BEHAVIOR AND GROWTH OF PIGS IN GROUP PENS UNDER DIFFERENT FEEDING SYSTEMS

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ABSTRACT

Five different feeding systems were tested on growing-finishing pigs. Behavior patterns on lying down, nibbling, drinking, urinating, defecating, walking, and eating were observed. Production traits such as weight gain and feed efficiency were recorded up to 18 weeks. Only two behavioral patterns were significantly affected by the different feeding systems, i.e., lying down and nibbling. Other behavioral patterns were not affected by the treatments. The production traits that were significantly affected by the different feeding systems were the number of days to reach 90 kg average liveweight and backfat thickness. Animals fed twice daily at 60 min each showed significantly shorter period to reach 90 kg average liveweight and have thinner backfat probe compared to those in other treatments.

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INTRODUCTION

Backyard swine raising is a popular enterprise for many farmers in the Philippines. Most of these backyard swine raisers do not employ commercial feeds for their pigs and have very little knowledge on the optimum level of feeding for swine.

Various studies have shown that pigs grow faster compared to other livestock. Dammert (1974) showed that animals under restricted feeding gained 13.6 g daily while those on *ad libitum* feeding gained only 10.6 g. Contrary to Dammert's findings, Supnet (1975) reported a higher average daily weight gain from animals subjected to full

feeding than those on restricted feeding (0.58 kg vs. 0.39 kg). Kneale (1972) found that there was a significant advantage of wet feeding over dry feeding for fattening bacon pigs in terms of daily weight gain and the number of days to reach market weight.

Pigs given limited feeds and kept in overcrowded pens showed slower growth rates and lower feed intake compared to pigs kept as litter groups (Sherritt *et al.*, 1974). Furthermore, Bryant and Eubank (1972) indicated that growth is related to social rank and fighting when pigs are on a limited feeding program. Under *ad libitum* feeding, Casteel and Bekhaert (1974) showed that the growth rate of individually housed pigs was 8.5% higher than those fed in groups. Elliot and Doige (1973) found that pigs confined individually in concrete-floored pens had significantly lower rate of gain, compared to pigs confined in groups of four.

Morrison *et al.* (1968) reported that exercised pigs tended to spend more time resting and less time eating than non-exercised pigs. The feeding pattern showed that exercised animals decreased feeding primarily around noon and late afternoon. Cole *et al.* (1968) concluded that pigs which have restricted exercise grew slowly and possessed less fat and more lean at 50 kg liveweight.

Pond and Maner (1974) found that if the size of the pen was restricted, the pigs defecated and urinated at a corner of the pen apart from the resting area. Furthermore, Heitman *et al.* (1962) revealed that in 10 and 20 sq ft pig pens, one or two distinct areas tended to be used for defecating and the rest remained relatively dry for resting and sleeping. They further concluded that animals with higher feed utilization tended to spend more time sleeping and resting and less time standing or walking.

Recent reports tend to suggest that there is a greater return for efficient feeding management of pigs than for advances in technique, breeding, building and equipment, nutrition, disease control and marketing (Moyer *et al.*, 1975).

MATERIALS AND METHODS

Thirty-five crossbred pigs from seven different littermates were used in the experiment. Three littermates were offsprings of a commercial strain of Large White x Duroc combination and four littermates from Large White x Landrace combination. The pigs were obtained from the Swine Research Project of the Animal Breeding and Physiology Division, UPLB. The pigs had an average initial weight of 16 kg and an age of 79 days. Pigs were dewormed and immunized prior to their distribution into the different treatment groups. Deworming was repeated during the middle part of the experiment.

The animals were randomly distributed in five 9 sq m pens (2.13 m x 4.26 m). Seven piglets were placed in each pen. A randomized com-

plete block (RCB) design was followed in the experiment.

The treatments were: T_1 - *Ad libitum* day feeding at 7:30 a.m.; T_2 - two feedings of 30 minutes each at 7:30 a.m. and 4:00 p.m.; T_3 - two feedings of 60 minutes each at 7:30 a.m. and 4:00 p.m.; T_4 - three feedings of 30 minutes each given at 7:30 a.m., 11:30 a.m. and 4:00 p.m.; and T_5 1-1 *Ad libitum* night feeding starting at 5:00 p.m.

The pigs were bathed every morning. They were floor-fed with a grower ration up to an average liveweight of 60 kg and a finisher ration from 60 to 90 kg. After each feeding period, any excess feed was removed and weighed. Water was made available at all times. Each biweekly increase in weights and daily feed consumption records were taken.

