

## ENERGY AND NITROGEN METABOLISM OF KOREAN NATIVE HEIFERS FOR GROWTH

T. Y. Thak

Livestock Experiment Station, Rural Development Administration, Suweon, Korea

### Introduction

Foreign feeding standards for beef cattle such as NRC and ARC have been used for Korean native cattle, however, because there were no available data in Korea, while Korean native cattle is different from other beef cattle in growth performance.

This experiment was conducted to know the energy and nitrogen metabolism for growth of Korean native heifer.

### Material and Methods

#### Experimental animal, feed and plan

Nine Korean native heifers weighing about 120 kg were used. Three treatment of 0.2 kg ( $T_1$ ), 0.6 kg ( $T_2$ ) and 0.8 kg ( $T_3$ ) of target daily gain were assigned.

Metabolism trial was carried out from 150 kg to 350 kg of body weight with the interval of 50 kg. Three percentage of feed of body weight were fed and ratio of concentrate to roughage according to treatment were based upon NRC (1976).

The preliminary periods for each period of collection were 15 days and at this time values were obtained on feed intake and corresponding weight gain. Collection periods were 7 days with

24 hours respiration experiment in the last of the period.

### Result and Discussion

#### Nitrogen metabolism

In 150-250 kg of body weight daily gains were 0.23, 0.51 and 0.77 for  $T_1$ ,  $T_2$ , and  $T_3$  group, respectively.

Daily gain and nitrogen intake in 250-350 kg of body weight were similar those in 150-250 kg of body weight, but feces nitrogen excretion increased with increasing of daily gain. Using pooled data from all stages of body weight, relationship between nitrogen intake (Y) and daily gain (X) was expressed as linear equation ( $Y = 0.9688 + 1.201X$ ).

#### Energy metabolism

Heat production increased with an increases of ME intake and energy retention was 11.1, 23.3 and 35.4 Kcal per metabolic body weight, respectively.

Using pooled data from all stage of body weight, relationship between energy intake (Y) and daily gain (X) was expressed as follows:

$$\text{TDN intake}(Y) = 28.81 + 29.92X - 2.92X^2$$

$$(r = 0.95)$$

TABLE 1. NITROGEN BALANCE IN 150-250 kg OF BODY WEIGHT

Item	$T_1$	$T_2$	$T_3$
Metabolic body wt. (kg)	41.22	54.14	47.33
Daily weight gain (kg)	0.23	0.51	0.77
Nitrogen intake (g/W <sup>0.75</sup> )	1.292 <sup>a</sup>	1.467 <sup>ab</sup>	1.897 <sup>b</sup>
Nitrogen excreted (g/W <sup>0.75</sup> )	0.845	0.710	1.040
Feces	0.731	0.538	0.819
Urine	0.114	0.172	0.221
Nitrogen retained (g/W <sup>0.75</sup> )	0.447 <sup>a</sup>	0.757 <sup>ab</sup>	0.857 <sup>b</sup>

\*Significantly different at  $p < 0.05$  value with different superscripts.

TABLE 2. NITROGEN BALANCE IN 250-350 kg OF BODY WEIGHT

Item	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>
Metabolic body wt. (kg)	66.67	72.82	65.50
Daily weight gain (kg)	0.31	0.60	0.79
Nitrogen intake (g/W <sup>0.75</sup> )	1.329 <sup>a</sup>	1.699 <sup>ab</sup>	1.964 <sup>b</sup>
Nitrogen excreted (g/W <sup>0.75</sup> )	1.049	1.095	1.394
Feces	0.747	0.781	0.927
Urine	0.302	0.314	0.467
Nitrogen retained (g/W <sup>0.75</sup> )	0.280 <sup>a</sup>	0.604 <sup>b</sup>	0.570 <sup>b</sup>

\*Significantly different at  $p < 0.05$  value with different superscripts.

TABLE 3. ENERGY BALANCE IN 150-250 kg OF BODY WEIGHT

Item	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>
GE intake (kcal/W <sup>0.75</sup> )	335.85 <sup>a</sup>	387.85 <sup>b</sup>	411.47 <sup>b</sup>
DE intake (kcal/W <sup>0.75</sup> )	175.56 <sup>a</sup>	222.68 <sup>b</sup>	247.75 <sup>b</sup>
TDN intake (g/W <sup>0.75</sup> )	38.01 <sup>a</sup>	50.39 <sup>b</sup>	53.28 <sup>b</sup>
Urine (kcal/W <sup>0.75</sup> )	2.70 <sup>a</sup>	5.34 <sup>b</sup>	4.28 <sup>b</sup>
Methane (kcal/W <sup>0.75</sup> )	14.36	14.83	13.91
ME intake (kcal/W <sup>0.75</sup> )	158.50 <sup>a</sup>	202.51 <sup>b</sup>	229.56 <sup>b</sup>
Heat production (kcal/W <sup>0.75</sup> )	147.43 <sup>a</sup>	179.24 <sup>ab</sup>	194.20 <sup>b</sup>
Balance (kcal/W <sup>0.75</sup> )	11.07 <sup>a</sup>	23.27 <sup>ab</sup>	35.36 <sup>b</sup>
ME/GE	0.47 <sup>a</sup>	0.52 <sup>ab</sup>	0.56 <sup>b</sup>

\*Significantly different at  $P < 0.05$  value with different superscripts.

TABLE 4. ENERGY BALANCE IN 250-350 kg OF BODY WEIGHT

Item	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>
GE intake (kcal/W <sup>0.75</sup> )	372.94	370.22	396.16
DE intake (kcal/W <sup>0.75</sup> )	212.48 <sup>a</sup>	229.86 <sup>a</sup>	294.25 <sup>b</sup>
TDN intake (g/W <sup>0.75</sup> )	44.27 <sup>a</sup>	47.70 <sup>a</sup>	62.12 <sup>b</sup>
Urine (kcal/W <sup>0.75</sup> )	4.74 <sup>a</sup>	7.80 <sup>b</sup>	4.84 <sup>a</sup>
Methane (kcal/W <sup>0.75</sup> )	19.35	14.48	19.02
ME intake (kcal/W <sup>0.75</sup> )	188.39 <sup>a</sup>	207.58 <sup>a</sup>	270.39 <sup>b</sup>
Heat production (kcal/W <sup>0.75</sup> )	24.42 <sup>a</sup>	27.90 <sup>a</sup>	41.47 <sup>b</sup>
ME/GE	0.51 <sup>a</sup>	0.56 <sup>a</sup>	0.68 <sup>b</sup>

\*Significantly different at  $p < 0.05$  value with different superscripts.

$$\text{DE intake}(Y) = 132.80 + 106.88X \quad (r = 0.47)$$

$$\text{ME intake}(Y) = 112.75 + 149.51X - 23.85X^2 \\ (r = 0.99)$$

In order to know the energy and protein metabolism of Korean native heifers for growth, meta-

bolism trial was carried out using 9 heads of Korean native heifers. Nitrogen intake(Y) and daily gain(X) was expressed as linear equation ( $Y = 0.9688 + 1.201X$ ).

Energy requirement for gain in this experiment was lower than that of exotic breeds.

**Literature Cited**

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