SHEEP PRODUCTION GUIDE

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Sheep are considered to be among the first animals domesticated. Their usefulness to mankind has proven invaluable through the ages. Genetic improvements have yielded great strides in production of fiber and meat. Environmental modifications, improvements in reproductive efficiency, disease prevention/control, and nutritional technological advances have enabled sheep production to become an important and viable enterprise in the United States. This booklet covers basic sheep production guidelines.

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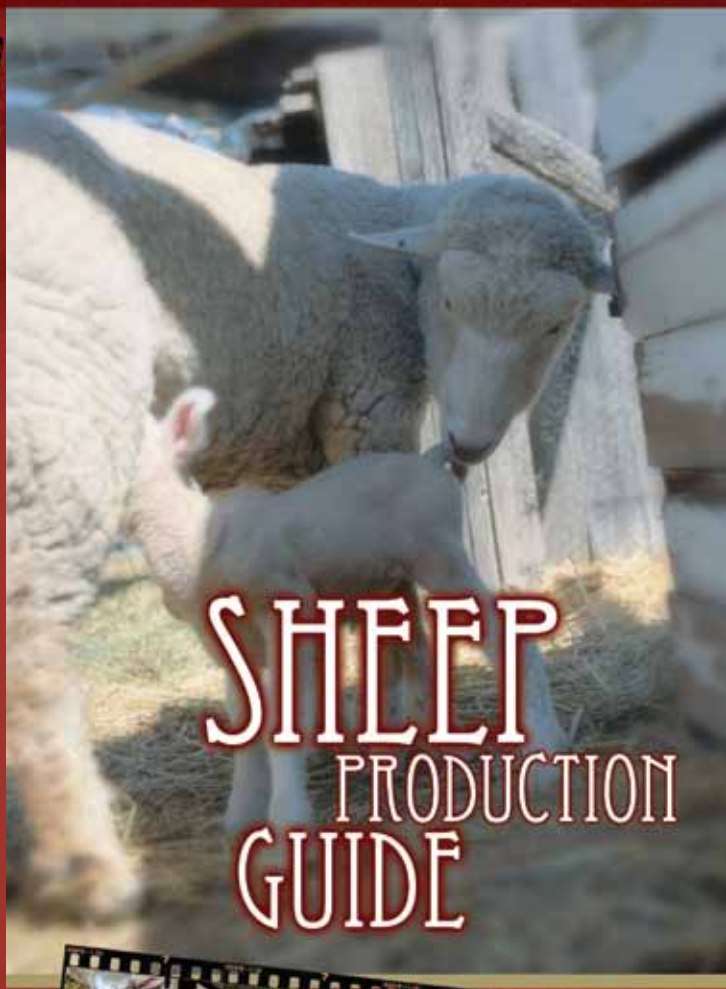

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Sheep are thought to be one of the first animals domesticated by man. Over thousands of years, sheep have been selected and bred to produce meat and fiber. Progress in genetics, management, nutrition, and environmental alteration has resulted in increased productivity and efficiency. For instance, many breeds are capable of producing three lambs at each birth and can average one and a-half lambings yearly compared to only one lamb per year. The production of fiber (wool and hair) and meat has also greatly increased.

While there are more than 30 breeds of sheep in the US, less than 10 are used for large-scale commercial production. Minor breeds may become more popular due to specific attributes, such as increased reproductive efficiency, improved carcass merit, higher wool yield, higher milk production, or adaptability to specific production situations.

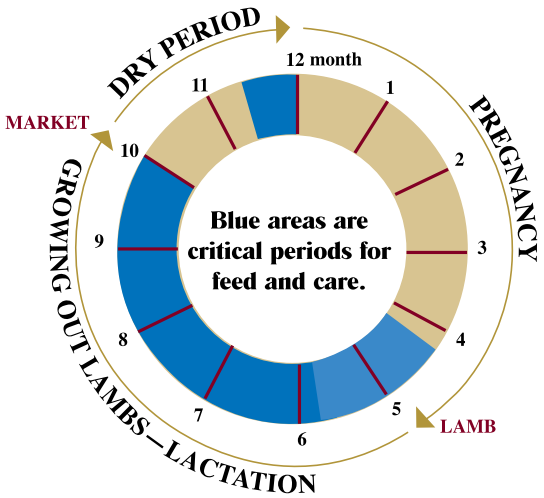
SHEEP PRODUCTION CONSIDERATIONS

Depending on flock size, only a relatively small capital investment in specialized buildings and equipment is needed. Unused buildings can be converted into low-cost sheep shelters. Total confinement operations also exist. Marginal land resources can be used during a portion of the annual production cycle of breeding sheep when nutritional quality of forage is not critical. The lamb crop accounts for 75-85% of the income for most sheep operations and often covers the annual cost of ewes. The wool clip can often be sold for additional income, dependent upon consumer demands and global supply.

Labor requirements of sheep operations are low compared to many other livestock enterprises. Lambing and shearing represent the periods of greatest labor need. Advances in feeding, management, and genetics have developed lambs with superior growth potential, creating the need to provide proper nutrition to achieve rapid, efficient growth of market lambs and fiber production.

Sheep producers should set production goals prior to the breeding season. Lambing season should be timed as early as possible based on facilities, weather, and available labor. Marketing opportunities should also be considered. Spring and early summer lamb prices are usually higher than late summer and fall prices. Lambs, which will be sold as feeder lambs, gain faster if they can be finished before hot weather. Profitability is also influenced by ewe "quality." An aggressive culling program may be needed to retain only healthy, vigorous, productive ewes in the flock. Figure 1 illustrates a typical production year for a sheep enterprise lambing once yearly.

