2013

Walking Distance and Performance of Drylot Developed Beef Heifers Following Being Moved to a Grazing Situation

G.A. Perry
South Dakota State University

E.L. Larimore
South Dakota State University

J.A. Walker
South Dakota State University

BEEF 2013-06

Walking distance and performance of drylot developed beef heifers following being moved to a grazing situation[1]

G. A. Perry, E. L. Larimore, and J. A. Walker

Department of Animal Science, South Dakota State University

SUMMARY

Research has shown that heifers moved from a drylot to grass after AI have decreased weight gains and pregnancy success compared to heifers developed on range. This effect could potentially be due to inexperience in a specific grazing environment, which could result in greater time spent exploring a new environment. In this study beef heifers were moved from a drylot to spring grass at two different times and their activity compared. Heifers in a drylot walked less than heifers grazing spring forage. However, following being moved to spring forage heifers that had been adjusted to grass for about a month took fewer steps during their first four days of grazing then did the heifers that did not have previous grazing experience. Heifers without prior grazing experience also lost weight during this period. In summary, moving drylot developed heifers to spring forage affected performance and activity.

INTRODUCTION

Reproductive failure costs the U.S. beef and dairy industry approximately $1 billion annually (Bellows et al., 2002), and the economic value of reproduction for commercial beef producers was reported to be five times greater than calf growth (Trenkle and Willham, 1977). Previous research has indicated that moving drylot-developed heifers to spring forage immediately after AI impacted ADG and AI conception rates (Perry et al., 2013). However, after 27 d of grazing experience there was no difference in ADG between heifers developed in a drylot and heifers developed on forage (Perry et al., 2013). Grazing skills and dietary habits are learned early in life (Provenza and Balph, 1988). This learning resulted in the development of motor skills necessary to harvest and ingest forages (Provenza and Balph, 1987) and allows animals to increase their consumption of forage (Lyford, 1988). Skills learned between weaning and breeding have been reported to carry through to the next grazing season (Olson et al., 1992). The objective of this study was to determine the impact of prior grazing experience on weight change and activity when heifers were moved to spring forage.

MATERIAL AND METHODS

All procedures were approved by the South Dakota State University Animal Care and Use Committee. Angus-cross beef heifers were developed in a single pen following weaning until 14 mo of age. At the start of treatment (d 0) heifers were blocked by weight and allotted to one of two treatments. Heifers either remained in the drylot (LOT; n = 34) or were moved to spring forage (GRASS; n = 35). Body weights were collected on d 0, 9, 20, 41, 53, and 74. Pedometers (IceCubes by IceRobotics Edinburgh, Scotland) were placed on 5 heifers per treatment on d 25 for 27 d to measure number of steps taken and amount of time standing and lying down. On d 44 all heifers were moved to new pastures of spring

[1] This research was supported by the South Dakota Agricultural Experiment Station.

forage, but were maintained in their respective group (12.1 ha/group). The period of time when heifers were being moved to and from pastures for data collection (i.e. weights) was removed from the analysis.

The effects of grazing experience on ADG, number of steps taken, and amount of time standing and lying down were analyzed by analysis of variance for repeated measures using the MIXED procedures in SAS as described by Littell et al. (1998). All covariance structures were modeled in the initial analysis. The indicated best-fit covariance structure: compound symmetry for BW, Ante-Independent for ADG, and Heterogeneous Compound Symmetry for pedometer data; was used for the final analysis. The model included the independent variables of treatment, day, and treatment x day. When a significant ($P \leq 0.05$) effect of treatment, day, or treatment x day was detected, LS means were separated by the PDiff option of SAS.

RESULTS AND DISCUSSION

There were treatment ($P < 0.01$), time ($P < 0.01$), and a treatment by time ($P < 0.01$) interaction effects on ADG (Figure 1). GRASS heifers had decreased ($P < 0.01$) ADG from d 0 to 9 compared to LOT heifers. There was no difference between treatments in ADG from d 9 to 20 or from d 20 to 41. After being moved to spring forage LOT heifers had decreased ($P < 0.01$) ADG from d 41 to 53 and from d 53 to 74 compared to GRASS heifers. In the present study naïve heifers lost weight and had increased activity compared to heifers that had an adaption period to grazing. This loss in weight was similar to previously reported losses when heifers were moved to a spring grazing situation after being developed in a drylot from weaning to breeding (Perry et al., 2014). The majority of grazing behavior is learned when an animal transitions from maternal care to independence (Provenza and Balph, 1988), this learning resulted in the development of the motor skills necessary to harvest and ingest forages efficiently (Provenza and Balph, 1987). Furthermore, the willingness to try novel food declined as an animal aged (Provenza and Balph, 1988). Thus livestock usually ingest small amounts of novel food and gradually increase the amount ingested if no adverse effects occur (Chapple and Lynch, 1986; Burritt and Provenza, 1987). Therefore, when introduced to a novel food or environment, livestock may spend more time and energy foraging (Osuji, 1974), but ingest less food (Arnold and Maller, 1977; Hodgson and Jamieson, 1981; Curll and Davidson, 1983).

