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FEED INTAKE BY SPRING AND FALL COW-CALF PAIRS

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In much of the western range area spring calving has been the tradition. Recent research (Davis and Wheeler, 1970; Mueller and Harris, 1967; Raleigh, Turner and Phillips, 1970) has shown that under certain conditions, fall calving can offer several economic and managerial benefits. Some concern has been expressed regarding nutrient requirements of the fall cow-calf pair in relation to the spring cow-calf pair. Since intake is a complex function of size, production, nutrient quality, etc., the degree to which these factors might be compensating each other is not readily apparent. Consequently, before the optimum managerial potential of a spring and/or fall calving system can be realized on the range, additional information is needed regarding relative feed requirements of the spring and fall cow-calf pair. This information is almost totally lacking except by inference from general nutrient recommendations such as the NRC bulletin (1970). The objectives of this research were to obtain estimates of relative feed intake by the spring and fall cow-calf pair over the spring-summer grazing season, and to determine how these intakes are affected by calf size and milk production.

Materials and Methods

Two experiments were conducted at the Squaw Butte Experimental Range Station in eastern Oregon during the summers of 1972 and 1973, corresponding respectively to trials 1 and 2. In the 1st trial 6 spring and 6 fall calved cows were confined with their calves in individual pens measuring approximately 4.5 x 12 m. A small creep area was provided for the calf at one end of the pen, and the feed bunks for the cows were designed such that the calf had no access to it. Consequently, the intakes of each cow and each calf could be determined on an individual basis.

Fescue, fescue-alfalfa, or meadow hay was harvested throughout the summer at intervals varying from 2 to 10 days to obtain hay showing a maturation curve similar to that seen in range forage. Measured quantities of this hay were fed twice daily to each animal from May 16 to August 21. A grab sample was taken from the hay in each bunk at each feeding and composited on a per feeding basis for dry matter (DM) determination, and uneaten feed was weighed once a week and discarded after sampling for DM determination. Hay samples taken for dry matter determination were ground, composited on a per harvest basis, and subsampled for crude protein analysis. Dry matter consumption for the cows was adjusted for metabolic size ($W_{kg}^{0.75}$) to apply to a uniform 410 kg body weight.

Cows were weighed monthly following an overnight shrink. Milk production was measured on 3 different dates between June 4 and July 8, using the calf suckling technique as described by Rutledge, et al. (1971).

In the 2nd trial 6 fall and 6 spring calved cows with steer calves grazed from 5 to 10-day periods at approximately 1 month intervals (between May 10 and August 31) on separate (by treatment) crested wheatgrass pastures varying from 2.99 to 6.55 ha. Cows were selected to provide comparable mean weights for spring and fall treatments.

Prior to introduction of the animals into the grazing areas, ten longitudinal transects were randomly located in each field, and ten points randomly located on each transect; at each point a 0.61 x 1.83 m frame was clipped, bagged, and dried for DM analysis. The mean sample weight adjusted for area, was used to estimate available forage. Following grazing, the procedure was repeated to estimate residual forage, and the difference between before and after grazing was used to estimate forage intake. An adjustment in intake, based on previous data collected from the area, was made to account for the rate of forage growth for the first grazing period.

Following each grazing period, the cows were shrunk overnight and weighed, and milk production was measured as in trial 1 with the exception that fecal bags were worn by the calves during the weighing and suckling procedures to prevent loss of feces.

Results and Discussion

Accurate determination of intake on range has been a problem for the range nutritionist for many years. Feeding in drylot tends to reduce intake and selectivity as compared to grazing animals, provided that range forage is not quantitatively or qualitatively limiting. In contrast, estimating intake by clipping before and after grazing results in overestimation of intake due to unaccounted losses such as trampling (Martin, 1970). Given the limitations of these two methods for estimating absolute intake, it is believed that relative intake values should be fairly accurately reflected where conditions between treatments are kept uniform as was done in these studies.

The results from trial 1 are shown in Table 1. Fall cows consumed 94% as much hay as spring cows while producing about one-half as much milk and gaining 0.11 kg more per day. Body weight gains over the summer period followed the same pattern for spring and fall cows, although fall gains tended to be higher for all weighing periods. Spring cow intake exceeded that for the fall cow for the entire trial period with the exception of the last two weeks.