Figure 1 Sheep Production Year



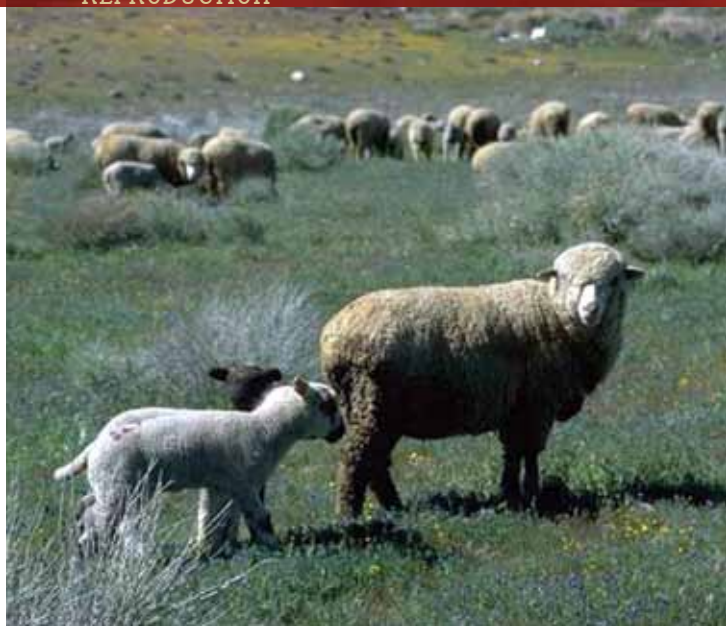
SHEEP BREEDS

Sheep are classified according to breed assets:

Fine-Wool Breeds: These breeds are more tolerant of heat, cold, and drought, and more likely to breed out of season compared to other breeds. They produce a more desirable, uniform, finer fleece. Rambouillet and Debouillet are the predominate fine-wool breeds.

Medium-Wool Breeds: The white-faced breeds Columbia, Corriedale, and Targhee are the most common medium-wool breeds in the US. These sheep are very productive provided feed is not restricted. Fleece varies in fineness/grade, and the breeding season tends to be more restricted.

Meat-Type Breeds: The common meat-type breeds in the US include Dorset, Hampshire, Shropshire, Suffolk, and Southdown. Rams of these breeds are often crossed with white-faced ewes to produce market lambs. Wool of these breeds is not as desirable as wool from the wool breeds.



Hair Breeds: Rather than wool, these breeds produce hair, which is shed in the spring. Hair breeds tend to be more heat and parasite resistant than wool breeds.

REPRODUCTION

The major factor affecting profitability of sheep operations is reproductive efficiency or percent lamb crop raised and marketed. The gain in nutritional or economic efficiency associated with an increased number or size of lambs offers the greatest potential for increased profitability due to the fact that 70% of the feed required to produce a weaned lamb is consumed by the ewe. Ewe maintenance cost is reduced when spread over more and/or larger lambs. Lamb production can be improved by:

- Producing more lambs at each lambing
- Increasing lambing frequency
- Improving herd health
- Reducing parasite infestation
- Reducing lamb death loss

Reproductive Facts:

Puberty: Minimum range is 5-9 months at 70-100 lb. Puberty is influenced by breed, genetic selection, body size, nutrition, and birth date.

Estrus Cycle: Ranges from 14 to 19 days, with average of 16.7 days. Estrus period is approximately 24-36 hours; with ovulation occurring near the end of the period.

Breeding Season: Length of daylight, breed, and age influence length of the breeding season. The breeding season typically starts in the fall and lasts five to seven months in common domestic sheep breeds. Going into the breeding season, ewes should be in moderate body condition and gaining weight.

Gestation: 142 to 152 days (approximately five months). Well-developed and well-managed ewe lambs may be bred to lamb as yearlings. Ewes must be thrifty and healthy, but not fat. During the last six weeks of pregnancy, a ewe should gain approximately 20 lb if carrying a single lamb and 30-35 lb if carrying twins or triplets. This gain will aid in preventing pregnancy disease, ensure strong lambs, and improve milk production and mothering instinct. The last six weeks of gestation are especially critical in the nutrition of ewes. Approximately 70% of fetal growth occurs during this period and sufficient nutrition must be provided for this nutrient drain. If nutrient restrictions occur, lighter lambs, increased post-natal losses, reduced mothering instinct, lower levels of milk production, and increased pregnancy disease will occur. When trimming hoofs or shearing during the last month of gestation, handle ewes gently.

Rams: To ensure a maximum lamb crop, use the proper number of rams. Rams should be at least 10 months old before mating. To achieve optimum breeding performance, rams should be subjected to a breeding soundness exam and should be in moderate body condition. Rams are normally left with the flock for an eight-week breeding season. Shearing rams prior to the breeding season may be beneficial, especially during hot weather. To facilitate breeding records, oil paint may be applied to the ram's brisket daily, which will identify ewes that have been bred. Paint colors can be coordinated with first, second, and third sections of the breeding season.

Ram to Ewe Ratios	
Yearlings to 5-year-old ram	25-50 ewes
Well-mature ram lamb	15-30 ewes
Older rams	Use for hand-breeding or pasture breeding (light duty)

LAMBING

Lambing time is the busiest season for the sheep producer. The average lamb weighs 9 lb at birth. Single lambs generally weigh 10-12 lb, a twin lamb weighs approximately 9-10 lb, and a triplet averages 5-8 lb. Proper preparation is essential for a successful lambing season.

Management Tips Prior to Lambing:

- Separate ewes close to lambing and place in separate pasture or lot to facilitate observation.
- Provide draft-free, dry lambing pens at least 4 ft x 4 ft (5 ft x 5 ft for large breeds) with clean bedding.
- Have on-hand heat lamps for use as needed.
- Provide one lambing pen per five ewes.
- Shear ewes if weather and facilities favor short coat; if not, clip ewe around rump and udder.

Management Tips After Lambing:

- Confine newborn lamb and ewe for one to three days after lambing; then move to mixing pens/lots.
- Ensure newborn lamb is breathing (remove fetal membranes from nose if needed).
- Ensure the newborn lamb nurses soon after birth in order to consume colostrum.
- Inspect ewe's udder (check for mastitis, milk supply, and chapped or cracked teats). If lamb's teeth are injuring udder, file sharp points on teeth with emery cloth or small file.
- Monitor lamb health and nursing activity.
- Provide external heat source during extremely cold weather to facilitate drying of lamb post-lambing.
- Treat navel cord with iodine (7%) or other suitable disinfectant.
- Place identification on lamb and record birth information.
- If a lamb is not receiving sufficient milk, graft the lamb onto another ewe (cross-foster) or feed artificially if grafting is not an option.
- Clean and disinfect lambing pens after use.

