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Wheat Pasture Intake by Early-Weaned Calves

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Story In Brief

Forty fall born Angus x Hereford steers and heifers weaned at approximately 73 d of age were used to determine if calf performance during the initial period of wheat pasture grazing is limited by calf size or by a forage intake adaptation regardless of size. Calves were assigned randomly to one of two receiving period lengths, 15 d (LIGHT) or 35 d (HEAVY), in order to create two weight groups prior to grazing wheat. Calves were weighed approximately every 2 wk to characterize performance changes throughout the grazing period. Forage intake after 20 d and 70 d of grazing wheat pasture was measured using a subset of 10 calves from each weight group. Because receiving period length differed, starting weights on wheat pasture were different for LIGHT and HEAVY groups. During the first 20 d of grazing wheat, LIGHT calves had higher daily gains than HEAVY calves. Daily gains from 20 to 70 d on wheat were similar for LIGHT and HEAVY groups. Forage organic matter (OM) intake, expressed as lb/d, was similar for LIGHT and HEAVY groups. However, when intake was expressed on a %BW basis, LIGHT calves consumed 11% more forage. Forage OM intake (lb/d) was 27% lower during the first 20 d of wheat pasture grazing compared with 70-d intakes. The results of this trial suggest that initial performance of early-weaned, lightweight calves grazing winter wheat is limited by low forage intake independent of calf weight.

(Key Words: Early Weaning, Wheat Pasture, Intake.)

Introduction

Early-weaned, lightweight calves grazing winter wheat pasture often have low rates of gain when introduced to wheat pasture. This reduced performance was originally thought to be related to age and(or) weight of the calf (Purvis et al., 1996). However, in a later trial conducted with calves from the same herd, performance of calves introduced to wheat pasture at heavier weights was similar to that of the lighter calves previously reported (Purvis et al., 1997). This suggests that calves may require a period of time to adapt to winter wheat pasture. Forage intake may be part of this adaptive response. The objective of this trial was to determine if wheat pasture forage intake increases with the number of days spent grazing wheat (adaptation to forage) or if intake is simply related to age and(or) weight of the calf.

Materials and Methods

Animal Performance. Forty Angus x Hereford fall-born crossbred steers and heifers averaging 73 d of age were weaned on December 3, 1996 and randomly assigned to either a 15- or 35-d drylot period. The purpose of the drylot period was to create different initial age and weight groups prior to grazing wheat. Calves assigned to 15- or 35-d drylot periods are referred to as LIGHT and HEAVY groups, respectively, reflecting their relative weights when introduced to wheat pasture. Calves were vaccinated with a killed 7-way clostridial vaccine and intra-nasal IBR/PI_3 vaccine at weaning, followed by a modified live respiratory vaccine (Vira-Shield 4) at approximately 120 d of age. Calves received aureomycin crumbles for the initial 5 d of the receiving period. During the drylot receiving period, calves received a high energy complete mixed diet used in previous trials (Table 1; Paisley et al., 1996) containing monensin at 30 g/ton (as-fed). Following the initial receiving period, calves were weighed and transported 20 miles to winter wheat pasture (Dec. 20 and Jan. 7, respectively for LIGHT and HEAVY groups). Ten of the 20 calves from each group were periodically used to determine forage intake using chromium dilution. Full weights were taken every 2 wk to closely track calf performance while grazing winter wheat. Final weights were taken April 23, 1997.

Forage Intake. Ten calves were selected from each group of 20 to measure forage intake at two predetermined times relative to when calves were placed on wheat pasture. Intakes were

determined after 20 d of grazing winter wheat (January 7 and 27, respectively, for LIGHT and HEAVY calves), which was considered to be during the intake adjustment phase. Forage intakes were measured again after 70 d of grazing wheat (February 25 and March 17), to represent forage intakes following adaptation. Forage intake was determined by bolusing calves with chromium oxide. Calves were bolused twice daily with gelatin capsules containing 2 g of chromic oxide. Bolusing began 4 d prior to fecal collection, and continued through each 3-d fecal collection period. Fecal samples were collected twice each day on three consecutive days. Samples were composited across days within steer for each sampling period. Chromium concentration of feces was determined by atomic absorption. Fecal output was calculated as follows: Fecal Output (FO), g/d = chromium administered, ug/d ¸ marker concentration in feces, ug/g.

Ten hand-clipped forage samples were taken during each collection. Individual samples for each collection period were analyzed for organic matter digestibility (OMD) using a 48-h *in vitro* procedure. *In vitro* digestibility values were then converted to *in vivo* values using known standards. Forage intake was determined using the equation: Forage Intake (FI) g/d = FO, g/d ¸ (1 – OMD/100).

Statistical Analysis. Intake data were analyzed as a repeated measures design with group (HEAVY or LIGHT), calf(group), collection period, and group x collection period included in the model. Calf(group) was used as the error term to test group effects on forage intake. Calf weights and daily gain data associated with feed intake measurement were analyzed using the GLM procedure of SAS (1990) as a completely randomized design with length of receiving period as the independent variable.

