

RELATIONSHIPS BETWEEN BEHAVIOR AND BODY WEIGHT GAIN IN GRAZING HOLSTEIN HEIFERS

N. Hasegawa, H. Hidari and H. Yoshida

Obihiro University of Agriculture and Veterinary Medicine,
Obihiro, Hokkaido, 080, Japan

Introduction

Raising dairy and beef cattle through grazing on pasture has been the traditional practice in many parts of the world. In Japan, though many people believe that cattle performance on grazing is lower than in dry lot and housing, many cooperative pastures are now being used to minimize labor costs without reduction in overall performance. Ikefaki et al. (1987) showed that heifers grown on pasture have comparable growth rates as those grown in dry lots. Many studies on the factors affecting behavior and body weight gain of grazing cattle have been carried out. Hasegawa et al. (1988) reported that cattle fed on trimmed pasture increased their nutrient intake and decreased the rate of rumination for grazing time than those fed on untrimmed pasture.

The present study aimed at investigating the relationships between behavioral characteristics and growth rates of grazing heifers.

Materials and Methods

Ten heifers (318 ± 33 kg average body weight) were chosen randomly from a herd of 25 Holstein heifers for the experiment. The herd was rota-

tionally grazed across five 3- to 5-day pastures approximately 8 ha located in Hokkaido 800 meters above sea level from June to October in 1987. The experimental animals were numbered individually using fluorescent paint and underwent 24-hour observations once a month for 5 months while being pastured with the rest of the herd. Behaviors observed at 5-min. intervals included standing (S), lying (L), grazing (G), ruminating (Rum), and resting (R). Body weight and body size were measured before each observation period. Samples of blood and rumen contents were obtained bimonthly and analyzed. Chemical composition of herbage samples of pasture taken from five quadrats at each time during the 24-hr behavior observation were determined.

Results and Discussion

Average daily gain (DG) of experimental heifers from June to October was 0.87 ± 0.29 kg. The highest DG recorded was 0.91 kg in September and the smallest was 0.41 kg in August.

Chemical composition of pasture herbage varied with month. Dry matter (DM) and crude protein (CP) contents on DM basis increased gradually from June (21.2, 12.2%, respectively) to October

TABLE 1. SEASONAL CHANGES IN HEIFERS' BEHAVIOR ON PASTURE AND DG

| Month | Posture | | Behavior | | | | | | | Av. DG |
|-------|--------------|------|----------|------|-------|-------|------|-------|-------|----------|
| | S | L | G | Rum | (S | L) | R | (S | L) | |
| | (% of 24-hr) | | | | | | | | | (kg/day) |
| 6 | 53.0 | 47.0 | 29.1 | 28.8 | (4.1 | 24.7) | 37.3 | (15.2 | 22.1) | 0.78 |
| 7 | 61.3 | 38.7 | 41.5 | 27.5 | (4.2 | 23.3) | 28.3 | (13.0 | 15.3) | 0.72 |
| 8 | 58.3 | 41.7 | 39.7 | 33.0 | (10.5 | 22.5) | 26.3 | (7.1 | 19.2) | 0.41 |
| 9 | 48.3 | 51.7 | 33.0 | 26.8 | (0.9 | 25.9) | 37.0 | (11.3 | 25.8) | 0.91 |
| 10 | 51.7 | 48.3 | 41.6 | 27.5 | (1.8 | 25.7) | 30.2 | (7.8 | 22.4) | 0.81 |

Values are expressed as the means of 10 observations.

S: standing, L: lying, G: grazing, Rum: ruminating, and R: resting.

(27.2, 16.7%, respectively). Acid detergent fiber (ADF) content on DM basis was highest in July and August (37.5 and 39.1%) and lowest in October (31.1% of DM).

Average daily gain of the experimental heifers tended to increase in the months when herbage contained higher CP and lower ADF.

Seasonal changes in behaviors of the experimental animals on pasture are shown in table 1. Time spent standing was longer in July and August than in other months. Time spent grazing was shorter in June and September, when the ADF content of herbage was low, than in other months except October which had the lowest ADF content and longest grazing time. This may be due to the scarcity of herbage on pasture in October. Time spent for rumination was longest in August, when the ADF content of herbage was also high

est. Time spent resting was shortest in August, when average DG of experimental heifers was also lowest.

There was no apparent relationship between plasma FFA, insulin, and lipid concentration and body weight gain of heifers.

In order to estimate the relationship between DG and behavior, 50 (10 head x 5 months) behavioral observations during the experimental period were sorted into 4 classes by DG. Table 2 shows the average percentage of each behavior in a day classified by the range of DG. There were no significant differences among DG ranges in the percentages of time spent in a day for grazing, ruminating, resting, resting while standing, and resting while lying. Heifers gaining more than 1.0 kg per day tended to have longer lying time and rumination with lying than heifers gaining less

TABLE 2. RATE OF BEHAVIOR CLASSIFIED BY DG RANGE

| DG Range | n | Posture | | Behavior | | | | | | | |
|----------|----|------------|------|----------|------|-------|-------|-------|-------|-------|--|
| | | S | L | G | Rum | (S L) | R | (S L) | | | |
| kg/day | | % of 24-hr | | | | | | | | | |
| 1 = < | 11 | 50.6 | 49.4 | 36.2 | 29.0 | (2.0 | 27.0) | 32.3 | (9.9 | 22.4) | |
| .75-1 | 14 | 56.9 | 43.4 | 37.3 | 28.8 | (4.8 | 24.0) | 31.3 | (12.0 | 19.3) | |
| .5-.75 | 16 | 53.9 | 46.2 | 36.3 | 28.0 | (3.8 | 24.2) | 33.0 | (11.2 | 21.8) | |
| <.5 | 9 | 57.3 | 42.7 | 38.6 | 29.6 | (7.1 | 22.5) | 29.9 | (9.6 | 20.2) | |

Values are expressed as the means of 10 observations.

S: standing, L: lying, G: grazing, Rum: ruminating, and R: resting.

than 0.5 kg per day ($p < 0.05$, $p < 0.01$).

These results showed that with lower body weight gain, heifers tend to have less lying time with rumination.

(Key Words: Grazing, Behavior, Body Weight Gain)

Literature Cited

Hasegawa, N., M. Yamagata, T. Iketaki, S. Ota,

M. Okamoto and N. Yoshida. 1988. Effect of trimming on pasture quality, and intake of nutrients and grazing behaviour in dairy heifers. Res. Bull. Obihiro Univ. 15:271-277.

Iketaki, T., H. Saito, H. Kurosawa, N. Hasegawa, M. Okamoto, M. Sato, S. Ota and N. Yoshida. 1987. Comparison of growth and nutrient intake of dairy heifers between grazing and dry lot feeding. Res. Bull. Obihiro Univ. 15: 209-216.