Nutrient requirements of sheep and goats

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General rule of thumb

- Sheep and goats will consume 2 to 4 percent of their body weight on a dry matter basis in feed.
- The exact percentage varies according to the size (weight) of the animal, with smaller animals needing a higher intake (percentage-wise) to maintain their weight.

Ewe Traits

- Mature body weight (ewes) - 67 to 75 kg
- Attainment of mature size - 2 to 3 years
- Productive life span - 6 to 8 years
- Wool production – 2.7 to 4.5 pounds per year

Reproduction:

- Seasonal breeders - will mate from September through December
- Length between estrous periods - 17 days
- Gestation length - 147 days (~ 5 months)
- Lambing months - February through May
- Puberty - 7 to 10 months
- First lambing - 1 or 2 years
- Number of lambs per birth - 1 to 3

Lamb Growth:

- Birth weight – 2.5 to 4.5 kg
- Survival of lambs to weaning - 85 to 95%
- Weaning age - 30 days (30 to 60 days younger than for non-dairy flocks)
- Weaning weight – 18 - 20 kg (early) 30 – 35 kg
- Daily gain (postweaning) – 0.270 to 0.400 kg per day
- Lamb market weight and age - 35 to 45 kg at 5 to 8 months

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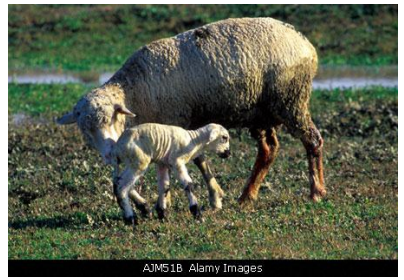


Lactation Traits:

- Lactation length - 90 to 150 days for domestic ewes, 120 to 240 days for specialized dairy breeds
- Milk production per lactation (mature ewes) - 45 to 90 kg for domestic ewes, 180 to 495 for specialized dairy breeds, 112.5 to 290 kg for crosses between domestic and specialized dairy breeds
- Fat content of milk - 6 to 8%
- Protein content of milk - 5 to 7%

Sheep Housing

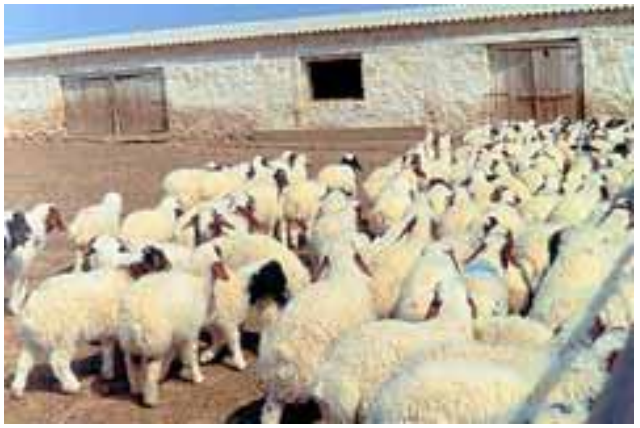
- Dairy sheep producers should have a barn or shed that can accommodate all their ewes.
- 1.5 to 2 sq. meters of barn space per ewe is necessary.
- The barn should have a porous floor (dirt, gravel, etc.) to allow moisture to move away from the sheep.
- The barn also should have good ventilation but be draft-free to prevent chilling of newbornlambs.

Requirements

- Maintenance requirements increase as the level of the animals' activity increases.
- For example, a sheep or goat that has to travel a farther distance for feed and water will have a higher maintenance requirements than animals in a feed lot.
- Environmental conditions also affect maintenance requirements.
- Added stresses of pregnancy, lactation, and growth further increase nutrient requirements.

- Composition of feeding rations for Awassi sheep three main factors have to be considered: total DM feed, digestible protein and ME MJ/kg DM fed.
- The quantities and ratio of these components depend on:
  - requirements for maintenance, growth, milk yield, pregnancy, preparation for a new lactation, service of the ram, and wool production.
  - The ration must also supply the necessary minerals and vitamins.