Behavioral observations were started two weeks after the beginning of the experiment. The behavioral patterns observed were lying down, eating, nibbling, drinking, urinating, defecating and walking. The area in the pen preferred for urination and defecation was also noted.

Observation periods were from 8:00 to 11:30 a.m. and 1:30 to 4:00 p.m. with a total daily observation time of six hours. Observations were made every other day with four pigs from each treatment being observed at a time. Each behavior was noted every five minutes. A total of seven observations per treatment were made during the experiment.

Data for production traits were recorded up to the 18th week when pigs in one treatment reached an average liveweight of 86.29 kg. The pigs in all the treatments were weighed at this time. Daily weight gain, feed intake and feed conversion were determined based on the average of the animals found in one pen.

RESULTS AND DISCUSSION

Behavioral Patterns of Growing-Finishing Pigs

The behavioral patterns exhibited by the animals during the growing-finishing period included lying down, nibbling, drinking, urinating, defecating, walking and eating. These activities are discussed in this paper in terms of frequency of occurrence and duration per activity.

Lying down pattern. At different stages of growth, it was shown that pigs fed *ad libitum* at night (T_5) have significantly higher lying down percentage (85.4%) compared to other treatment groups when the animals were 100 to 142 days old (Table 1). Other treatment groups did not show significant differences. As the animals grew older (between 163-202 days), the percentage lying down behavior changed considerably among the treatments. At 163 days, pigs in T_2 to T_5 showed significantly higher percentage values than those in T_1, which were fed *ad libitum* during daytime. At 194 days, growing-finishing pigs fed *ad libitum* at night showed higher lying down activity compared to

Table 1. Effect of different feeding systems on the average percentage and frequency of lying down activity of growing-finishing pigs.[1]

Treatment	Feeding system	Average lying down activity		
		Percentage	Frequency	Duration (min)
1	*Ad lib*. feeding, day	60.1	9.8	31.4
2	Two feedings, 30 min each	67.2	9.0	30.5
3	Two feedings, 60 min each	72.0	9.0	38.6
4	Three feedings, 30 min each	75.8	10.6	40.6
5	*Ad lib*. feeding, night	85.4	5.0	71.1

[1]Data based on seven observations using seven pigs per treatment.

those fed twice daily for 30 minutes. Other treatment means did not show significant differences.

The frequency of lying down activity was significantly lower in animals that were fed *ad libitum* at night compared to those in other treatments. The mean duration per lying down activity was significantly higher among animals fed *ad libitum* at night (T_5). However, increasing the duration of feeding from 30 to 60 min (T3) or increasing the number of feedings from two to three times (T4) slightly raised the percentage lying down activity. This finding suggests that animals fed at night utilize lesser energy in moving. So it could be expected that energy used in moving would be utilized for body metabolism.

Nibbling pattern. Table 2 indicates that animals fed twice for 30 min each (T_2) showed the highest nibbling activity (29.15%) and the highest nibbling frequency (12.38%), while animals fed *ad libitum* during daytime (T_1) showed the lowest percentage (6.85%) and shortest duration (13.41 min.). Increasing the duration of feeding from 30 to 60 min each (T3) or the frequency of feeding from two to three times daily (T_4) appreciably decreased the percentage of nibbling but did not influence nibbling frequency. When feed was available continuously in the pen, the

Table 2. Effect of different feeding systems on the average percentage and frequency of nibbling activity of growing-finishing pigs.[1]

Treatment	Feeding system	Average nibbling activity		
		Percentage	Frequency	Duration (min)
1	*Ad lib*. feeding, day	6.85	6.98	3.41
2	Two feedings, 30 min each	29.15	12.38	8.46
3	Two feedings, 60 min each	19.26	10.33	6.33
4	Three feedings, 30 min each	20.59	11.44	4.38
5	*Ad lib*. feeding, night	12.82	4.38	10.70

[1]Data based on seven observations using seven pigs per treatment.

shortest (3.41 min) duration of nibbling activity was shown by animals fed during the day and the longest (10.7 min) during the night.

During the growing-finishing period, the nibbling pattern observed indicated considerable variations. At age range of 100 to 142 days, pigs fed *ad libitum* once either during the day or night showed similar nibbling activity pattern. However, they showed significantly reduced nibbling percentages compared with those in T_2, T_3 and T_4 pigs, which also showed similar nibbling percentages. In most treatment groups, the highest frequency of nibbling was observed on pigs between 100 to 121 days. Although this activity was variable, its frequency tended to be low, i.e., about 10 times per observation period, when the animals were 163 to 202 days.

