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Supplementation of Grazing Sheep

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Disclaimer

The discussion herein focuses on the use of supplements in lamb production systems wherein sheep are expected to graze forages (or consume hay) as their primary source of nutrition.

Introduction

For those interested in profiting from the production of sheep for meat, **the key to success** centers around **reproductive performance, the cost of production and market price**. Adequate nutrition is a prerequisite for reaching the animal's genetic potential for reproductive performance, lactation and growth. Nutrition (feed, supplements, hay, etc.) is almost always among the three largest enterprise costs associated with lamb production. Reproduction and seasonal trends in the lamb market and market preferences are discussed elsewhere in these proceedings.

Characterization of Feeds vs. Supplements

Sheep Feeds	Supplements for Sheep
def. – *n*. food for animals or birds; (informal) a meal.	def. – *n*. something added to complete a thing, make up for a deficiency, or extend or strengthen the whole.
- developed to be a complete balanced diet protein, energy, minerals, vitamins, fiber	- compliments a forage base, forbs, grasses, harvested forage (i.e. hay)
- intended to be fed in larger quantity than supplements	- greater nutrient density than a "feed"
- generally 12-18% crude protein	- crude protein content ranges from 10-45 %
- may be textured or pelleted in < ¼" pellets	- nutrient content not balanced with animal requirements
- intended to be a complete balanced diet protein, energy, minerals, vitamins, fiber	- includes pellets, cubes, blocks, tubs, licks
- often includes medications or nutriceuticals for coccidiosis, urinary calculi, etc.	- co-products like whole cottonseed, oilseed meals, soy hulls, distillers grains, corn gluten feed, etc.
- developed to be fed at 1.5 - 4% of body weight	- whole grains (ex. corn, grain sorghum, oats)
	- typically fed at no more than 0.5% of body weight

Grazing Preferences

Sheep are grazers and prefer to harvest grasses and forbs.

Cattle have a broad muzzle and a large rumen capacity, which enables them to harvest and utilize lower quality forages like mature grasses. Goats have a very narrow muzzle and soft, flexible lips which facilitate browsing (picking leaves from trees and shrubs). In comparison, sheep have a narrow mouth and semi-flexible lips, which allow them to be selective harvesters and graze close to

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the soil surface. Unlike goats, sheep seldom stand on their hind legs to browse. Their relatively small rumen is not well suited for processing poor quality forages.

Grazing Behavior

Most domestic ruminants follow a bimodal daily pattern of grazing. If the forage supply is adequate, grazing animals will forage in the morning, seek shade and ruminate (chew their cud) during the midday hours, and then graze again during the late afternoon and evening. During the summer months, animals may shift the pattern and graze more during the night in an attempt to avoid the intense mid-day heat.

Normally, sheep will be found near the water source or in the shade during the mid-day hours. If sheep or other ruminants are observed grazing all day long and especially during the middle of the day, such behavior could indicate that forage availability is limited.

If possible, observe grazing patterns and provide/distribute supplements during the time of the day when sheep are not grazing in order to avoid interruption of the grazing pattern.

Providing Supplements and Promoting Health

The purpose of supplementation is to "fill the voids" between nutrient demand and nutrients provided by the browse/forage (for daily nutrient requirements, see Table 1). Supplements provide the protein, energy, minerals and/or vitamins required by sheep to achieve the desired level of performance. Performance comes in several forms – weight gain, lactation, and reproduction. The goal is to either simply "add to" the nutrients in the forage being consumed or use supplements to actually increase forage consumption.

Sometimes sheep replace forage with supplement (substitution). For example, suppose grazing conditions allow a sheep to harvest 3 pounds of forage daily. Yet when fed 1 pound of supplement, this same sheep might consume only 2.3 pounds of forage.

Generally, if the amount of supplement fed per day is held to 0.5% of body weight or less, supplementation occurs. As the amount of supplement fed daily moves closer to 1% of body weight and beyond, substitution begins to occur.

One of the most commonly used feed measuring containers is a 3 pound coffee can (actually a net weight of 39 oz. of coffee). For reference purposes, a 3 pound coffee can will hold the following amounts of feed:

Three pound coffee can capacity

¾" cubes ……... 4.75 lb.
5/32" pellets …… 5.00 lb.
whole shelled corn …… 6.25 lb.

Ideally, supplements should be provided in clean troughs 12 to 18 inches above the soil surface. Feeding in troughs reduces the chance of picking up infective stomach worm larvae or other soil borne pathogens. However, supplementing in troughs is not always practical, especially among larger flocks and in large pastures. Consequently, many pasture sheep are fed supplement on the ground. If so, move the feeding area frequently for sanitation purposes. Employ a pelleted supplement (3/8 to ½ inch cubes) to minimize wastage.

Note: Use feeds and supplements for their intended purpose as specified on the label. Sheep are sensitive to dietary copper concentration. Feeds and supplements prepared for swine, cattle and goats often have elevated copper concentrations that may be harmful to sheep.