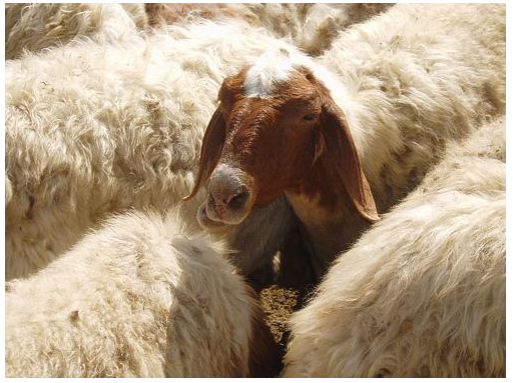
- The requirements for maintenance depend on the weight of the sheep.
- Animals of lighter weight need absolutely less, but relatively more, feed units and digestible protein than those of heavier weight



- No additional nutrients are required for pregnancy during the first three months as the foetus increases very little in weight in this period.
- But the plane of feeding during the last two months of pregnancy has a marked influence on the birth weight and vigour of the lambs, and more especially of twins.

The pregnancy period is also the time when dairy ewes with high milk yields have lost condition in the course of the lactation period;

- preparation for the following lactation requires **restoration of their weight and accumulation of fat in the tail**.



Energy

- Insufficient energy limits performance of sheep probably more than any other nutritional deficiency.
- An energy deficiency may result from inadequate amounts of feed or from feeds (generally forages) that do not contain enough protein to sufficiently "unlock" the energy in the feedstuff.

- The major sources of energy for sheep are hay, pasture, silage, and grains. Barley, corn, oats, and wheat also can be used to raise the energy level of the diet when necessary.
- Energy deficiencies can cause reduced growth rate, loss of weight, reduced fertility, lowered milk production, and reduced wool quantity and quality.

Protein

- In sheep rations, the amount of protein is much more important than quality of protein.
- Since the sheep is a ruminant, mature sheep use effectively the naturally occurring protein and non-protein nitrogen (urea) in their diets.

- Common sources of natural protein; cottonseed, soybean, sunflower, linseed, and peanut meals.
- These oilseeds contain from 40 to 50 percent protein and are excellent sources of supplemental protein.
- High-quality legume hays can contain from 12 to 20 percent protein and provide adequate protein for most classes of sheep when fed as a complete ration.

- Grains, however, are low in protein. They generally contain only 8 to 11 percent protein.
- Additional protein is necessary in high-grain, lamb-finishing rations for maximum performance
- Non-protein nitrogen sources should not be fed to young lambs.

- Young lambs are not functioning ruminants until they are approximately 2 months old, depending upon how soon they have access to grain and forage.
- Mature sheep can be fed low levels of nonprotein nitrogen.
- In general, supplemental non-protein nitrogen is beneficial only when adequate energy is available.

- Urea should never make up more than one-third of the ruminally degradable protein in the diet.
- Non-protein nitrogen sources should not be used when lambs are limit-fed.
- Urea can be toxic if consumed in large amounts over a short time, especially when the diet lacks ruminally available energy.
- Urea is very unpalatable.

- If adequate forage is present, but the standing forage is dry and brown (containing < 5 to 6 percent crude protein), it may be necessary to supplement with a high-protein feed (> 35 percent protein).
- If the amount of available forage is insufficient or if the forage is still somewhat green (> 6 percent protein), a lower-protein supplement should be fed to provide additional energy, if needed.

- Lactating ewes have the highest protein requirement and may require supplemental protein if the range forage contains less than 10 to 12 percent crude protein.

Water

- Water is essential for all livestock. Producers must plan for an adequate supply of clean water when designing any type of sheep enterprise.
- The quality of the water is also important. Sheep will not consume enough water if it is stagnant or of poor quality.

- Sheep consume two to three times as much water as dry matter.
- Abundant, clean water is a must in lamb feedlots.
- Without water, lambs may eat less.
- Water running through a low trough or water dripping into the trough can help to start the lambs drinking and eating.

Minerals

- Approximately 13 different minerals are essential in sheep nutrition. Most of these requirements are met under normal grazing and feeding habits.
- In Cyprus the soils are deficient in cobber, cobalt, selenium and zink.

- Almost all pastures and hays contain an abundance of calcium, but grains are lower in calcium.
- When lambs are fed on a high-concentrate diet, calcium supplementation may be necessary.
- Any efficient sheep operation uses a high percentage of roughage or pasture, it is good insurance to assume that the sheep need mineral supplementation.

Phosphorus

- Commercial mineral blocks or loose forms of mineral supplements, look at the calcium-to-phosphorus ratio.
- The narrower this ratio, the better.
- Important to make sure that the ratio is not inverted (more phosphorous than calcium).

- If producers prefer to mix a mineral supplement, mix 50 percent salt with 5 percent cottonseed meal and approximately 45 percent dicalcium phosphate.
- Provide this supplement free choice and year-round in a feed box protected from rain and moisture.