- Dock tails at 7-14 days of age and castrate males not intended for breeding stock (usually done at the same time tails are docked); treat with disinfectant and turn lambs out on clean pasture or house in clean, well-bedded building.

FLOCK MANAGEMENT

Profitability is tied to flock management. Successful sheep producers keep abreast of marketing strategies; new developments in management, nutrition, health, genetics, and reproduction; and maintain accurate records. Health programs should be developed, implemented, and maintained under the consultation of a veterinarian.

Shelter: Sheep can withstand considerable cold provided protection from wind and a dry bedding area are provided. If sheds are provided, ensure they are well ventilated and floors (or ground) are able to drain. To prevent injuries from crowding, gates and doors should be 10 to 12 ft wide. Keep pens, lots, pastures, etc. free of debris that could injure feet and udders. Entrances to buildings/sheds should not require ewes to jump over a sill, which could injure udders. Space requirements are given in Table 1.

Water Source: Provide an unlimited supply of clean, fresh water. Stale, stagnant water sources discourage water consumption. Feed consumption can be reduced if water intake is limited. Regardless of water system, it should be capable of supplying three gallons per head daily.

- Open tank – One linear ft per 15 head.
- Automatic water bowl – One bowl per 40 head.

Shade: During hot weather, sheep need six to eight ft of shade per head. If natural shade is not available, provide artificial shades eight to 10 feet above ground surface.

Table 1 — Typical Space Requirements for Commercial Sheep Breeding Herd

Feeder Space	
Group-fed	16-20 inches/ewe
Self-fed	8-10 inches/ewe for hay; 10-12 inches for silage/ewe
Creep Feed	1-1.5 inches/lamb
Water	
Automatic bowl	40-50 ewes or ewes with lambs
Tank	15-25 ewes or ewes with lambs per foot of tank perimeter
Shelter Space	
Open-front building with lot	10-12 sq. ft./ewe; 12-16 sq. ft./ewe and lamb
Lot	25-40 sq. ft./ewe or ewe and lambs

Shearing: Shearing ewes two to four weeks prior to lambing will eliminate the need to tag ewes. Shelter should be available to shorn ewes during cold weather. Additional feed (energy) may also be needed. To encourage physical and sexual activity and possibly fertility, rams should be shorn six weeks before the breeding season. Shear feeder lambs during the grow-finish period. Shearing during hot weather will help improve feed consumption and lamb performance.

Hoof Trimming: To prevent serious hoof problems, trim hoofs if necessary and keep pasture/range or lots free of wet/muddy areas where sheep congregate. Inspect feet when shearing and prior to the breeding season.

Grazing: Sheep are exceptional grazers. While grass or legume pastures provide excellent forage, browse (broad-leafed woody plant, shrub, bush, or smaller trees) comprise a major portion of sheep diets when on range. Forbs (broad-leafed, herbaceous

Photo: Dr. Chris Visser; www.karoogenetics.com

plants) are also readily consumed by sheep. Carrying capacity of pasture/range varies greatly depending on condition of land and quality of forages. An acre of well-managed, properly rotated grass-legume pasture in the Midwest can support up to six ewes and lambs; whereas more then six acres may be required in western areas to support one ewe/lamb pair. Pasture rotation can be incorporated into the sheep production system. The benefits include more forage yield and reduction in internal parasite load on pastures, which lessens reinfection rates.

Health Programs: An effective health program is essential to the economic sustainability of a sheep operation. Sheep are susceptible to numerous health challenges, some of which are nutritionally induced (such as pregnancy toxemia in ewes and acidosis in feeder lambs) while others are infectious diseases that require biosecurity precautions to prevent transmission. Sheep producers are strongly urged to consult with a veterinarian in the development and implementation of a disease prevention program. One aspect of a health program targets internal/external parasite control. A three-phase program will help achieve parasite control:

- Utilize pasture rotation
- Strategically deworm ewes/lambs
- Control external parasites by dipping or dusting

Sheep and lambs over one month of age should be dewormed in the spring prior to pasturing and again in the fall after the first hard freeze. If sheep are allowed to continuously graze short pasture, a mid-summer deworming is strongly suggested. Under some circumstances (crowding, wet pastures, etc.), frequent deworming may be needed.

Nutrition

The largest single production cost in any livestock operation is feed. Due to the unique nature of the sheep's gastrointestinal tract, forages can comprise the majority of a ewe's diet. Sheep diets must be designed to support optimal production, while also being economical. Nutritionally sound diets will avert nutrition-related disorders, thus promoting health and productivity. Nutrient requirements are influenced by:

- Age
- Stage of production
- Forage quality and quantity
- Production system (range versus confinement)
- Environmental/climatic conditions
- Management
- Body condition

Nutrient needs included water, energy, protein, minerals, and vitamins. Sheep nutrient requirements can be obtained from *Nutrient Requirements of Sheep* published by The National Academy of Sciences.

Water: The need for water is basic. An unlimited, fresh water supply is needed for sheep in all stages of production. Limitations to water intake may limit feed intake, hampering production, and contribute to the occurrence of urinary calculi in male sheep.

Energy: Insufficient energy limits ewe performance more than any other nutrient. The predominate energy

source for ewe diets is forage. The use of highly digestible fiber sources in complete sheep feed enables healthier rumen function. A lack of protein can result in ewes not efficiently utilizing energy in forage. For feedlot lambs, grain sources are used to supply most of the energy needs. Energy content of finishing diets can be boosted with the addition of 2-3% fat. Using more than 3% fat may reduce feed intake, decrease gain, and cause "off-color" carcass.