Managing the Cost of Supplementation

Following is a prioritized list of suggestions for getting a grasp on supplement costs.

1. An **appropriate stocking rate** is essential if efficiency and economy are expected of the supplementation program. The success or failure of a supplementation program is often dictated by the browse/forage being supplemented.

2. Nutrient **requirements** of the ewe must be **matched with the productivity** of the environment. In a stress-free environment, those ewes with larger mature size, later maturity and greater milk production potential will have a production advantage. However, in the environments where sheep have a competitive advantage (over cattle and goats), seasonal nutrient deficiencies will occur; in these environments, early maturing, smaller mature size sheep will be more efficient producers.

3. The period of greatest **nutrient demand** (last 1/3 of gestation through lactation) should coincide with the greatest expected **nutrient availability**. Ewes lambing in the spring are in perfect time with Mother Nature. Marketing opportunities may warrant lambing at other times. If so, higher market prices will be required to offset the increased cost of production. Unless intensively managed, lambs born mid-May through early September in the southern US will typically grow slower and be lighter at weaning compared to fall, winter and spring born lambs.

4. Where possible, **sorting ewes by physiological status and age** will improve supplementation efficiency and reduce costs. Older ewes will dominate the feed ground and consume more than their share of supplements. Late-bred and lactating ewes have much greater nutrient demands than open ewes. Body condition adjustments are most efficiently made during the first and second trimesters of pregnancy. Such sorting is not feasible if rams are continually mating ewes (year-round breeding).

5. Deciding **when to begin and end supplementation** are critical decisions. The tendency for many producers is to start too late and quit too early. Body condition is less expensive to maintain than to replace. Dormant forages and the environmental stress of winter normally warrant supplementation. Drought requires providing a forage substitute such as hay.

6. **Nutrient content of the supplement** has a significant impact on the response observed and cost of the program. When comparing supplements, perhaps the most effective method is to compare on a cost per unit of nutrient basis.

There is generally an inverse relationship between protein content and cost per unit of protein. If protein is the first limiting nutrient, the higher protein supplements are usually the most cost effective.

Similar comparisons can be made for cost per unit of energy using TDN (total digestible nutrient) content.

7. **Sound decisions** relative to **purchasing and providing** supplements can reduce costs.

Where feasible, buying in bulk or by the ton is less expensive than buying supplements or feed 50 pounds at a time. However, the additional cost associated with purchasing supplements on an as needed basis assures fresh feed and takes advantage of the retailer's storage facilities.

Self-limiting supplements (tubs and blocks) are usually more expensive on a $/lb of nutrient basis than pellets, cubes or by products feedstuffs. Producers are paying for the additional manufacturing and packaging costs and the convenience (fewer/less frequent trips to the pasture) afforded by a self-limiting supplement. Also, in theory, the continuous availability of supplement will result in more uniform consumption across the herd. Such is not always the case.

Research involving grazing cattle indicates that all natural (does not contain a non-protein source such as urea) high protein (>30% crude protein) supplements can be fed infrequently with no adverse effect on grazing behavior, forage digestibility or animal performance. Studies indicate that animal performance was similar when cows were offered supplement daily, every other day or twice weekly.

In contrast, energy dense supplements (corn, barley) should be offered daily, especially if fed at level above 0.5% of body weight. Large doses of grain will reduce rumen pH, reduce forage digestibility and intake, and can result in acidosis or bloat.

Comments on some of the more common supplements and feedstuffs used in the sheep industry are found in Table 2.

