

# THE EFFECT OF FEED AND NAPIERGRASS INTAKE ON GROWTH PERFORMANCE AND CARCASS CHARACTERISTICS OF LANYU PIGS

Lee, C. J.<sup>1</sup>, J. C. Huang<sup>2</sup>, Y. Y. Tseng<sup>3</sup>, H. P. Chu<sup>1</sup>, W. C. Chen<sup>1</sup>, L. C. Cheng<sup>4</sup> and C. W. Liao<sup>5\*</sup>

<sup>1</sup> Taitung Animal Propagation Station, COA-LRI, Taitung 954, Taiwan.

<sup>2</sup> Hengchun Branch Institute, COA-LRI, Pingtung 946, Taiwan.

<sup>3</sup> Department of Animal Science, National Pingtung Science and Technology University, Pingtung 912, Taiwan.

<sup>4</sup> Miaoli County Government, Miaoli City, Miaoli 360, Taiwan.

<sup>5</sup> Nutrition Division, COA-LRI, Hsinhua 71246, Taiwan.

\*Corresponding author, E-mail: chungwen@mail.tlri.gov.tw

## ABSTRACT

The aim of this study was to investigate the effect of feed and napiergrass intake on average daily gain (ADG), feed efficiency (F/G) and carcass characteristics of Lanyu pigs. A total of 24 Lanyu pigs were allocated into 4 groups which were daily provided 0.4 kg (L-0.4), 0.7 kg (L-0.7), 1.0 kg (L-1.0) of feed and fed *ad libitum* (L-*ad*). The first 3 groups were also provided with napiergrass (Taishi No.2) *ad libitum*. Experiment started when the average body weights (BW) of Lanyu pigs were 30 kg and the pigs were slaughtered when BW reached 50 kg. Results showed that there were no difference in ADG and F/G between L-1.0 and L-*ad* group. The ADG was significantly ( $P < 0.05$ ) decreased in L-0.4 and L-0.7 groups compared to other treatments. The daily feed intake and the backfat thickness was larger ( $P < 0.05$ ) in L-*ad* than the other groups. The L value of meat color of L-1.0 and L-*ad* pigs were higher than other groups. The crude fat of loin meat in L-1.0 pigs was significantly ( $P < 0.05$ ) higher than the other groups. In conclusion, daily provision of 1.0 kg of feed and napiergrass fed *ad libitum* to Lanyu pigs can obtain growth and carcass performance as those pigs fed *ad libitum*.

**Key words:** Lanyu pigs, Napiergrass, Growth performance, Carcass characteristics

## INTRODUCTION

The Lanyu pigs is an indigenous miniature pig breed originated from Lanyu island located at offshore southeastern Taiwan. The pig has a characteristics small body size, narrow and straight head, small erect ears and coarse black hair (Lee *et al.*, 1994). The local breed grow slowly and has lower meat percentage. Nevertheless, it has higher heat tolerance and disease resistant. It can also consume high roughage. In habitant area, the pigs were provided with vegetable, kitchen waste and limited amount of feed. The data on the feed intake and the provision of roughage for Lanyu pigs and its effect on growth or carcass performance are limited. The purpose of this study was to study the effect of feed and napiergrass intake on growth performance and carcass characteristics of Lanyu pigs.

## MATERIALS AND METHODS

### *Animals and experimental design*

A total of 24 Lanyu pigs were allocated into 4 groups which were daily provided 0.4 kg (L-0.4), 0.7 kg (L-0.7), 1.0 kg (L-1.0) of feed and fed *ad libitum* (L-*ad*). The first 3 groups were also provided with napiergrass (Taishi No.2) *ad libitum*. Experiment started when the average body weights (BW) of Lanyu pigs were 30 kg and pigs were slaughtered when BW reached 50 kg. The feed provided to Lanyu pig contained 17.5% crude protein, 3,500 kcal/kg digestible energy (DE) and 2.85 % crude fiber. The breed of Napiergrass is Taishi No 2, which was harvested at the height of 1 m and cut into 2 cm in length. The dry matter content is 18.7%, crude protein 8.5 %, DE 275 kcal/kg and acid detergent fiber 40.2 %. Feed and napiergrass consumption were recorded daily. Body weight were measured every two weeks. At the end of experiment, average daily gain, feed efficiency, carcass characteristics, pork chemical composition and meat color were measured.

### *Statistical analysis*

Data were analyzed by ANOVA as a completely randomized design with computed the SAS package (SAS, 1997). Experimental units were individual pig. Analysis of variance was conducted by the general linear model procedure. The difference between treatments were detected by the Duncan's New Multiple Range Test. A  $P < 0.05$  was regarded as significantly different.

