Nutritional Management of Replacement Sheep Utilizing Southern Forages: A Review

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ABSTRACT: Intensive sheep production systems seem to be an appropriate means of fully using the available resources, particularly the forages, of the southern region. In such systems, ewes should lamb first at approximately 1 yr of age. Programs to accomplish this goal must be well-planned and carefully integrated and executed. The primary goal is to achieve two-thirds of the ewe's projected mature weight before exposure for breeding. General management must reduce heat stress and parasitism. Forage quality must be maintained at a level consistent with National Research Council requirements for energy and protein. Protein is not normally a limiting factor. Energy supplementation and grazing pressure can be used to maintain growth without over-condition, which reduces subsequent performance.

Key Words: Sheep, Reproduction, Forages

Introduction

The southeastern region of the United States is diverse in soil type, topography, and climatic conditions. This diversity has prompted the development of a broad range of livestock management systems in the region. These programs make use of a wide spectrum of genetic material to meet various production goals. This discussion will confine itself to the development of a replacement ewes in the region often referred to as the "humid south." The region stretches from Virginia west to eastern Oklahoma and Texas and encompasses the remaining southeastern states. It is characterized by rainfall > 1,250 mm/yr and a growing season of < 200 d in Virginia to > 250 d in Mississippi, Alabama, and Georgia.

The ability to produce abundant amounts of forage in the region throughout most of the year should encourage intensive sheep production systems. Based on this assumption, this discussion will further center on development of ewe lambs with the goal of first lambing at 12 to 13 mo of age. Ewes bred to lamb at 1 yr of age have the potential for greater lifetime production (Terrill, 1968). Faster genetic gains are possible because the generation interval is shortened by 1 yr (Hulet, 1977). Maintenance costs can be reduced significantly.

Management Practices

Ewe Lamb Development. Season of birth, age, nutrition, weight, breed, and environment all affect development of puberty in ewe lambs (Southam et al., 1971; Laster et al., 1972; Dickerson and Laster, 1975; Christenson et al., 1976; Dyrmundsson, 1981; Quirke, 1981). The sheep producer can exert the most immediate effect through nutritional programs that encourage optimal growth resulting in early puberty because nutrition may be one of the few factors over which he or she has significant control.

The work of Keane (1974) suggested a threshold of 40 kg BW is needed for development of puberty early in the ewe lamb's life. As ewes get older, this threshold seems to decline because ewe lambs begin to cycle at lighter BW as the breeding season advances (Southam et al., 1971). The commonly used recommendation is that ewe lambs should have attained two-thirds of their mature weight before exposure for breeding. The NRC (1985) recommends that Finn cross ewe lambs weigh ≥ 43 kg and that other breeds weigh ≥ 50 kg at breeding.

Based on a suggested 5-kg birth weight and an exposure age of 223 d, ADG to breeding must be 21 kg. Growth periods and suggested gain are shown in Table 1.
Lamb growth response on southern forages can be characterized as highly variable (Reid et al., 1978; Ely et al., 1980). In the development of such programs, consideration of some basic concepts are essential.

General Management. Heat stress is an important consideration in managing livestock in the southern region. To reduce heat stress in developing lambs, general management should include shearing and providing shade, water, and trace mineralized salt containing selenium.

Parasite Control. Adult sheep are the source of internal parasites for lambs. Grazing ewes and lambs together increases the potential for internal parasite problems in lambs. Comprehensive parasite control in the ewe flock and the use of “safe” spring pastures for ewe and lamb grazing are essential to reduce internal parasitism. A “safe” pasture is one that is not grazed by sheep in the later portion of the previous grazing season or has had the sod disrupted since it was last grazed by sheep.

Weaning. Lane and Albrecht (1991) suggested that lambs can be weaned to pasture as early as 30 d. Several studies have reported low performance in the first 3 to 4 wk after placing weaned lambs (from 30 to ≥ 60 d of age) on pasture from drylot (Ely et al., 1980; Yoder et al., 1990; Lane and Albrecht, 1991). Two factors may play a major part in this “adjustment” period. First, the ruminal microorganisms must adjust from a concentrate to a forage diet and, secondly, the lamb must “learn” to graze. The review of Provenza and Balph (1988) suggests the adult sheep, and particularly the lamb’s dam, have a major effect on development of eating habits. Programs aimed at weaning lambs to pasture should consider grazing ewes and lambs together before weaning, preferably on the same types of forages the lambs will be grazing after weaning. Data from Yoder et al. (1990) show that young lambs become selective grazers by their 2nd mo on forages. The commonly recommended weaning weight of 25 to 30 kg permits the lamb to have more than adequate digestive capacity to utilize forages as a major portion of the diet.

Forage Quality. The energy and crude protein requirements suggested in Table 1 require that forage quality be kept at a high level. A maximum sward height consistent with the vegetative stage is the goal.

Four to six paddocks with a resting period of ≥ 21 d between grazing periods is preferred for recommended forage management (Blaser, 1986).

Condition. The work of Umberger et al. (1985) and McCann et al. (1989) emphasize the need to monitor the composition of gain in developing ewe lambs. Umberger et al. (1985) reported that lambs weaned at 20 kg and fed for accelerated growth (200 g·animal⁻¹·d⁻¹) from weaning to breeding had increased lambing percentages, but tended to have impaired milk production compared with lambs fed to gain (100 g·animal⁻¹·d⁻¹). There were fewer alveoli numbers in the udders of the ewes fed at the higher rate (334 ± 88/4.23 mm²), but the difference from the ewes fed to gain 100 g·animal⁻¹·d⁻¹ (402 ± 83) was not significant. The workers suggested that these effects were fixed by the time the ewes were bred because changing them to the alternate diet had no effect on lambing and milking performance.