- Mature sheep require all the fat-soluble vitamins: A, D, E, and K.
- They do not require supplemental B vitamins, which are synthesized in the rumen.
- Normally, the forage and feed supply contain all essential vitamins in adequate amounts, except vitamin A, which is sometimes deficient in dormant forage.

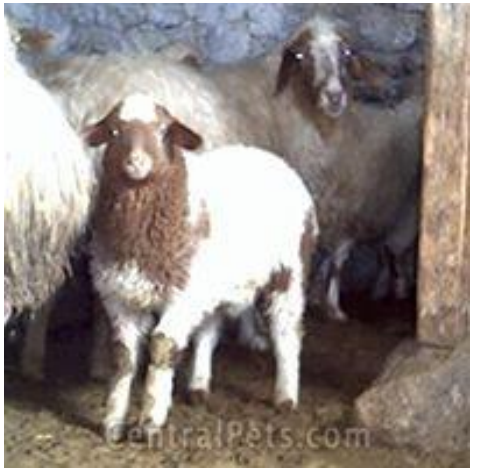
- However, sheep can store vitamin A for a considerable time. If ewes have been pastured on green forage or have had access to high-quality legume hay, vitamin A is not usually deficient. Not the case in Cyprus in summer.
- In some areas, lambs may develop white muscle disease.
- This is thought to be caused from a deficiency of vitamin E, selenium, or both.
- Treatment is most effective with early diagnosis and injection of a vitamin E-selenium material.

Economics

- In a dairy sheep operation, milk is one of three major products - the other two being meat and wool.
- Lamb and wool will be a major source of income from a dairy sheep operation, and their production must receive adequate attention in order to maximize returns.

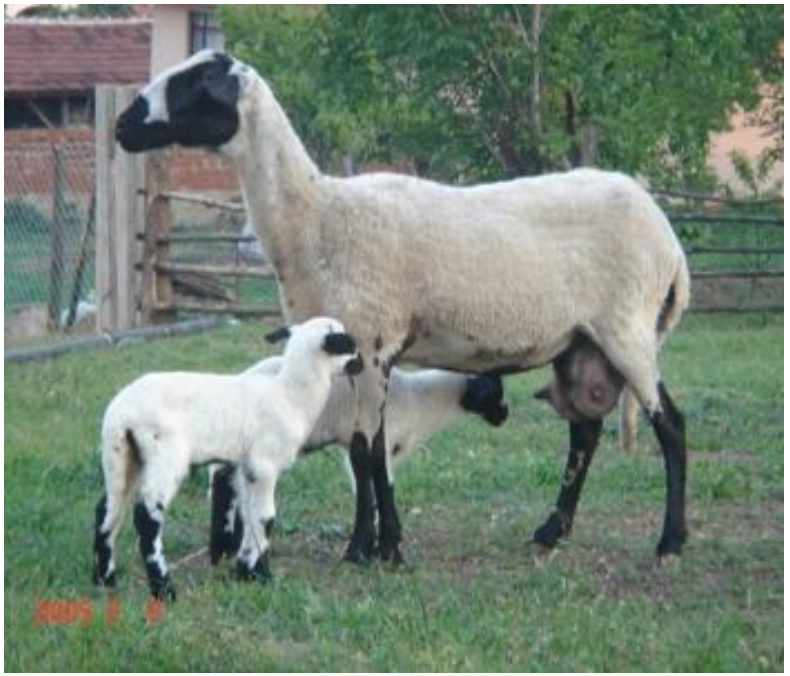
Creep feeding

- The objective of any farm sheep enterprise, besides milk production, should be to develop healthy, fast-gaining lambs that can be marketed at an early age.
- Creep feeding may help accomplish this objective.



- The most efficient conversion of feed to weight gain occurs during the first 100 to 120 days of a lamb's life.
- Lambs can easily gain 0.3 – 0.4 kg per day in their first 70 to 80 days.
- In well-managed flocks of efficient, fast-gaining breeds, it is common for lambs to reach weights of 50 kg at 120 days of age.

- Young lambs can gain 0.45 kg for every 1.4 to 1.8 kg of feed consumed.
- By comparison, old-crop feeder lambs require 2.25 to 2.7 kg of feed per kg of gain.



There are several potential advantages to using a creep-feeding program:

- Increased weight gains, especially for multiple-birth lambs.
- Highly efficient feed conversion.
- Early marketing.
- Early growth and development of the lamb lessens the stress of early weaning.