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Table 1. Daily DM intake and performance of spring and fall pairs in drylot (trial 1)

Item	Spring	Fall	Fall as % of spring
Dry matter intake, kg:			
Cow	10.64[a]	10.04[b]	94
Calf	1.27[c]	3.48[d]	274
Cow + calf	11.91[c]	13.52[d]	113
ADG, kg:			
Cow	0.39	0.50	123
Calf	0.52[e]	0.70[f]	135
Cow + calf	0.91[e]	1.20[f]	133
Feed/gain:			
Cow + calf	14.34	11.71	82
Ave. daily milk production, kg[g]	3.73[c]	2.13[d]	57

a,b. Means on same line with unlike superscripts differ ($P < 0.05$).

c,d. Means on same line with unlike superscripts differ ($P < 0.01$).

e,f. Means on same line with unlike superscripts differ ($P < 0.10$).

g. Mean of 3 measurements from June 4 to July 8.

Fall calves going on study weighed an average of 160 kg and consumed 2.74 times as much hay as the spring calves, which initially had a mean weight of 69.7 kg. Final weights averaged 120.4 and 228 kg for the spring and fall calves treatments, respectively, with fall calves gaining 0.18 kg more per day ($P < 0.10$). Fall calves consistently had a higher average daily gain (ADG), with the largest differences between treatments occurring during the 1st month, and with a decline in ADG differences for the next two months.

Total intake by the fall pair exceeded ($P < 0.01$) that of the spring pair by 13%, or 157 kg of DM over the 98-day experimental period. Feed efficiency (kg feed/kg gain), based on total animal gains, favored the fall treatment with 18% less feed required per unit of gain than for the spring pair. This is consistent with the findings of other investigators. Cook (1970) considers a unit of saleable gain derived directly from the forage to be 60% more efficient than a similar unit derived from milk, and cites several sources relevant to this situation. The fall calf receives less of its requirement from milk and more directly from forage than the spring calf. The fall cow, although eating less than the spring cow, has a smaller lactation burden and can use a greater proportion of the nutrient intake for body rebuilding. This is reflected in the greater body weight gains by the fall cow. Consequently, it should be expected, and is supported by the data from this trial, that the fall cow-calf unit would utilize the forage more efficiently for body weight gain.

In the 2nd trial (Table 2) fall cow-calf pair intake exceeded that for spring pairs by 20%. Fall cows registered a 0.17 kg greater daily gain than did spring cows, although calf gains were nearly identical. Initial calf weights for spring and fall treatments averaged 64.4 and 153.8 kg, respectively, and final weights, 149.5 and 240 kg, respectively. As in trial 1, gains by spring and fall cows followed a similar pattern though consistently favoring the fall treatment. In contrast, fall calf gains exceeded (1.04 vs 0.73 kg/day; $P < 0.01$) those for the spring calf during the 1st 37 days, but were lower (0.38 vs 0.91 kg; $P < 0.01$) for the last 37 days. Significant differences were not registered during the middle of the summer.

Table 2. Mean DM intake and performance of spring and fall pairs on crested wheatgrass pasture (trial 2)

Item	Spring	Fall	Fall as % of spring
Dry matter intake, kg[a]:			
Cow + calf	16.9	20.3	120
ADG, kg:			
Cow	0.63	0.80	127
Calf	0.79	0.80	100
Ave. daily milk production, kg	4.35[b]	1.76[c]	40

a. Intake differences not analyzed statistically.

b,c. Means on same line with unlike superscripts differ ($P < 0.01$).

Daily milk production by spring cows, determined at approximately 1 month intervals throughout the summer, exceeded by 2.59 kg that from fall cows, the latter amounting to only 40% of spring cow production. By the termination of both trials, 1 or more of the fall calves had already weaned themselves, and the final daily milk production for trial 2, determined on August 31, averaged 0.21 kg for the fall treatment and 2.92 kg for spring.

One of the managerial options available to the fall calving operator is that of early weaning. This may take place prior to spring turnout or at some time following turnout. At the Squaw Butte Station fall calves are weaned during the latter part of July, since studies have shown that by this time daily gains in the fall-born calf will have dropped to 0.5 kg or less (Raleigh, 1970). If this management program (July weaning of fall calves) were followed, total range forage consumption over the experimental periods for fall pairs would be only 102 and 105% of spring cow-calf pair intake for trials 1 and 2, respectively. If the fall-born calf were to be weaned in the spring prior to turnout, the intake for the dry fall-calving cow is estimated at 72% of that for the spring cow and her calf, a value that agrees rather well with the differences indicated in the NRC (1970) recommendations for dry and nursing cows.

The pattern of relative feed intake in the early part of the summer in trial 1, shows the fall pair intake exceeding that of the spring pair by an average of about 5%. From the middle of June until the 1st part of August, differences ranged largely from 10 to 15%, and increased somewhat thereafter. In trial 2, although the magnitude of differences was somewhat larger than in trial 1, a similar pattern is seen. This suggests that the least relative grazing pressure on the range by fall pairs (as compared to spring pairs) would occur during that period when the range grasses are most susceptible to grazing damage and the heaviest relative utilization would take place after the forage had matured.

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