From d 25 to 38, there was an effect of treatment ($P < 0.01$), time ($P < 0.01$), and a treatment by time ($P = 0.03$) interaction on the number of steps taken each day (Figure 2), with GRASS heifers taking more ($P < 0.05$) steps per d than LOT heifers. Following being moved to spring forage, LOT heifers took more ($P < 0.05$) steps per day on d 44, 45, 46, and 47 compared to GRASS heifers (Figure 3). However, across the entire experiment there was no treatment effect on the amount of time a heifer spent standing and lying down per day. The increase in activity was similar to dairy heifers that did not have prior grazing experience compared to heifers that had previously grazed pastures (Lopes et al., 2013). When dairy heifers that had been developed in confinement were moved to pasture it took 5 d for them to develop a similar grazing pattern as experienced animals (Lopes et al., 2013). Similarly, in this study on d 5 after being moved to pasture, LOT heifers took a similar number of steps as GRASS heifers. In summary, after being moved to spring forage drylot developed heifers had decreased ADG compared to heifers that had prior grazing experience. This decrease in ADG is likely due to decreased nutrient intake and increased activity as unexperienced heifers took more steps per day compared to experienced heifers.

LITERATURE CITED

Arnold, G. W., and R. A. Maller. 1977. Effects of nutritional inexperience in early and adult life on the performance and dietary habits of sheep. Appl. Anim. Ethology 3: 5-26.

Bellows, D. S., S. L. Ott, and R. A. Bellows. 2002. Review: cost of reproductive diseases and conditions in cattle. The Prof.Anim. Sci. 18: 26-32.

Burritt, E. A., and F. D. Provenza. 1987. Ability of lambs to discriminate between safe and harmful foods. In: 40th Annual Meeting of the Society for Range Science, Boise, Idaho

Chapple, R. S., and J. J. Lynch. 1986. Behavioral factors modifying acceptance of supplementary foods by sheep. Res. Dev. Agric. 3: 113-120.

Curll, M. L., and J. L. Davidson. 1983. Defoliation and productivity of a Phalaris-subterranean clover sward, and the influence of grazing experience on sheep intake. Grass Forage Science 38: 159-167.

Hodgson, J., and W. S. Jamieson. 1981. Variations in herbage mass and digestibility, and the grazing behaviour and herbage intake of adult cattle and weaned calves. Grass and Forage Sci. 36: 39-48.

Littell, R. C., P. R. Henry, and C. B. Ammerman. 1998. Statistical analysis of repeated measures data using SAS procedures. J. Anim. Sci. 76: 1216-1231.

Lopes, F., W. Coblentz, P. C. Hoffman, and D. K. Combs. 2013. Assessment of heifer grazing experience on short-term adaption to pasture and performance as lactating cows. J. Dairy Sci. 96:3138-3152.

Lyford, S. J., Jr. 1988. Growth and development of the ruminant digestive system. In: D. C. Church (ed.) The Ruminant Animal. p 44-63. Prentice Hall, Englewood Cliffs, NJ.

Olson, K. C., J. R. Jaeger, and J. R. Brethour. 1992. Growth and reproductive performance of heifers overwintered in range or drylot environments. J. Prod. Agric. 5: 72-76.

Osuji, P. O. 1974. The physiology of eating and the energy expenditure of the ruminant at pasture. J. Range Manage. 27: 437-443.

Perry G.A., B.L. Perry, J.A. Walker, C.L. Wright, R.R. Salverson, and H.H. Patterson. 2013. Evaluation of prior grazing experience on reproductive performance in beef heifers. Prof. Anim. Sci. 29:595-600.

Provenza, F. D., and D. F. Balph. 1987. Diet learning by domestic ruminants: Theory, evidence and practical implications. Appl. Anim. Beh. Sci. 18: 211-232.

Provenza, F. D., and D. F. Balph. 1988. Development of dietary choice in livestock on rangelands and its implications for management. J. Anim. Sci. 66: 2356-2368.

Trenkle, A., and R. L. Willham. 1977. Beef production efficiency. Science 198: 1009-1015.

