ALFALFA GRAZING STRATEGIES TO MAXIMIZE LAMB GAINS

Juan N. Guerrero and Vern L. Marble

ABSTRACT A two year lamb grazing trial was held at the Imperial Valley Agricultural Center. The purpose of the study was to relate lamb weight gain to available alfalfa forage. Lambs were grazed successively on the same paddock in order to relate gain to available forage. The relation between gain and available forage is constant until a point where forage availability is limiting and then lamb gains decrease precipitously. Available alfalfa leaf was a better predictor of lamb gain than was total available alfalfa forage. About 7% of lamb body weight available as alfalfa leaf dry matter must be available for lambs to maximize weight gains. Lambs graze leaves exclusively until the leaf resource is almost zero before lambs start to lose weight. Once the leaf resource is exhausted lambs start to graze the remaining stems and lamb weight loss continues.

KEYWORDS alfalfa, grazing, lambs, selectivity, forage availability

INTRODUCTION

Every winter, while the rest of the country is freezing, thousands of lambs graze alfalfa fields in the Imperial Valley of southeastern California. By October the torrid summer temperatures of the Sonoran Desert are back down to normal, alfalfa growth in the Imperial Valley is coming back after a late summer doldrum, and late-born mountain lambs arrive by the truckloads weighing 65-85 lb.; a combination of factors that makes alfalfa grazing in the Imperial Valley a viable (sometimes) economic option.

Lambs begin arriving in the Imperial Valley in early October with the last lambs arriving shortly after Thanksgiving. Although grazing systems vary throughout the Imperial Valley, normally bands of 1600 lambs graze 40 acre alfalfa fields for about 12-15 days. Grazing continues on a particular field until the alfalfa resource is exhausted. Fat lambs at about 125 lb. start departing the Imperial Valley at the end of January with almost no lambs remaining by the end of February. Lamb gains are in the order of 8-12 lb/hd/month. The lamb grazer pays the owner of the alfalfa field a grazing fee on a per head per day basis. For many years this has been the traditional U.S. Sonoran Desert winter grazing system.

METHODS

In the winter of 1985/86 the University of California Cooperative Extension started a two-year lamb grazing study at the Imperial Valley Agricultural Center in order to relate lamb weight gain to available alfalfa forage. To assist desert graziers, UC Cooperative Extension researchers formulated the question that was the underlying purpose for this study, “How do I know exactly when the lambs should be moved to the next pasture?”

Each year in mid November 48 lambs were chosen at random from a commercial flock. About half the lambs were black-faced and about one-third were ewe lambs. The lambs were randomly allotted to three groups. Each group of 16 was then randomly allotted to four pens, each pen 66 ft. by 66 ft., of four each. Lambs were moved every five days. Figure 1 depicts the grazing scheme used in this study. The A grazers were moved to fresh pasture every five days. Every five days B grazers moved to paddocks abandoned by the A grazers, i.e. B grazers moved to paddocks that had been grazed for five days. Every five days C grazers moved to paddocks abandoned by B grazers, i.e. C grazers always moved to

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paddocks that had been grazed previously for 10 days. The same 1600 lambs/40 acre relation-
ship as the traditional desert grazing scheme was maintained on the 4356 ft² experimental paddocks. The grazing cycle lasted for 28 days. Then lambs were weighed. After Christ-
mas another 28 day grazing cycle was evaluated. This animal management scheme permitted the evaluation of lamb weight gain in relation to available alfalfa forage. Each paddock was sampled before and after grazing for available alfalfa forage.

RESULTS AND DISCUSSION

Figure 2 represents lamb weight gain in relation to total alfalfa forage for all grazings over two years. Figure 3 is lamb gain in December over both years and Figure 4 is lamb gain in January over both years. Figure 5 is lamb gain in 1985 and Figure 6 is lamb gain in 1986. It may be observed that gain is fairly constant over the flat part of the curve until some point when forage availability limits gain. At that point, gains drop precipitously. December gains are less than January gains.