Further work by McCann et al. (1989) found that ewe lambs fed a finishing diet after weaning at 42 d were 1 wk younger at puberty than those fed a growing diet. Ewes on the higher plane of nutrition had higher mammary gland fat pad area and lower milk production than those fed the growing diet. Gross and adjusted mammary duct areas were greater in the ewes fed for growth, but the differences were not significant. Condition scores for the two groups were 7.3 for ewes fed the finishing diet and 5.3 for ewes fed the growing diet (1 = very thin, 9 = very fat). Johansson and Hart (1985) reported similar results. These studies suggest that a condition score approaching 5 to 6 should be maintained during this stage of development.

Forage Supplementation. The diets suggested by the NRC (1985) for growing and gestating ewe lambs vary in concentrate:forage ration from 35:65 to 15:85 and in crude protein content from 12.8 to 10.2%. When lambs are gaining at the rates suggested earlier, concentrate or protein supplementation is not required. Yoder et al. (1990) reported no response in reproductive performance to supplemental energy in ewes gaining 100 g·animal⁻¹·d⁻¹ on primarily fescue pastures from 40 kg weaning weight to 50 kg at

Table 1. Suggested growth rates, target weights, and nutrient requirements for developing ewe lambs from birth to yearling parturition

<table>
<thead>
<tr>
<th>Period</th>
<th>Average daily gain, kg</th>
<th>Final wt for period, kg</th>
<th>% TDN</th>
<th>% Crude protein</th>
<th>% Concentrate</th>
<th>% Forage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth to weaning (1 to 80 d)</td>
<td>0.25</td>
<td>25</td>
<td>80</td>
<td>16.9</td>
<td>90</td>
<td>10</td>
</tr>
<tr>
<td>Early growth (81 to 156 d)</td>
<td>0.20</td>
<td>40</td>
<td>65</td>
<td>12.8</td>
<td>35</td>
<td>65</td>
</tr>
<tr>
<td>Late growth-breeding (157 to 223 d)</td>
<td>0.16</td>
<td>50</td>
<td>65</td>
<td>10.2</td>
<td>35</td>
<td>65</td>
</tr>
<tr>
<td>Average for periods above</td>
<td>0.20</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Early gestation (224 to 342 d)</td>
<td>0.14</td>
<td>67</td>
<td>59</td>
<td>10.6</td>
<td>15</td>
<td>85</td>
</tr>
<tr>
<td>Late gestation (343 to 370 d)</td>
<td>0.23</td>
<td>73</td>
<td>66</td>
<td>12.8</td>
<td>40</td>
<td>60</td>
</tr>
</tbody>
</table>
puberty (P < .05). Concentrate supplementation and grazing pressure may be a major means of supporting growth while controlling for condition in developing lambs.

Protein is not normally a limiting factor in developing ewe lambs fed high-quality forages. Yoder et al. (1990) found no advantage to supplementing soybean meal to ewe lambs grazing primarily fescue pastures from June to November in terms of growth or reproductive performance. Daura and Reid (1991) reported that, whereas soybean meal significantly increased gains of lambs grazing endophyte-infected fescue, differences between protected and unprotected protein were small. Crude protein content of the swards ranged from 10.5 to 22.5%.

Flushing is defined by the NRC (1985) as the practice of increasing nutrient intake or the dynamic effect that influences BW change and condition before and during breeding. Although “flushing” is not commonly recommended, the research cited here strongly favors feeding ewe lambs adequately before breeding time. Diets resulting in increased weight gain at this time have generally increased ovulation rate and(or) lambing percentage (El-Sheikh et al., 1955; Foote et al., 1959; Umerger et al., 1985).

Christenson et al. (1976) suggested, from the results of a study involving > 400, ½ or ¾ Finn-cross ewe lambs, that ewe lambs should receive 4,500 kcal of DE and 160 g of CP per animal per day in late gestation. The results suggest the NRC requirements are adequate for the high-producing ewe lamb in late gestation.

Work conducted in Illinois and Minnesota emphasizes the need to assess mature size accurately when developing growing programs for ewe lambs. Ricketts et al. (1991) found that when large-framed Hampshire ewe lambs were fed for 252 d after weaning at 22% above the NRC recommended level of energy, they tended to have earlier lambing dates (-8 d), a higher percentage of ewes lambing (+5%), a higher lambing percentage (+.23 lambs/ewe), and a greater weight of lambs weaned per ewe (+4.0 kg) than the NRC group although differences were not significant. Jordan and Christians (1992) concluded that Finn-cross ewe lambs fed below or above NRC recommendations for energy showed similar performance in conception rate, lamb vigor, early milk production, and ewe mothering ability. Some of the Hampshire ewes in the Illinois study weighed an average of 90 kg at lambing, whereas the average weights for the Finn-cross ewes in the Minnesota study were 57.9, 68.6, and 80.6 kg for low-, medium-, and high-energy groups, respectively.

Implications

The “humid south” has the potential to produce forages that will support nutritionally sound and efficient ewe lamb development programs. The present suggested nutrient requirements and target weights allow sufficient development of ewe lambs so that they reach puberty, breed, and lamb by 12 to 13 mo of age. General management must include integrated internal parasite control, efforts to reduce heat stress, and maintenance of forage quality. Weight gains must be accurately measured and supplementation of energy and protein should be provided as necessary during development, breeding, and gestation. Ewe lambs should be developed in a manner to ensure adequate growth while preventing over-condition.

Literature Cited


