. 2005.

Lambing

1. Martin, S. John. *Assisting the Ewe at Lambing* FACTSHEET. Agdex# 433/22, 01/99. 1999.
2. Martin, S. John. *Care of the Newborn Lamb* FACTSHEET. Agdex# 431/23, 01/99. 1999.

Marketing

1. Alberta Lamb Producers. *Building the Vision Together*. Alberta Lamb Producers brochure. 2011.
2. Alberta Lamb Producers N'ewesletter. *Traceability*. February 2011, pp 11.
3. Alberta Lamb Producers. *Making it Pay*. Alberta Lamb Producers N'ewesletter. September 2010, pp 19.
4. Alberta Lamb Producers. *Questions and Answers for Distributing Meat*. Alberta Sheep Fact Sheet. 2009.
5. Hosford, S. Lakeland Carcass Sire Project. 2007 Alberta Sheep Symposium. 2007.
6. *Number of Sheep in Canada*. Statistics Canada. Information as of Jan 1, 2011.
7. *Sheep*. Popular Farming Series, Bowtie Magazines. Volume 5. 2011.

Nutrition

1. Alberta Agriculture, Food, and Rural Development. *Sheep 4-H Manuals Level 1-3*. SP 095. 1995.
2. Alberta Sheep & Wool Commission. *The Western Canadian Sheep Production Manual: The Art and Science of Shepherding*. 1999.
3. Doig, Bryan. *Sheep Nutrition*. Saskatchewan Ministry of Agriculture.
4. Kleinschmidt, J. *Sheep and Goat Management in Alberta—Nutrition*. pp. 173-176.
5. Smart, M. *A Practical Guide to Profitable Sheep Production*. Aspen Hills Enterprise. 1996. pp. 24-29.

Predators

1. Alberta Lamb Producers. *Guardian Animals for Alberta: Predator Control*. Alberta Sheep Fact Sheet. 2009.

Reproduction

1. Alberta Sheep & Wool Commission. *The Western Canadian Sheep Production Manual*, 1999.
2. Palmer, C. *Sheep and Goat Management in Alberta—Reproduction*. pp. 59-60.

Sheep Housing

1. Alberta Lamb Producers. *Shelter and Sheep Facilities*. Alberta Sheep Fact Sheet. 2009.
2. Canada Plan Service. <http://www.cps.gov.on.ca/english/frameindex.htm>
3. Canadian Agri-Food Research Council. 1995. *Recommended Code of Practice for the Care and Handling of Farm Animals: Sheep*. <http://www.nfacc.ca/codes-of-practice/sheep>.
4. Conroy, F. and Hanrahan, P. *Basic Handling Facility Layout for Sheep Flocks. Sheeppark and Shearing Shed Design*. 1994.

5. O'Brien, A. *Handling System*. FACTSHEET. Agdex # 430/20, 09/02, 2002.
6. Saskatchewan Ministry of Agriculture. *Fencing Costs*. Fact Sheet. April, 2009.
7. Saskatchewan Sheep Development Board. *The Basics of Good Sheep Management*. Rural Route Series DVD.

Statistics

1. Ranking America. Ranking of World Sheep Numbers. <http://rankingamerica.wordpress.com/?s=in+sheep>. April 2012.
2. Statistics Canada. Sheep Statistics Chronological Index. (Canadian Current Sheep Statistics). <http://www5.statcan.gc.ca/bsolc/olc-cel/olc-cel?catno=23-011-X&CHROPG=1&lang=eng>

Additional Resources

Alberta Lamb Producers Website and Links

Alberta Lamb Producers: www.ablamb.ca

Auctions and Buyers: www.ablamb.ca/contracts/buyers

Shearers: www.ablamb.ca/contracts/shearers

Websites and links: www.ablamb.ca/links

Alberta Sheep Groups: www.ablamb.ca/sheepgroups

Animal Handling

Alberta Farm Animal Care Association: www.afac.ab.ca

Guide to Humane Care, Handling and Transportation of Sheep. Alberta Sheep & Wool Commission. 2005.

Livestock Transport requirements in Canada. www.inspection.gc.ca

Livestock Behaviour, Design of Facilities and Humane Slaughter. Temple Grandin. Colorado State University. www.grandin.com

History of Sheep

History World: History of the Domestication of Animals. www.historyworld.net/wrldhis/PlainTextHistories.asp?historyid=ab57#ixzz1sWBuNp00

Livestock ID Animal Identification Resources "Canadian Lamb Company Initiative: A New Organization". <http://livestock-id.blogspot.com/2010/07/canadian-lamb-company-initiative-new.html#ixzz1sWipISzT>

Industry Websites

Canadian Food Inspection Agency: www.cfia-acia.agr.ca

Canadian Sheep Breeders Association: www.sheepbreeders.ca

Canadian Sheep Federation: www.cansheep.ca

Canadian Sheep and Lamb Food-Safe Practices Program: www.fsf.cansheep.ca

Ontario Sheep Marketing Agency: www.ontariosheep.org

Ropin' the Web: www.agric.gov.ab.ca

Resources to Assist in Raising Sheep

Compendium of Veterinary Products: http://csf.naccvp.com/?m=main_intro

Midwest Plan Service. *Sheep Housing and Equipment Handbook*. 1982. Available online at: www.mwps.org/stores/mwps/files/Sheepcontents_D251D4104B0BC.pdf.

Sheep 101 and 201: A Beginner's Guide to Raising Sheep: www.sheep101.info/201/index.html

Sheep and Goat Management in Alberta—Health, Nutrition and Reproduction modules. Available to order from www.ablamb.ca or view online at: http://ablamb.ca/producer_mgmt/sheep_goat_mgmt.html

SheepBytes Ration Balancer: www.sheepbytes.ca