Protein: The need for supplemental protein depends on production stage and quality of available forages. Protein supplementation of sheep on medium to low-quality pasture/range can increase rumen microbe activity, thereby increasing forage intake, digestion, and performance. Sheep can utilize non-protein nitrogen (NPN), such as urea and biuret. Limit NPN to 1% of the total ration or not more than $^{1}/_{3}$% of the total ration nitrogen. Non-nitrogen protein sources should not be used in rations for young lambs and in creep rations. Young, growing lambs and high producing ewes require higher levels of amino acids. Sheep, like other ruminants, derive amino acids from feed protein that bypasses the rumen and from microbial protein produced in the rumen. Most amino acids are derived from microbial protein; however, microbial protein may not supply all amino acids needs for high producing ewes and young lambs. Rumen by-pass protein sources may be beneficial for improved performance of young lambs and high producing ewes.

Minerals: The relationship of minerals to each other must be taken into account when formulating supplemental sheep mineral products. The amount of one mineral may influence the amount of another mineral needed in the diet. Lack of a mineral creates a deficiency, while too much may cause toxicity. Sheep are especially sensitive to copper. While they need some copper in the diet, the spread between requirement and toxicity is very narrow. Zinc, especially complexed zinc,

has been associated with enhanced hoof health and immune response. The inclusion of ammonium chloride in high-grain rations has been shown to lessen the likelihood of urinary calculi in male sheep.

Vitamins: Sheep require dietary sources of the fat-soluble vitamins A, D, and E. Young lambs also require vitamin K and B-vitamins until the rumen becomes functional. Depending on grazing/harvest conditions, forage may be low in vitamin A, creating a need for supplementation. Niacin, a B-vitamin, is beneficial for increasing gain and feed efficiency in rations containing higher energy and protein. Another B-vitamin, thiamin may help prevent polioencephalomalacia in feedlot lambs.

Suggested Feeding Guidelines for the Sheep Breeding Flock*

Production Stage	14% Grain–Concentrate Mix (lb/hd/day)
Growing and replacement ewe lambs	1 – 1.5
Flushing ewes (feed two weeks prior to turning in rams and continue for first four weeks of breeding season)	0.5 – 1
Late gestation (starting six weeks prior to lambing)	1 – 1.5
Lactation (first six to eight weeks of lactation; nursing twins)	3
Lactation (nursing single lamb)	2
Growing and replacement ram lambs	2 – 3
Breeding (mature) rams	1 – 2

* Adjust grain-concentrate feeding rate based on desired body condition, environment, etc.
Feed good-quality forage (pasture, range, and/or hay) free-choice.
Provide unlimited supply of clean, fresh water and provide mineral supplementation as desired.

Breeding Herd Nutrition

Forage is the foundation of a breeding herd feeding program. Supplemental nutrient needs will depend on forage quality and quantity and production stage. Reproductive performance can be impacted by nutritional status of the ewe. Poor body condition of ewes can result in:

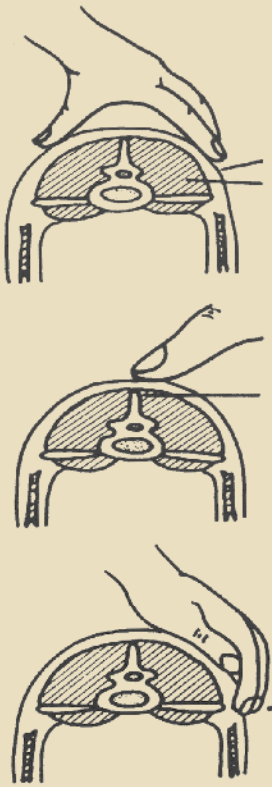
- Delayed estrus
- Lower conception rates
- Fewer lambs born
- Lighter birth and weaning weights
- Weak lambs at birth
- Higher feed costs in an attempt to increase weight to reach optimum body condition

Body Condition Scoring: One of the best and easiest to use measures of nutritional status and potential reproductive performance of the ewe is body condition scoring. Ewes are scored by manually determining the degree of muscling and fat covering around and over the vertebrae in the loin area. Condition scores range from 0 (extremely thin) to 5 (extremely fat). Intermediate scores (e.g. 2.5) can be accessed. Figure 2 (on pages 18-20) provides a description of body condition scoring for sheep, while Figure 3 (on page 21) depicts body condition score at various production stages. Optimal body condition of ewes will vary depending on production stage. At lambing, ewes should score 3.5 and at weaning body condition may drop to 2.5. Body condition outside of these ranges may impact reproductive performance.

Flushing: Increasing feed intake two to three weeks prior to the breeding season may increase ovulation rate, increasing the percent lamb crop potential and allows for an earlier, more uniform lamb crop. Flushing can be accomplished by moving ewes to better quality pasture or feeding mixed hay-grain concentrate mix at 0.5-1 lb/head/day. Flushing should continue two to four weeks into the breeding season and then feed should be gradually withdrawn from ewes. Drastic reductions in feed intake during the early gestation period may result in early embryonic death loss.

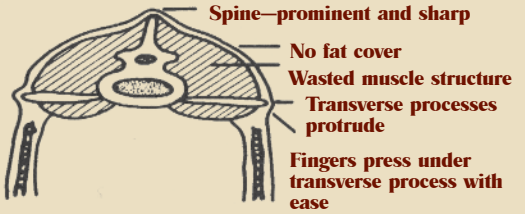
Gestation: Nutrient requirements for pregnancy are only slightly above maintenance needs during the first 15 weeks of gestation. Provided the ewe has regained most of the early lactation weight loss during the last eight to 10 weeks of lactation, the feeding program should be quite simple. Suitable forage and a supplemental mineral-vitamin product can supply ewe nutrient needs through the first two-thirds of gestation. Since 70% of fetal growth occurs during the last four to six weeks of gestation, supplemental nutrients will be needed to build body condition and deliver strong,

Figure 2 — Body Condition Scoring of Sheep

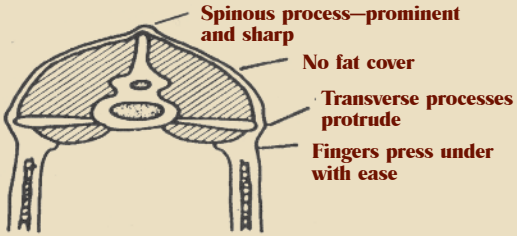


Area to Palpate to Determine Body Condition
The above sketches illustrate the cross-section of the loin area to be palpated when determining body condition score. The fingertips can be used to palpate fat cover over and around the vertebrae in the loin region. The best area to palpate is just behind the last rib. The spinal column has a vertical process at the midpoint of the back and a transverse process horizontal to the back and just below the loin. The prominence of these two points, or their lack of prominence due to fat cover, is helpful when estimating body condition.