- When practical, start lambs on creep feed as soon after birth as possible.
- Ordinarily, lambs do not consume much feed until they are 3 to 4 weeks of age.
- The small amount consumed at earlier ages is critical for establishing rumen function in the lamb.
- Most studies have shown that if the intake of the creep ration does not average 225 grams per day from 20 days of age to weaning, then no increase in lamb performance is realized from creep feeding.

- Locate the creep feeders where the lambs will use them.
- In a drylot, place the feeders in a convenient, dry, well-bedded, protected area.
- In pasture areas, place the feeders relatively close to water tanks, resting areas, or salt and supplement feeders.

- To get lambs started on a creep, make sure the starter ration is palatable.
- Soybean meal in the starter ration increases palatability and provides additional protein.
- Soybean meal is expensive. High-quality alfalfa hay, alfalfa pellets, and oat grain also are very palatable.

- The creep ration does not have to be complex. It should provide at least 15 to 16 percent natural protein.
- A simple creep ration containing 40 percent corn, 40 percent wheat or barley, 10 percent oats, 10 percent oilseed meal, with alfalfa hay free choice should be adequate.
- In general, young lambs prefer coarse, rolled grains and pelleted feeds.

- The cost of preparation can make the ration costly, but rate of gain and feed efficiency are increased by pelleting complete feeds, concentrates, and roughages.
- Pelleting also allows the producer to include different additives, standardize the grain-roughage ratio, and lessen feed waste.
- Do not feed dusty, moldy, wet feeds. If practical, give any feed left in the creep feeder daily to the ewes, and provide the lambs with fresh feed every day.

- Individual management systems differ, but often it is feasible to discontinue feeding the ewes grain after the lambs are approximately 6 weeks old and are eating adequate amounts of the creep feed.
- It is more efficient to feed the grain directly to the lambs because they will convert the feed to gain more efficiently than the ewes can convert feed to milk to lamb gain.

- Some producers wean lambs when they are 60 days old.
- Early weaning of 18 to 22.5 kg lambs can be successful, provided the lambs are consuming adequate amounts of feed.
- Research has shown that the ewe's milk production reaches a peak at about four weeks following lambing, and steadily declines to about half as much by the 10th week of lactation.
- About 74 percent of all milk is produced in the first eight weeks of lactation.

- If the farm enterprise is geared to producing marketable lambs in the shortest possible time, creep feeding the lambs early in life is essential to early weaning and to subsequent rapid development in the feedlot.
- The size of the lamb at weaning is more important than its actual age. Generally, lambs should weigh at least 22.5 kg before weaning.
- Lambs that are on full feed at weaning generally have little difficulty adjusting to a feedlot environment.

- One of the biggest advantages of not pasturing the lamb with the ewe is that lambs have less chance of internal parasite infestation.
- Usually, the lambs must be placed in a feedlot to be adequately finished for market.
- Intensive management is the key to success in lamb feeding.
- In the feedlot, the first few days are the most critical.

- As soon as the lambs are over the stress of relocation, treat them for internal and external parasites.
- Also, vaccinate them for enterotoxemia, and other diseases nessasary.
- Adequate feeding pens should be available so that the lambs can be sorted by size and fed accordingly.

- Immediately isolate weak or sick lambs.
- Size and age of lambs influence the ration composition.
- Heavy lambs must be finished more rapidly, so they need a ration with a higher level of grains for energy.
- Lighter lambs can be fed rations containing more roughage.

- Generally, lambs are started on rations containing 60 to 70 percent roughage.
- For general lamb feeding, where both legume hay and feed-grains are readily available, a ration of 50 to 60 percent grain and 40 to 50 percent hay can produce very economical gains while minimizing the occurrence of digestive disturbances.

Sheep	Percent Protein (CP)	Energy (ME MJ/KG)
Maintenance (70 kg. mature ewe)	**9.6**	**8.7**
Late Gestation 180-225% lamb crop expected	**11.2**	**10.1**
Lactation Nursing Twins	**14.8**	**10.2**
Early Weaned Lambs (29.7 kg) Moderate growth High Growth	**14.5**	**11.4**
Lamb Finishing 39.6 kg., 4-7 mos of age	**11.7**	**11.6**
Yearlings (50 kg)	**9.1**	**8.7**
Source: Sixth Revised Edition, National Research Council, 1985.		

Goats	Percent Protein (CP)	ME MJ/KG
Bucks	**11**	**9.1**
Dry Doe	**10**	**8.3**
Late Gestation	**11**	**9.1**
Lactation Avg. Milk High Milk	 **11** **14**	 **9.1** **9.8**
Weanling	**14**	**10.3**
Yearlings	**12**	**9.8**