Regression analysis (SAS 1990) was used to evaluate the effects of calf weight and days grazing wheat on daily gains of calves grazing winter wheat. Individual linear response curves were generated for each group (LIGHT vs HEAVY) to characterize the effects of calf weight and days spent grazing wheat on daily gains.

Results

Forage Intake. There were no calf size by collection period interaction (P>.69) for any performance or intake variables, so only main effects of calf size and collection period are presented. Forage OM intake was similar (9.86 vs 9.91 lb/d; P=.90) for LIGHT and HEAVY groups (Table 2). However, when intake was expressed as a percentage of body weight, LIGHT calves consumed 11% more forage (2.84 vs 2.56%; P<.01) in relation to calf size. Forage OM intake was lower (P<.01) during the first 20 days of wheat pasture grazing compared intakes after 70 d (8.34 vs 11.42 lb/d; Table 3). These data suggest that initial gains of early-weaned, lightweight calves grazing winter wheat are influenced by low forage intakes independent of calf weight.

Calf Performance. Because the receiving period length differed, starting weights on wheat pasture were different (252 vs 300 lb; P<.01) for LIGHT and HEAVY groups (Table 4). During the first 20 d of grazing wheat, LIGHT calves had higher (1.85 vs .50 lb/d; P<.01) daily gains than HEAVY calves. Daily gains from 20 to 70 d on wheat were similar (1.80 vs 1.89 lb/d; P=.50) for LIGHT and HEAVY groups.

Regression Analysis. Response curves characterizing the relationship between calf weight and daily gains indicated that LIGHT calves, or calves introduced to wheat at earlier ages, initially had higher daily gains than HEAVY calves (Figure 1); however, intake by HEAVY calves increased faster with weight, resulting in both groups having similar predicted ADG's at about 590 lb. Another way of describing initial group differences is to estimate the average weight at which both groups would gain 2.0 lb/d. Based on response curves, LIGHT calves achieved 2.0 lb/d at weights 66 lb lighter than HEAVY calves (347 vs 420 lb). This initial difference may have been created by experiment design, as LIGHT calves were introduced to wheat pasture 48 lb lighter than HEAVY calves (252 vs 300 lb).

Response curves describing the relationship between days spent grazing wheat and daily gains for LIGHT and HEAVY calves (Figure 2) were closer together, indicating that performance of the two groups was similar while grazing wheat. Although R^2 values for these relationships

were slightly lower in this comparison, this may reflect the wide range in calf age inherent in both groups. Because calves originated from the same herd and grazed a common wheat pasture, we would expect daily gain response to be similar for both groups of calves. Based on this assumption and intake results using days spent grazing wheat to predict animal performance may be acceptable, because ADG response curves were closely related for LIGHT and HEAVY groups.

Literature Cited

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Table 1. Feedstuff and nutrient content of receiving diet (as-fed basis).

Ingredients	
Corn (dry-rolled), %	49.2
Alfalfa Pellets , %	15.0
Cottonseed Hulls, %	14.8
Soybean Meal (47.5% CP), %	14.7
Cane Molasses, %	4.7
Limestone (38%), %	0.9
Dicalcium Phosphate, %	0.4
Salt, %	0.2
Vitamin A-30 (30,000 IU/g), g	204[a]
Vitamin E (50%), g	136[b]
Rumensin 80 Premix, g	170[c]
Nutrient	
Dry matter, %	88.4
NEm, Mcal/cwt	84.14
NEg, Mcal/cwt	50.59
Crude Protein, %	16.21
Fat, %	2.93
Crude Fiber, %	12.89
Potassium, %	1.23
Calcium, %	0.84
Phosphorus, %	0.40

[a] To result in 2000 IU Vitamin A/lb as-fed.
[b] To result in 22.5 IU Vitamin E/lb as-fed.
[c] Added to provide 30g/ton of monensin.

Table 2. Effect of length of receiving period on wheat pasture forage intake of early-weaned calves averaged across both collection periods.

Item	LIGHT	HEAVY	SE	P=
Average age, d	139	160	2.3	<.01
Average wt, lb	347	386	10.1	.01
OM intake, lb/d	9.86	9.91	.313	.90
OM intake, %BW	2.84	2.56	.071	.01

Table 3. Effect of time spent grazing wheat pasture on wheat pasture forage intake of early-weaned calves averaged across LIGHT and HEAVY calves.

Item	After 20 d	After 70 d	SE	P=
Average age, d	124	174	--	--
Average wt, lb	324	409	3.7	<.01
OM intake, lb/d	8.34	11.42	.259	<.01
OM intake, %BW	2.59	2.80	.075	.06

Table 4. Weight, age, and daily gain of early weaned calves grazing winter wheat pasture.