Table1. Nutrient Requirements of Sheep – Daily Nutrient Requirements*

Body Wt. (lb.)	Avg Daily Gain, lb.	Dry Matter, lb./head	% Body Weight	Total Protein, (lb.)	TDN (lb.)	Ca (lb.)	P (lb.)	Vit. A (IU)	Vit. E (IU)
Weaned Lambs, 4 to 7 months old									
66	0.65	2.9	4.3	0.42	2.1	0.014	0.007	1480	20
88	0.60	3.5	4.0	0.41	2.7	0.014	0.007	1880	24
110	0.45	3.5	5.2	0.35	2.7	0.012	0.007	2350	24
Replacement Ewe Lambs									
66	0.50	2.6	4.0	0.41	1.7	0.014	0.006	1410	18
88	0.40	3.1	3.5	0.39	2.0	0.013	0.006	1880	21
110	0.26	3.3	3.0	0.30	1.9	0.011	0.005	2350	22
132	0.22	3.3	2.5	0.30	1.9	0.010	0.005	2820	22
Ewes - Maintenance									
110	0.02	2.2	2.0	0.21	1.2	0.004	0.004	2350	15
132	0.02	2.4	1.8	0.23	1.3	0.005	0.005	2820	16
154	0.02	2.6	1.7	0.25	1.5	0.005	0.005	3290	18
176	0.02	2.9	1.6	0.27	1.6	0.006	0.006	3760	20
Ewes – Nonlactating, First 15 Weeks of Gestation									
110	0.07	2.6	2.4	0.25	1.5	0.006	0.005	2350	18
132	0.07	2.9	2.2	0.27	1.6	0.007	0.005	2820	20
154	0.07	3.1	2.0	0.29	1.7	0.008	0.006	3290	21
176	0.07	3.3	1.8	0.31	1.8	0.008	0.007	3760	22
Ewes – Last Four Weeks of Gestation (180-225% Lamb Crop Expected)									
110	0.50	3.7	3.4	0.43	2.4	0.014	0.007	4250	26
132	0.50	4.0	3.0	0.45	2.6	0.015	0.008	5100	27
154	0.50	4.2	2.7	0.47	2.8	0.017	0.010	5950	28
176	0.50	4.4	2.5	0.49	2.9	0.018	0.013	6800	30
First 6-8 Weeks of Lactation, Suckling Twins									
110	-0.13	5.3	4.8	0.86	3.4	0.023	0.016	5000	36
132	-0.13	5.7	4.3	0.89	3.7	0.023	0.017	6000	39
154	-0.13	6.2	4.0	0.92	4.0	0.024	0.018	7000	42
176	-0.13	6.6	3.8	0.96	4.3	0.025	0.019	8000	45
Last 4-6 Weeks of Lactation, Suckling Twins									
110	0.20	4.6	4.2	0.67	3.0	0.020	0.013	4250	32
132	0.20	5.1	3.8	0.70	3.3	0.020	0.014	5100	34
154	0.20	5.5	3.6	0.73	3.6	0.020	0.015	5950	38
176	0.20	5.7	3.2	0.76	3.7	0.021	0.016	6800	39
Flushing (2 Weeks Prebreeding and First 3 Weeks of Breeding)									
110	0.22	3.5	3.2	0.33	2.1	0.012	0.006	2350	24
132	0.22	3.7	2.8	0.34	2.2	0.012	0.006	2820	26
154	0.22	4.0	2.6	0.36	2.3	0.012	0.007	3290	27
176	0.22	4.2	2.4	0.38	2.5	0.013	0.007	3760	28

*Sixth Revised Edition, National Research Council, 1985.

	Table 2. Observations & Comments on Commonly Used Feedstuffs
Corn	Sheep candy. Excellent energy supplement. When combined with a bucket, is a very inexpensive management tool for gathering, moving and penning sheep. Can be fed on the ground or in a trough. If fed alone, feed as whole kernel. If mixed in a textured feed, cracking, rolling or flaking is suggested to reduce sorting.
Pellets, cubes	Excellent supplements, especially those ≥20% crude protein. Convenient, easy to handle. Can be formulated to correct specific deficiencies and deliver medications and nutriceuticals.
Whole oats	Safe. Good energy supplement. Slightly higher protein than corn and grain sorghum. Should be fed in a trough. Disadvantage – more expensive ($/lb energy) than corn.
Grain sorghum	Protein and energy content similar to corn, but less palatable. If fed alone, should be fed whole and in a trough.
Cottonseed	Excellent protein, energy (from oil) and phosphorus supplement. Can be fed on the ground or in troughs. Disadvantage – must be purchased bulk in large quantity and ideally protection from the weather is recommended. If fed at high levels for long periods, gossypol can reduce reproduction. Handling is labor intensive.
Alfalfa hay	Bi-vocational – can be used as a supplement to or a substitute for forage. Very palatable. If fed on the ground, some of the leaves may be wasted.
Sorghum sudan hay	Seldom of high enough quality to be used as a supplement. Leaves and small stems readily consumed. Larger stems often wasted. To make hay for sheep, if possible, plant densely and harvest and bale before seed heads emerge.
Bermudagrass hay	High quality hay is a good forage substitute for mature sheep. If more than 20 days old at harvest, will be little more than filler.
Peanut hay	Potentially a supplement. Very palatable. Quality can vary significantly; more leaves and peanuts = better quality. Be careful when purchasing sight-unseen. Disadvantage – limited availability.
Soybean hulls	Excellent energy supplement. By-product of soy oil and soybean meal industry. Energy content similar to corn, but potential for bloat/acidosis is reduced. May be pelleted or bulk. Should be fed in a trough. Disadvantage – freight costs, handled in bulk quantity, must be protected from the weather.
Cottonseed hulls	Never a supplement. Very palatable. Excellent fiber source. Low protein (5%) and very low energy content. Work very well in mixed feeds, pellets and cubes. Disadvantage – expensive ($/unit protein or energy), freight costs, handled in bulk quantity, should be protected from the weather.
Rice hulls, peanut hulls	Never a supplement. Poor quality, relatively low palatability. Used as inexpensive filler in some feeds.