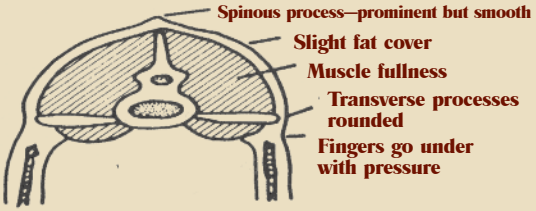
Figure 2 — Body Condition Scores 0 – 2



Body Condition 0
Sheep is extremely thin, unthrifty and weak. Skeletal features very prominent, e.g. backbone, shoulder blades and ribs. Wasted muscle tissue evident. Eye socket is prominent and sunken. May be humped back and isolates self from flock.

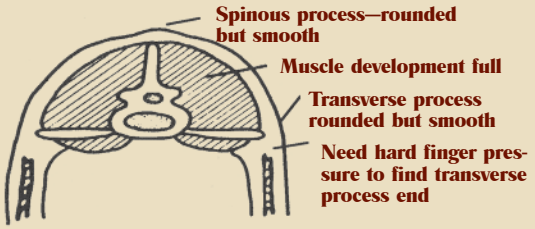


Body Condition 1
Sheep is extremely thin, unthrifty but agile. Skeletal features are prominent with no fat cover. No apparent muscle tissue degeneration. Has strength to remain with the flock.

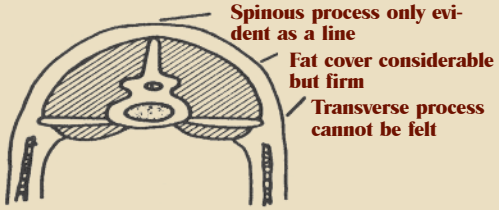


Body Condition 2
Sheep is thin but strong and thrifty with no apparent muscle structure wasting. No evident fat cover over the backbone, rump and ribs, but skeletal features do not protrude.

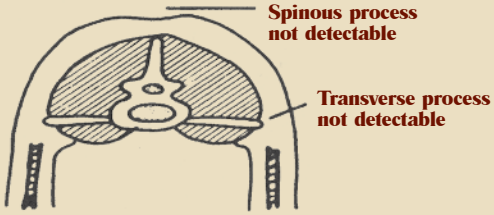
Figure 2 — Body Condition Scores 3 – 5



Body Condition 3
Sheep are thrifty with evidence of limited fat deposits in fore rib, over top of shoulder, backbone, and tail head. Hipbone remains visible.



Body Condition 4
Moderate fat deposits give the sheep a smooth external appearance over the shoulder, back, rump, and fore rib. Hipbone is not visible. Firm fat deposition becomes evident in brisket and around the tail head.



Body Condition 5
Sheep are extremely fat with the excess detectable over the shoulder, backbone, rump, and fore rib. Excess fat deposits in brisket, flank, and tail head regions lack firmness. Sheep appear uncomfortable and reluctant to move about. Quality fleeces are generally found.

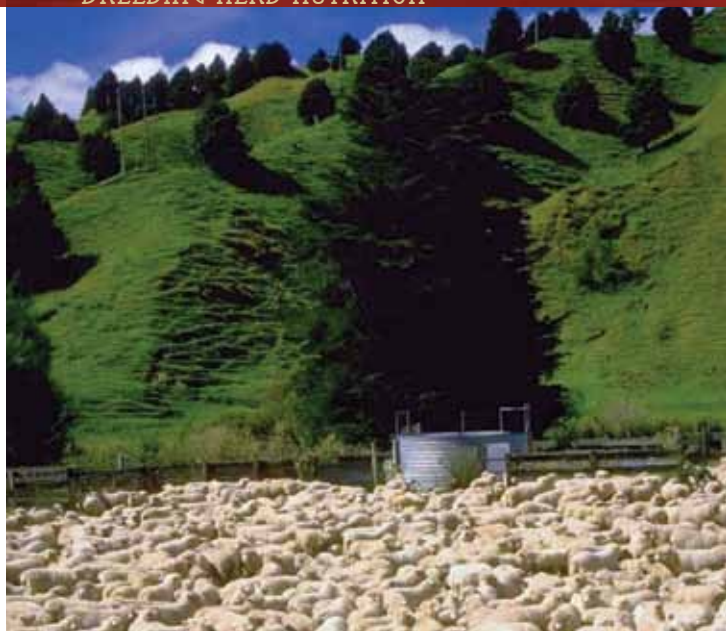
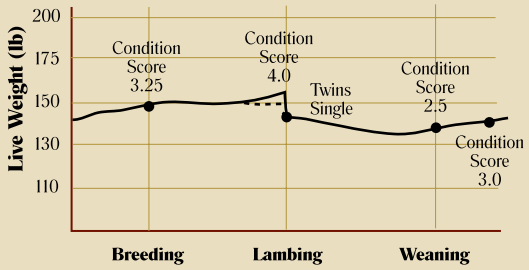


Figure 3



Source: Range Sheep Seminar–Nutritional needs of sheep. C. J. Kercher–University of Wyoming, March 17, 1993.

healthy lambs. Periodically check body condition of ewes and adjust feeding program if needed. Don't confuse wool growth and lamb development with body fleshing.