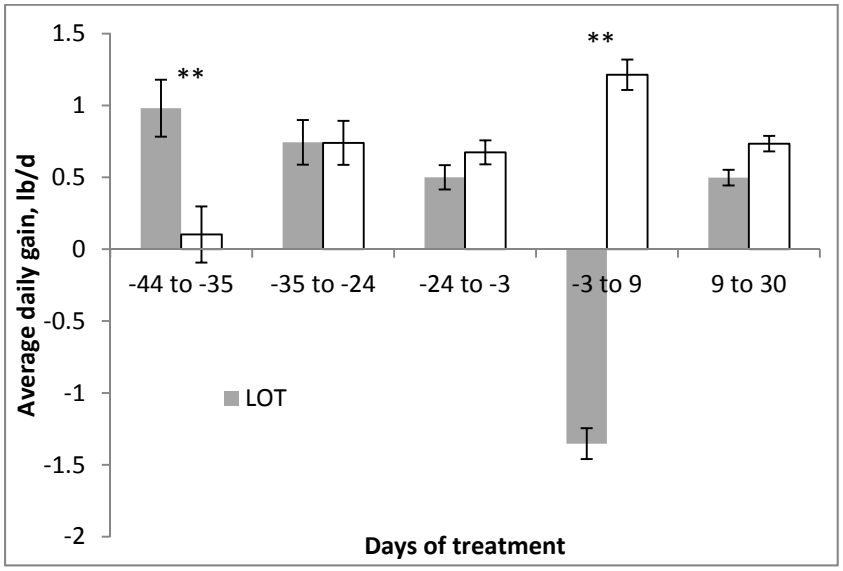

Figure 1. Average daily gain for heifers during the study. GRASS heifers were moved from the drylot to forage on d 0 and LOT heifers were moved from the drylot to forage on d 44. **P < 0.01 within day.

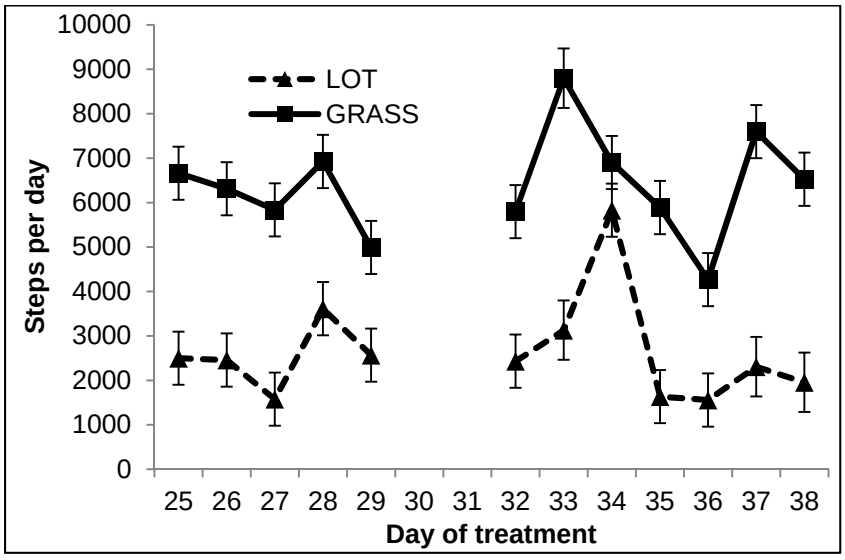

Figure 2. Number of steps taken per day from d 25 to 38 of treatments. GRASS heifers were moved from the drylot to forage on d 0. LOT heifers were still in the drylot (P < 0.05).

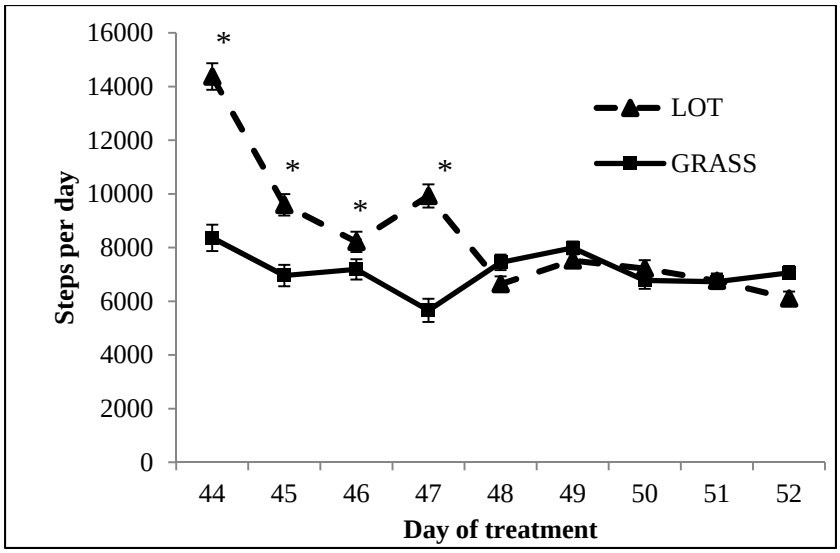

Figure 3. Number of steps taken per day from d 44 to 52 of treatment. GRASS heifers were moved from the drylot to forage on d 0. LOT heifers were moved from the drylot to forage on d 44. (*P < 0.05)