## RESULTS AND DISCUSSION

Pigs fed L- 0.4 and L- 0.7 of feed daily significantly ( $P < 0.05$ ) reduced average daily gain than fed L-1.0 or L-*ad*. Although the amount of napiergrass intake for L-0.4 and L-0.7 pigs were significantly ( $P < 0.05$ ) larger than L-1.0 and L-*ad* (Table 1). The pig's average daily gain were still lower, indicating that pigs provided with limited amount of complete feed and consumed napiergrass *ad libitum* can not have the growth performance as those pigs provided with high amount of complete feed. NRC (1998) estimated the maintenance DE requirement of grower pigs as 110 kcal of DE/kg of BW<sup>0.75</sup>/day. In the present experiment, the average body weight of pigs was approximately 34 kg. Therefore, the maintenance DE requirement for L-0.4 pigs was close to 1,499 kcal DE/d and the additional provision of 1.93 kg/d napiergrass for pigs obtained 0.04 kg daily gain. Lanyu pigs fed feed *ad libitum* can consume 1.28 kg of feed daily (Table 1). This feed intake is consistent to the result of another experiment. Lee *et al.* (2003) showed that pigs fed 1.2 kg/d of diet had significantly ( $P < 0.05$ ) larger average daily gain than the pigs fed 0.9 kg/d of diet during the finishing period and those pigs had the most efficient feed utilization when compared with other treatments. Pigs grazed on pasture and supplemented with 1.2 kg/d diet had a significantly ( $P < 0.05$ ) higher lean percentage than the pigs fed 1.5 kg/d diet, which is consistent to the result of Pond *et al.*, (1989). Besides, the grazing pigs also had the lowest fat percentage among the five groups. During the finishing period, Lanyu pigs grazing on pasture and supplementing 1.2 kg/d of diet increased 3% of lean meat and decreases 7% of fat compared with the pigs without grazing. The daily feed intake for BW 30-50 kg Lanyu pigs is recommended to be 1.2 kg.

Lanyu pigs fed L-0.4 or L-0.7 kg of feed had lower slaughter and carcass weight than

fed the L-1.0 or L-*ad* (Table 2). Nevertheless, there were no difference on dressing percentage of pigs among the four groups. The Loin eye area of L-0.4 pigs tended to be smaller than L-1.0 or L-*ad*. Significant lower backfat thickness was observed on L-0.4 pigs. Due to higher feed intake, pigs in L-*ad* had significantly ( $P < 0.05$ ) larger backfat thickness than other groups.

The percentage of ash, crude protein and crude fat in loin meat were significantly lower for pigs fed L-0.4 or L-0.7 when compared to L-1.0 and L-*ad* (Table 3), indicating that pigs daily fed 1.0 kg feed and napiergrass can provide sufficient dietary protein and nutrient for lean muscle accretion.

The L-value and a value of meats from pigs fed L-0.7 and L-*ad* were higher than those pigs fed L-0.4 (Table 4). The result is also obtained by Candek-Potoker *et al.* (1998). Nevertheless, the b value for L-0.4 was higher than the other groups. The pigs in L-0.4 ate less feed but larger amount of pasture which possibly consumed high level of xanthophyll,  $\beta$ -carotene and carotenoid that can contribute to the pigments accumulation in meat.

In conclusion, for Lanyu pigs with body weight from 34 kg to 47 kg, daily provision of 1.0 kg of feed and napiergrass fed on *ad libitum* basis can obtain the growth performance and carcass characteristics as those pigs fed feed *ad libitum*. Lanyu pigs fed complete feed *ad libitum* had significantly increased the backfat thickness.

## REFERENCE

- Candek-Potoker, M., B. Lender, L. Lefaucheur, and M. Bonneau. 1998. Effects of age and/or weight at slaughter on *Longissimus Dorsi* muscle: Biochemical traits and sensory quality in pigs. *Meat Sci.* 48:287-300.
- Lee, C. J., W. C. Chen, J. L. Tseng, H. L. Chang, and M. C. Wu. 1994. Analysis of litter size in a population at random mating of Lanyu breed sows. *J. Taiwan Livest. Res.* 27(2):109-112.
- Lee, C. J., H. P. Chu, J. C. Huang, W. C. Chen, L. C. Cheng, Y. Y. Tseng, T. M. Su, and C. W. Liao. 2003. Effect of different feeding levels and grazing on the growth performance and carcass characteristics of Lanyu pigs. *J. Chin. Soc. Anim. Sci.* 32 (1): 15-21.
- NRC. 1998. *Nutrient Requirements of Swine* (10<sup>th</sup> Ed.). National Academy Press, Washington, DC., USA.
- Pond, W. G., V. H. Varel, J. S. Dickson, and W. H. Haschek. 1989. Comparative response of swine and rats to high fiber or high protein diets. *J. Anim. Sci.* 67: 716-723.
- SAS Institute Inc. 1997. *SAS User's Guide: Statistics* (Version 6.2). SAS Institute, Cary, NC., USA.