Lactation: Milk production greatly increases nutrient need. Depending on breed, a ewe produces 2-7.5 lb of milk daily. Ewes suckling twins have higher nutrient needs than those nursing a single lamb. Ewes nursing twins need a more nutrient dense diet. To facilitate proper feeding, separate ewes with twins from ewes with single lambs. Nutrient needs are greatest during the first four to six weeks, with requirements declining thereafter. Ration adjustments are needed to compensate for the varying nutrient needs during lactation. Again, monitor body condition and adjust diet as needed. An orphan lamb or lamb from ewe with insufficient milk or nonfunctional udder should be grafted to a ewe with sufficient milk to raise the orphan and its own lamb. Also, a weak lamb born with a strong twin lamb maybe grafted.

Rams: During the mating season, rams should be in good body condition (not fat). If rams lack sufficient body condition, feed grain mix (approximately 1.5 to 2 lb/head/day) along with forage prior the breeding season. Depending upon body condition, supplemental grain feeding may be necessary for six weeks before and during the breeding season. To ensure maximum sperm production, nutrient needs must be supplied four to six weeks prior to the breeding season due to a lag time in sperm production, and nutrient needs must continue to be met throughout the breeding season. Heavily worked rams, especially ram lambs, may need periodic rest periods during the breeding period, provided a sufficient number of rams are available.

Tips for Feeding Ewes

- When pasture/range quality declines, supplement with good-quality hay or hay/silage mixture. If forage provided is poor-quality, supplement ewes with a high-protein sheep supplement.
- Do not feed moldy hay or silage.
- To prevent ketosis, ensure ewes gain satisfactory body condition during the last four-six weeks of gestation by feeding a well-balanced ration.

- At lambing:
  - ⇨ Ensure lambs consume six to eight ounces of colostrum soon after birth to receive passive immunity and unique nutrients supplied by colostrum. Maintain a supply of colostrum for feeding to orphan or weak lambs.
  - ⇨ Do not feed grain mix to the ewe immediately following lambing.
  - ⇨ Gradually increase grain-mix fed over the next three feedings.
  - ⇨ When lamb(s) begin consuming all the milk produced by the ewe, feed 1-2 lb of grain mix daily for ewes nursing single lambs and feed and 1.5-3 lb of grain mix for ewes nursing multiple lambs. Continue to provide good-quality forage free-choice.
- At dry-off (drying-off of heavy milking ewes is critical when lambs are weaned early):
  - ⇨ Five days prior to weaning discontinue grain-mix feeding and reduce forage by one-half.
  - ⇨ Restrict ewe water intake 1-1 1/2 days prior to weaning.
  - ⇨ Remove all feed and water from ewes 24 hours before weaning.

Lamb Management & Nutrition

Tips for Feeding Milk Replacer

- Ensure lamb has received a sufficient amount of colostrum before transitioning to milk replacer.
- Use high-quality milk replacer when grafting is unsuccessful or not an option.
- Use only milk replacers formulated for sheep.
- Preferably, the lamb milk replacer should provide 20-25% milk protein, 25-30% fat, and 30-35% lactose.
- Use a milk replacer that stays in suspension and use as directed.

Creep Feeding

Creep feeding offers numerous benefits:

- Promotes faster gains.
- Lambs can often be finished prior to extremely hot weather.
- Market lamb prices are generally more favorable when fewer finished lambs are sold.

Creep feeding is especially advantageous given the following situations:

- Lambs will be weaned early (less than 60 days of age).
- Accelerated lambing system.
- Lambs are born during the fall/winter.
- Under drought conditions.
- With high lambing rate.
- During unfavorable weather.

Creep Feeding Tips

- Initiate creep feeding program at 10 days of age. Providing creep feed helps stimulate rumen development.
- Locate creep feeders in dry, well-bedded, protected area.

- On pasture, located creep feeders near water sources, supplement feeders, and/or resting areas.
- Use a palatable, nutritious ration that will encourage feed intake and subsequent growth.
- Construct creep barriers that will exclude ewes while allowing lambs to access the creep area. Openings should be approximately 6-10 inches wide by 18 inches tall; adjust opening as lambs grow.
- Use a feeder designed to keep lambs from stepping into the trough.
- Use highly palatable creep during the first several weeks to entice feed consumption.
- Target consumption of 0.5 lb/head/day from 20 days of age to weaning is needed to achieve an increase in performance from creep feeding.

Weaning

Weaning age varies depending upon production situation. Weaning may occur as early as three to four weeks of age up to five-six months of age. The lamb's rumen is sufficiently developed at 40-50 days of age to enable weaning without negative effects provided the lamb weighs approximately 45 lb. At 40 days into lactation, ewe milk production starts to rapidly decline. Lambs should be fed the creep ration for 14 days post-weaning or switched to the arrival/starter feed a week before weaning.

Finishing Lambs

Feeder lambs may be retained for finishing or sold to finishing operations. The size of the feeding operation can vary greatly. Weights of feeder lambs range from 50-90 lb, with the greatest demand being for 65-75 lb meat-type lambs. For lambs that are shipped to finishing operations, the first two weeks following arrival is critical to getting lambs off to a fast, efficient start on feed. Shipped lambs may be stressed due to handling and hauling, infectious disease exposure,

excitement, environment changes, and diet changes. Consult with a veterinarian in developing an arrival health program to minimize health challenges. With good management, death loss will typically only average 2%. The following guidelines can help reduce stress and health challenges in shipped lambs:

- Do not delay transport from range to feedlot.
- Provide unlimited supply of clean, fresh water and locate waterers in areas easily accessible to lambs.
- Upon arrival, sort and group lambs by size.
- Treat for internal and external parasites and vaccinate for enterotoxemia.
- Shear if needed.
- Provide good-quality hay.
- Gradually introduce lambs to feed.
- Carefully evaluate lambs daily and move sick/weak lambs to isolation pen for treatment.
- For highly stressed lambs, allow ample time for lambs to rest and consume water and feed before processing.