Item	LIGHT	HEAVY	SE	P=
Weaning weight, lb	224	223	10.1	.91
Age at weaning, d	73	73	2.7	.93
Receiving period ADG, lb/d	1.55	2.16	.142	<.01
Wt when introduced to wheat, lb	252	300	10.2	<.01
Age when placed on wheat, d	90	108	2.7	<.01
First 20 d gains, lb/d	1.85	.50	.117	<.01
Wt after grazing wheat 20 d, lb	276	307	10.4	.04
D 20-70 gains, lb/d	1.80	1.89	.097	.50
Wt after grazing wheat 70 d, lb	361	404	11.0	.01
Subsequent gains, lb/d[a]	2.63	2.39	.118	.16
Final wt, April 23, lb	519	504	12.9	.41
Overall ADG on wheat, lb/d[b]	2.15	1.92	.055	<.01

[a]Final 28 d of grazing wheat, March 27 to April 23
[b]124 and 106 d, respectively, for LIGHT and HEAVY calves

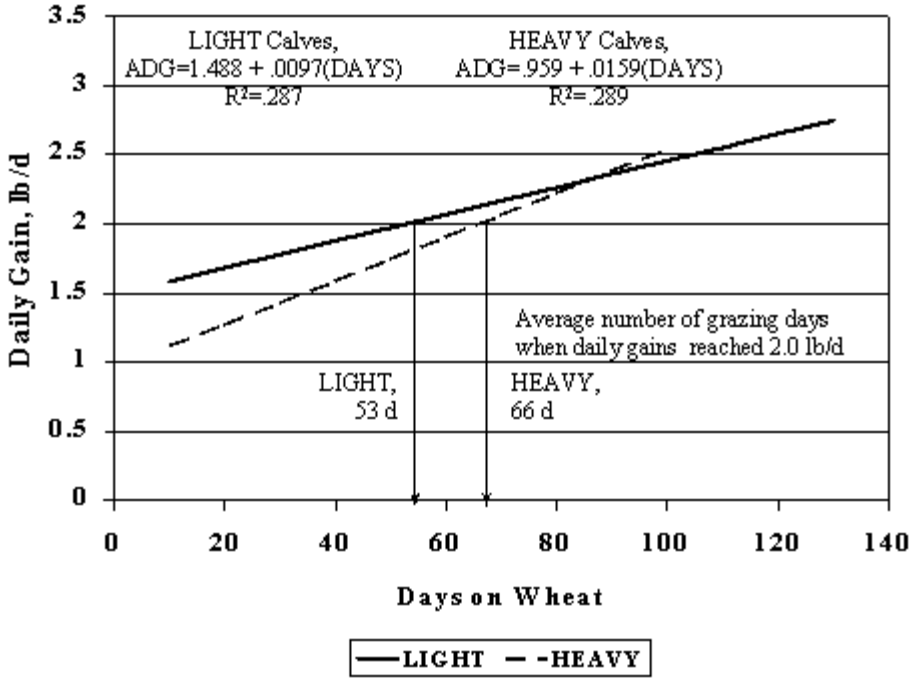

Figure 1. Effect of calf weight (lb) on daily gains of early weaned calves grazing winter wheat

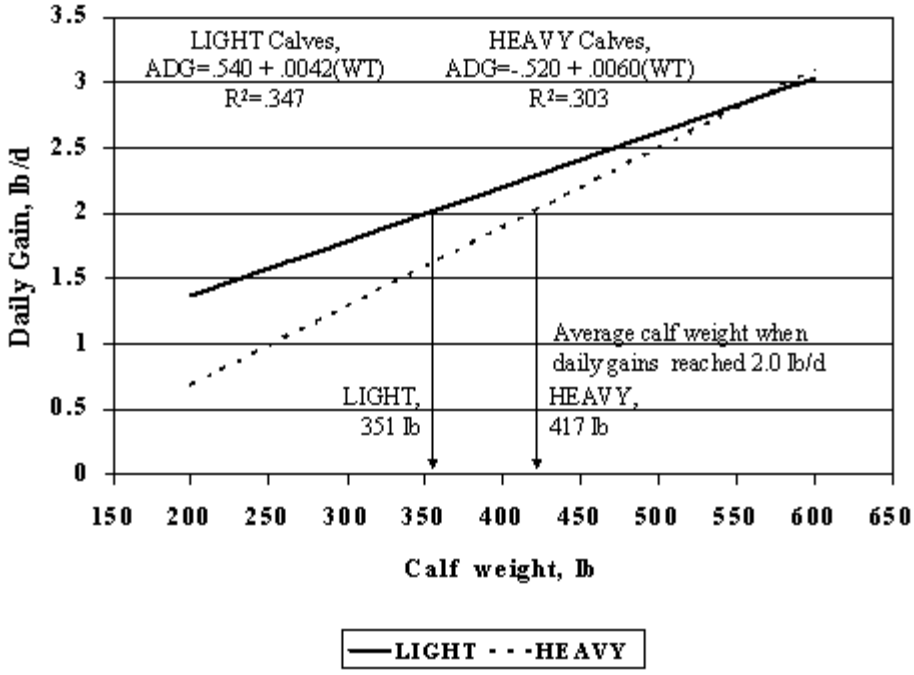

Figure 2. Effect of number of days grazing winter wheat on daily gains of fall-born early weaned calves grazing winter wheat.

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