Table 1 depicts lamb gain in relation to total alfalfa forage. According to Table 1 lambs must have 8-12% of their body weight as total available alfalfa forage to maximize weight gains. For example, an 100 lb. lamb must have 8-12 lb. of alfalfa dry matter or about 40-60 lb. of fresh alfalfa available for grazing to maximize weight gains. At less than this amount of available forage, lack of lamb grazing selectivity resulted in decreased lamb gains. Monthly gains were 7.4 lb/hd/mo. Table 1 does not accurately represent the desert lamb grazing system, because the 7.4 lb/hd/mo. figure underestimates actual lamb performance under Imperial Valley grazing conditions. Relating lamb weight gain to total alfalfa forage is not a true representation of the desert grazing system, because lambs do not graze the whole plant uniformly, but eat the leaves first.

Each clipped alfalfa sample was separated by hand into leaf and stem portions. Lamb weight gain was then related to available alfalfa leaf providing quite a different picture of lamb grazing in the desert. Figure 7 is lamb gain in relation to total alfalfa leaf over all grazings over both years. Figure 8 is lamb gain as leaf in December over both years and Figure 9 is lamb gain as leaf in January over both years. Figure 10 is lamb gain as leaf in 1985 and Figure 11 is lamb gain as leaf in 1986.

Table 2 depicts lamb weight gain in relation to available alfalfa leaf. Table 2 demonstrates that lambs must have at least 7%, except for the 1986 grazing anomaly, of their body weight available as leaf dry matter in order to maximize weight gain. For example, an 100 lb. lamb must have available 7 lb. of leaf dry matter or about 45 lb. of fresh alfalfa leaf matter to maximize weight gain. Lambs can theoretically consume only 2.5-4% of their body weight as feed. The 7% of lamb body weight as alfalfa leaf at maximum weight gain indicates the extent to which lambs are selectively grazing the leaf portion of the alfalfa plant rather than consuming the whole plant in a "lawn-mower" grazing pattern. The amount of alfalfa leaf at maximum weight gain is more than fifteenfold more leaf than at that point where lambs start to lose weight on the paddock, e.g. .00445 lb. of leaf dry matter per lb. of lamb at zero weight gain versus .0705 lb. of leaf dry matter per lb. of lamb at maximum weight gain. Lambs do not start to lose weight until the leaf resource is almost zero. When the alfalfa stand is about 4-6 inches tall and practically devoid of all leaves, the lambs are forced to consume exclusively the remaining stem portion of the plant. At this inflection point, gains begins to drop precipitously. Relating lamb gain to alfalfa leaf rather than to total alfalfa resulted in mean lamb performance of 11.8 lb/hd/mo., a much more accurate representation of the desert lamb grazing system.

As all graziers well know, each grazing season may be quite different from the previous year depending on environmental reasons. The 1986/87 winter grazing season in the Sonoran Desert was an exceptional year. Ambient temperatures were abnormally cold. At temperatures warmer than 80F lamb forage consumption decreases. The little rainfall that does occur in the Sonoran Desert usually comes in the winter and in late summer showers. The 86/87 winter had no measureable rainfall at IVAC. If a severe rainfall does occur in the desert during the winter grazing season lambs are removed from the alfalfa fields to "rain corrals" in order to prevent alfalfa stand damage. Lambs in the "rain corrals" gain no weight or lose weight. Environmental conditions were perfect for exceptionally high lamb gains during the 86/87 winter grazing season.
Lamb weight gains during the 86/87 winter grazing season were exceptionally high (Table 2). Since the 86/87 grazing season was exceptional the predicted curves in Figures 6 and 11 did not plateau as theoretically they should have. Figure 7 is a good example of the expected theoretical relationship between lamb gain and available forage leaf.

CONCLUSIONS

Based on the two-year lamb grazing trial at IVAC, several conclusions may be inferred for the U.S. Sonoran Desert lamb grazier:

1. After 10 days of grazing or when the alfalfa is 4-6 inches tall and practically devoid of leaves, lamb gain begins to drop dramatically. This critical decision point corresponds roughly to about .20 ton/acre of stem material. Within a few days lambs will start to lose weight. After 10 days of the grazing the grazier will start to make less money on the lamb grazing enterprise.

2. December gains are less than January gains. December lambs are still recuperating from the shock of the long transportation and the recent shearing. December lambs are smaller and have less gut capacity. Perhaps unknown alfalfa factors are also responsible. Some older sheepmen say that January alfalfa has more "jugo" (juice) and has "mas vitamina" (more vitamins) than alfalfa earlier in the grazing season. Since December lambs do gain less, to maximize per day profits, lamb movements should be made on the eleventh day or very shortly thereafter. Another early season option would be to place lambs on cheaper sudan, bermuda-grass, or grassy, low-quality alfalfa fields.