Sophisticated facilities are not required for finishing lambs. Facility needs are dictated by location of feedlot (south versus north, for instance). Regardless of geographic location, finishing lots should be designed to facilitate drainage to prevent muddy lot conditions. Locate feed troughs and waterers on high ground, in easily accessed areas, preferably with concrete aprons. Ensure feeders and waterers are kept clean. Space requirements depend on type of finishing operation. Suggested space needs are given in Table 2 (on page 28).

Feeding Management: The amount of time needed to finish a lamb depends on type of lamb, starting weight, rate of gain, desired market weight, and feeding program. Finishing programs vary greatly depending on type of operation, which impacts length of feeding period. Lambs may be self-feed (free access to feed at all times) or hand-fed. Less labor and feeder space are needed when self-feeding lambs; however, producers need to ensure that lambs are not without feed once started on a self-feeding program. For maximum gains, lambs should be placed on feed as rapidly as possible taking care to use step-up rations when finishing lambs on high-grain rations. Lambs that are hand-fed are usually fed once or twice daily. Table 3 on page 29 lists amount of protein suggested for various complete lamb feeds.

Ration composition is dependent upon availability and cost of feed ingredients, management, and size, age, and health of lambs. High-grain rations are typically used for finishing heavy feeder lambs. Lambs that are weaned early need more nutrient dense rations to take advantage of their rapid growth potential.

Table 2 — Space Requirements for Finishing Lambs

Shelter	6-8 sq. ft./lamb
Lot	15-20 sq. ft./lamb
Confinement	
Slotted floor	4-5 sq. ft./lamb
Solid floor	8-10 sq. ft./lamb
Feeder Space	
Group-fed	9-12 inches/lamb
Self-fed	3-4 inches/lamb
Water Space	
Tank	25-40 lambs/ft. of tank perimeter
Automatic bowl	50-75 lambs/bowl

FINISHING LAMBS

Table 3 — Suggested Protein Percentage for Complete Lamb Diets

	Growth Potential	
Production Phase	**Rapid**	**Moderate**
Birth to weaning	21% protein creep	21% protein creep
Weaning to 60 lb	18% protein	
Weaning to 45 lb		18% protein
60 – 85 lb	15% protein	
45 – 85 lb		15% protein
85 lb to market weight	12.5% protein	12.5% protein
Provide unlimited supply of clean, fresh water and mineral supplementation as desired.		

Table 4 — Typical Feed Efficiency Ratios for Feeder Lambs

	Lambs Weaned at 6–10 weeks	Lambs Weaned at 5–7 months
Lamb Weight, lb	(lb feed/lb gain)	
40–60	3.5	–
60–80	4.75	5.0
80–100	5.75	6.5
100–120	8.0	8.5
120+	9.0	10.0

Gains for finishing lambs average 0.5 lb/hd/day. Feed consumption typically ranges from 3.75-4% of body weight (for example, a 75 lb lamb will consume 2.8-3 lb/day). Feed efficiency will depend on nutritional adequacy of the ration and how old the lamb was at weaning. Table 4 on page 29 lists typical feed efficiency ratios. Feed efficiency improves when lambs are fed higher energy dense rations (lower fiber) and when weaned early. Growth stimulants and feed additives are often used to promote growth and feed efficiency. Additives to control/prevent coccidiosis are also commonly used. Lasalocid (Bovatec®*) is the most common feed additive used to prevent coccidiosis and promote growth.

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Roughage Feeding Program: Small groups of lambs are sometimes fed a grain-concentrate mix in a trough or self-feeder along with hay in a separate rack. If silage is fed, it can be mixed with the grain-concentrate or placed in a trough and the grain-concentrate top-dressed on it. Feeding tips:

- Start feeding feeder lambs 1/2 - 3/4 lb of a grain-concentrate mix per head daily, full feed hay and/or silage.
- Increase grain-concentrate mix by 0.1 lb/hd/day over the next 2 to 2 1/2 weeks until lambs are on full feed.
- Full feed has been reached when lambs are consuming 3.75–4% of body weight in total feed.
- At full feed, proportions should be 20% forage and 80% grain-concentrate mix.
- 2.5–3 lb of silage is equivalent to 1 lb of hay.

High-Grain Finishing Program: While sheep can efficiently utilize forages, they can also produce fast, efficient gains when fed high-grain diets. However, from a feed management standpoint a small amount of forage will help avoid digestive disturbances compared to a diet devoid of forage. The goal of feeding high-

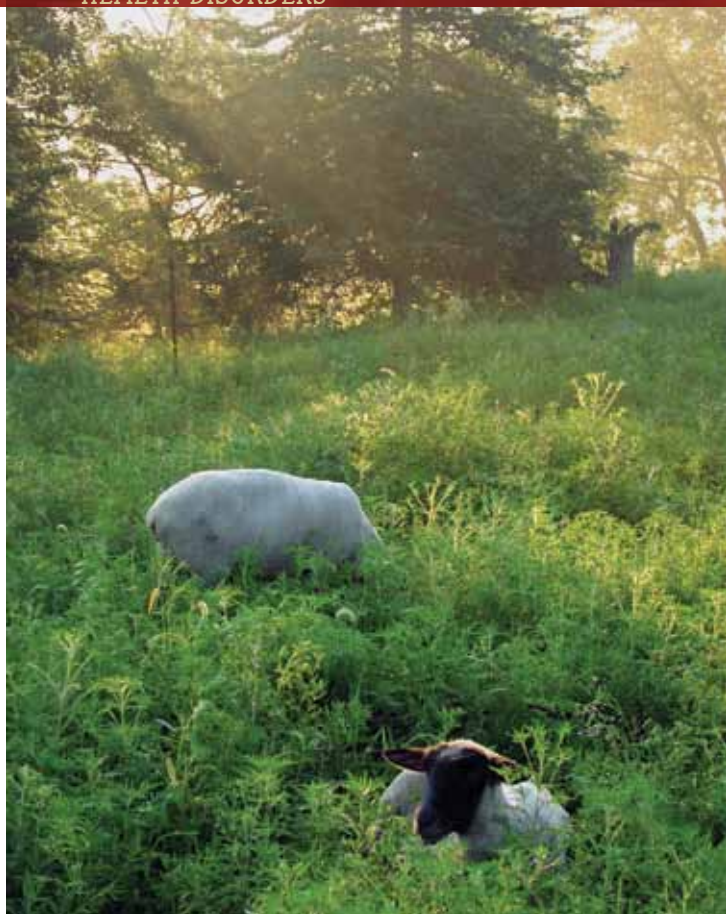
grain diets is to produce faster gains, better feed efficiency, and improved carcass characteristics, leading to greater profit opportunities. Feeding tips:

- Gradually change lambs from arrival/starter ration to all-concentrate ration over a period of two weeks.
- Use of whole shelled corn will eliminate processing cost.
- Ensure feed is kept fresh. Do not allow stale feed to accumulate in troughs.
- Use only good-quality grains.
- Corn can be fed whole; coarse crack or flake other grains.
- Avoid fines in the ration.
- Do not allow lambs to go without feed when on a self-feeding program.
- Up to 3% fat may be used in rations to boost energy intake.
- Molasses (4-5% replacement for grain) can be incorporated into finishing rations to increase palatability and water consumption. Molasses also reduces ration dustiness.
- Provide unlimited supply of clean, fresh water.

Nutrition-related Health Disorders

Enterotoxemia (overeating disease): This potentially fatal condition occurs when bacteria (*Clostridium perfringens*) normally present in the digestive tract release powerful toxins. Prevention hinges on proper feed management and vaccination. Employ the following feed management practices to reduce the possibility of enteroxemia:

- Gradually step-up lambs to high-energy rations.
- Avoid sudden ration changes.
- Do not let lambs on self-feed go without feed.
- When hand-feeding, avoid feeding irregularity.
- Provide sufficient bunk space.
- Feed lambs of similar size together (avoid wide weight ranges)



- Ensure lambs have been dewormed.
- Vaccinate and provide booster immunizations (confer with veterinarian).

Acidosis (grain founder): Easily confused with enterotoxemia, acidosis is an acute disease that occurs when excessive ingestion of starch or sugar triggers production of a large amount of acid in the rumen. Sound feed management can help prevent acidosis:

- If lambs are sorting feed in self-feeder, process ration to prevent sorting.
- Provide at least a small amount of roughage.
- Avoid sudden changes in grain processing.

- Ensure ration is properly mixed.
- Do not feed large amount of grain without first acclimating lambs.

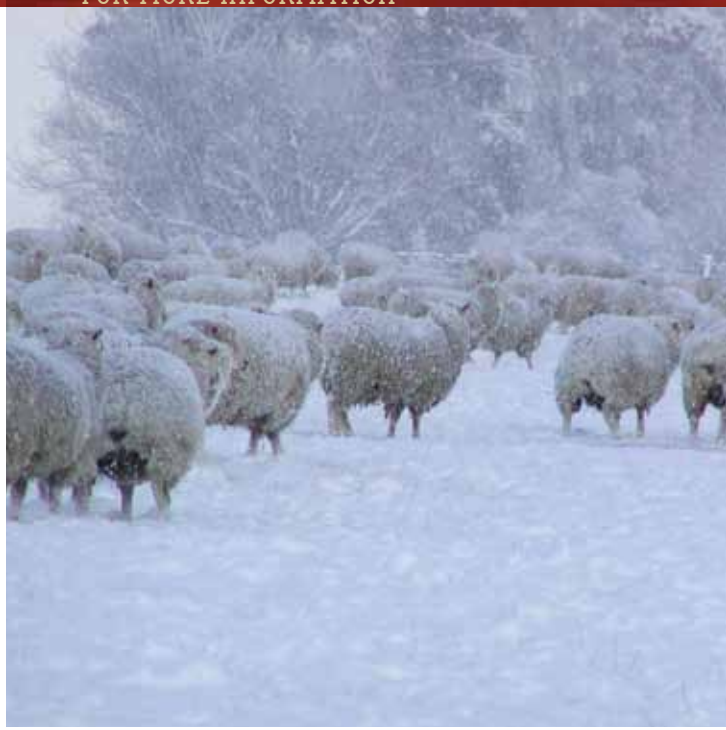
Urinary Calculi (water belly): High-grain rations are typically high in phosphorus, which predispose rams and wethers to formation of urinary stones. The condition can also occur in sheep on succulent pastures or on grain stubble. The inclusion of ammonium chloride in diets of susceptible sheep has been shown to lessen the likelihood of urinary calculi. Ensuring unlimited access to fresh, clean water is also important in preventing urinary calculi.

Polioencephalomalacia (PEM): High-grain diets (especially diets which contain corn by-products) may predispose sheep to a thiamine deficiency, resulting in neurological symptoms. Addition of thiamine to the diet may help prevent PEM.

Pregnancy Disease (ketosis): Ewes in poor body condition, overly fat, or those carrying twins or triplets are at higher risk of succumbing to ketosis. A disturbance in carbohydrate metabolism causes ketosis. Proper feed management will help prevent ketosis. Ewes should be kept in proper body condition and fed to support the rapidly growing fetus during the last six weeks of gestation. Avoid stressing ewes as stress may trigger ketosis, especially in highly susceptible ewes. Propylene glycol drenches and glucose injections may help treat ketosis if administered in the early stages. Ensure ewes in the last trimester of gestation are provided with ample opportunity to exercise (such as walking) and have access to pasture/browse if possible.

Grass Tetany: This condition is seen predominately in lactating ewes grazing lush or rapidly growing spring pasture. It has also occurred when sheep graze irrigated pastures or when pastures have received heavy applications of nitrogen fertilizer. Low blood magnesium level is a factor in development of grass tetany. Prevention can be accomplished by providing supplemental magnesium to sheep grazing forages that predispose sheep to grass tetany.

FOR MORE INFORMATION



FOR MORE INFORMATION

Extensive sheep production information can be found in the *Sheep Production Handbook* published by the:

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