Table 1. The effect of feed and Napiergrass intake on growth performance of Lanyu pigs

Item	Feed, kg/d			
	0.4	0.7	1.0	<i>ad libitum</i>
Initial weight (kg)	34.42±2.62	35.10±2.01	32.10±2.70	31.92±3.44
Final weight (kg)	40.58±3.34 <sup>c</sup>	49.19±0.93 <sup>b</sup>	49.48±0.86 <sup>b</sup>	49.20±0.80 <sup>b</sup>
Feeding period (days)	164.00±0 <sup>a</sup>	140±4.47 <sup>b</sup>	77.83±14.93 <sup>c</sup>	80.50±19.42 <sup>c</sup>
Daily gain (kg/d)	0.04±0.01 <sup>d</sup>	0.10±0.02 <sup>c</sup>	0.19±0.03 <sup>b</sup>	0.22±0.03 <sup>b</sup>
Daily feed intake (kg)	0.4±0.01 <sup>e</sup>	0.70±0.01 <sup>d</sup>	0.96±0.04 <sup>c</sup>	1.28±0.04 <sup>b</sup>
Feed efficiency (F/G)	11.04±2.82 <sup>a</sup>	7.06±1.05 <sup>b</sup>	5.28±1.12 <sup>bc</sup>	5.97±1.12 <sup>bc</sup>
Daily Napiergrass intake (kg) *	1.93±0.07 <sup>a</sup>	1.38±0.12 <sup>b</sup>	0.87±0.16 <sup>c</sup>	—
Daily dry matter intake (Napiergrass) (kg)	0.36±0.01 <sup>a</sup>	0.26±0.02 <sup>b</sup>	0.16±0.02 <sup>c</sup>	—

Means in the same rows with different superscripts differ significantly ( $P < 0.05$ ).

\* Napiergrass was provided *ad libitum*.

Table 2. The effect of feed and Napiergrass intake on carcass characteristics of Lanyu pigs

Item	Feed, kg/d				SEM
	0.4	0.7	1.0	<i>ad libitum</i>	
Live weight (kg)	37.00 <sup>c</sup>	46.92 <sup>b</sup>	48.80 <sup>b</sup>	47.00 <sup>b</sup>	1.57
Carcass weight (kg)	26.15 <sup>c</sup>	32.67 <sup>bc</sup>	34.89 <sup>b</sup>	35.05 <sup>b</sup>	4.00
Dressing percentage (%)	70.79	69.62	71.65	70.68	4.35
Carcass length (cm)	52.07 <sup>b</sup>	57.70 <sup>ab</sup>	62.89 <sup>a</sup>	58.29 <sup>ab</sup>	5.73
Loin-eye area (cm <sup>2</sup> )	21.47	23.72	25.53	24.18	—
Back fat thickness (cm)	2.10 <sup>c</sup>	2.75 <sup>b</sup>	2.74 <sup>b</sup>	3.34 <sup>a</sup>	0.03

<sup>a, b, c</sup> Means in the same row with different superscripts differ significantly ( $P < 0.05$ ).

Table 3. The effects of feed and Napiergrass intake on chemical composition of loin from Lanyu pigs (%)

Item	Feed, kg/d				SEM
	0.4	0.7	1.0	<i>ad libitum</i>	
Water	75.75 <sup>a</sup>	74.16 <sup>ab</sup>	72.29 <sup>bc</sup>	72.63 <sup>bc</sup>	0.29
Ash	1.05 <sup>b</sup>	1.07 <sup>b</sup>	1.11 <sup>ab</sup>	1.15 <sup>a</sup>	0.01
Protein	20.16 <sup>c</sup>	21.15 <sup>bc</sup>	22.26 <sup>ab</sup>	22.45 <sup>a</sup>	0.16
Crude fat	1.67 <sup>c</sup>	3.04 <sup>b</sup>	4.60 <sup>a</sup>	3.23 <sup>b</sup>	0.06

<sup>a, b, c</sup> Means in the same rows with different superscripts differ significantly ( $P < 0.05$ ).

Table 4. The effects of feed and Napiergrass intake on meat color and melting point of subcutaneous fat of Lanyu pigs

Item	Feed, kg/d				SEM
	0.4	0.7	1.0	<i>ad libitum</i>	
Meat color					
L value	23.76 <sup>b</sup>	34.92 <sup>a</sup>	39.96 <sup>a</sup>	39.15 <sup>a</sup>	3.42
a value	4.37 <sup>b</sup>	8.37 <sup>a</sup>	7.23 <sup>ab</sup>	7.85 <sup>a</sup>	0.87
b value	10.00 <sup>a</sup>	4.82 <sup>b</sup>	7.19 <sup>ab</sup>	6.92 <sup>ab</sup>	2.07
Fat color					
L value	59.82 <sup>c</sup>	68.00 <sup>a</sup>	67.05 <sup>a</sup>	69.03 <sup>a</sup>	1.17
a value	-0.15	0.69	0.36	0.23	0.68
b value	11.13 <sup>a</sup>	8.74 <sup>bc</sup>	9.21 <sup>b</sup>	8.12 <sup>bc</sup>	0.26
Fat melting point (°C)					
Upper layer fat	36.67	38.05	38.26	37.85	0.57
Lower layer fat	40.48	39.45	39.20	38.75	0.42

<sup>a, b, c</sup> Means in the same rows with different superscripts differ significantly ( $P < 0.05$ ).

L value, a value and b value mean lightness, redness and yellowness respectively.