3. If anticipated lamb sale prices appear to be going higher or if anticipated per head profits appear to be higher than normal the desert lamb grazier has several additional options:
   a) Pay a higher per head grazing fee for choice, immature, high gain potential, high quality alfalfa fields.
   b) **ONLY** in this case may grazing be extended profitably to 12-13 days. Remember, at 12-13 days of grazing, lambs are losing weight.

4. If anticipated lamb sale prices appear to be going downhill, or expected per head profits appear to be lower than normal then the desert lamb grazier has other considerations to contemplate:
   a) Since the whole profit feasibility is in jeopardy, lamb gains and consequently per day profits must be maximized in order to reduce days on feed and total costs.
   b) Lambs should be moved on day 11 or very shortly thereafter

5. Additional concerns are raised:
   a) Perhaps the traditional desert grazing system is not the most appropriate. Maybe the same number of lambs should be placed on a larger field so that lambs be given the opportunity to selectively graze more leaf for a longer period of time.
   b) What is the effect of moving lambs so often? What will be the effect of moving lambs on shorter grazing schedules over a 4-5 mile trailing movement?

These results are preliminary, but do support the concept of limiting grazing to 10 days at the stocking rate employed in the Imperial Valley. Additional adaptive research is needed to resolve which grazing system is the most appropriate for the desert lamb grazier and to determine the optimal trailing distance and time for the U.S. Sonoran Desert lamb grazing enterprise.
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\(^a\) Amount of available alfalfa forage below which lambs start to gain less weight. This figure is also the amount of total available forage at maximum weight gain as a fraction of lamb weight.

\(^b\) Maximum lamb weight gain, weight gain when available alfalfa forage no longer limits lambs.

\(^c\) Amount of total alfalfa forage available to maintain constant weight, as a fraction of lamb weight. Total alfalfa forage less than this figure will eventuate in weight loss.
Table 2.

Lamb Gain in Relation to Available Alfalfa Leaf

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<th>Inflection point&lt;sup&gt;a/&lt;/sup&gt;</th>
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<sup>a/</sup> Amount of available alfalfa leaf below which lambs start to gain less weight. This figure is also the amount of alfalfa leaf available at maximum weight gain as a fraction of lamb weight.

<sup>b/</sup> Maximum lamb weight gain, weight gain when available alfalfa leaf no longer limits lambs.

<sup>c/</sup> Amount of alfalfa leaf available for lambs to maintain constant weight, as a fraction of lamb weight. Leaf amounts less than this figure will eventuate in weight loss.
Figure 1. Study design to relate lamb gain to available alfalfa forage.

On day 5 "A" grazers move North. "B" grazers move onto paddock left by "A" grazers.

Figure 2.
LAMB WEIGHT GAIN IN RELATION TO TOTAL ALFALFA FORAGE

A = ACTUAL
P = PREDICTED

LB. ALFALFA DM • LB. LAMB$^{-1}$
Figure 4.

LAMB WEIGHT GAIN IN RELATION TO TOTAL ALFALFA FORAGE IN JANUARY

A = ACTUAL
P = PREDICTED
Figure

LAMB WEIGHT GAIN IN RELATION TO ALFALFA LEAF

A = ACTUAL
P = PREDICTED

LB. GAIN PER DAY

EAF DM LB AMB
LAMB WEIGHT GAIN IN RELATION TO ALFALFA LEAF IN 988

A = ACTUAL
P = PREDICTED

LBS. GAIN PER DAY

LBS. LEAF DM LBS. LAMB
Figure 7.

LAMB WEIGHT GAIN IN RELATION TO TOTAL ALFALFA LEAF

A = ACTUAL
P = PREDICTED
LAMB WEIGHT GAIN IN RELATION TO TOTAL ALFALFA LEAF IN DECEMBER

Figure 8.

A = ACTUAL
P = PREDICTED
LAMB WEIGHT GAIN IN RELATION TO TOTAL ALFALFA FORAGE IN 1985

A = ACTUAL
P = PREDICTED
Figure 11. LAMB WEIGHT GAIN IN RELATION TO TOTAL ALFALFA FORAGE IN 1986

LB GAIN PER DAY

LB. ALFALFA DM \cdot LB. LAMB^{-1}

A = ACTUAL

P = PREDICTED