The findings showed that animals fed for 30 min per feeding are not satisfied, therefore they seek for more feeds, while animals on *ad libitum* feeding eat when they are not resting.

Drinking pattern. The highest average percentage, frequency and duration per drinking activity of growing-finishing pigs was observed in T_1 while the lowest was observed in T_5 (Table 3).

At 100 days, T_1 and T_4 pigs have significantly higher drinking percentages compared to T_5 pigs. At

121 days, pigs in T_1, T_2, T_3, and T_4 showed significantly higher drinking activity compared to T_5. When the animals reached 142 days, only pigs in T_1 showed significantly higher drinking percentage compared to T_5.

There was no significant difference in drinking frequency among the treatment groups from 142 to 202 days, but the duration per drinking activity was significantly higher among T_2, T_3, and T_4 compared to T_5 pigs.

Urinating pattern. The feeding systems did not influence the urinating pattern of growing-finishing pigs. However, at 142 days, the duration per urination among T_3 pigs was significantly higher than those in T_1. The animals tended to urinate during the first disturbance in the early morning. However, some animals urinated during feeding time.

Defecating pattern. Defecating pattern of growing-finishing pigs was not affected by the different feeding systems. However, significant differences were observed on T_4 pigs at 100 days and on T_2, T_3 and T_4 pigs at 121 days. The animals usually defecated near the door area.

Walking pattern. Like in urinating and defecating activities, feeding system had no significant effect on the walking activity of pigs. However, the percentage and frequency of walking activity was significantly higher between 100 to 121 days in T_2 compared to T_5 pigs. Beyond this age, all treatment groups failed to show significant differences. The findings showed that limiting the feeding period to 30 min each feeding at the growing stage of the pigs tended to increase their walking pattern.

Eating pattern. The percentage time devoted to eating was directly proportional to the age of the pigs up to 180 days. Although the eating percentage decreased at 142 days, the time spent for eating considerably increased at 163 days, then leveled off at 190 days. The eating percentage declined drastically between 194 to 202 days, which could be due to the heavier weight of the animals. Bigger animals usually consumed greater amount of feeds at a shorter period of time.

The frequency of eating activity was inversely proportional to the age of the animals. The eating frequency was highest at 100 days and decreased gradually up to 202 days.

Growth Responses of Growing-Finishing Pigs

Variations on the growth rate pattern of pigs was observed from the eighth to the 18th week of the feeding period, when the animals under two feedings at 60 min each (T_3) showed faster rate of growth than the rest of the treatment groups. Animals in T_3 reached an average of 90 kg liveweight on the 19th week which was two to four weeks ahead of the other treatment groups.

Average weight and daily gain of

growing-finishing pigs. There were no significant differences among treatments on the final weight and average daily weight gain of animals under different feeding systems. However, the data showed that two feedings at 60 min each (T_3) was most favorable since the highest weight gain (70.3 kg) was observed in this treatment. The lowest weight gain of 57.7 kg was observed in T_2.

Feed consumption and feed efficiency of growing-finishing pigs. There were no significant differences among treatments on the amount of feed consumed and feed efficiency of pigs under different feeding systems. Daily feed consumption ranged from 1.62 (T_2) to 2.00 kg (T_3).

Although not statistically significant, pigs in T_3 have the lowest feed intake to produce a unit gain in weight of 3.05 kg. Animals under *ad libitum* feeding during daytime showed the poorest feed efficiency.

Average age at 90 kg liveweight and body measurements. As shown in Table 3, animals in T_3 showed the shortest feeding period of 133 days to reach 90 kg average liveweight. Pigs fed *ad libitum* feeding, whether day or night, took 160 days to reach this same weight, which was the longest period observed. There were significant differences among treatments on the average age of the animals to attain 90 kg liveweight. T_3 pigs were significantly younger than T_1, T_3 and T_5 pigs. Animals in T_3 attained 90 kg liveweight 32, 27, 27, and 16 days earlier than those in T2, T1, T5 and T4 respectively.

Backfat probe measurement. Animals in T_3 had significantly thinner backfat probe than T_2 and T_4 pigs but not significantly different from those in T_2 and T_5 (Table 3).

Table 3. Effect of different feeding systems on the average age to reach 90 kg liveweight and body measurements of experimental animals.[1]

Treatment	Feeding system	Feeding period (days)	Age at 90 kg LW	Backfat probe (cm)	External measurements (cm)		
					Body length	Heart girth	Height
1	*Ad lib.* feeding, day	160	239	2.38	115	100	67
2	Two feedings, 30 min each	155	244	2.85	120	102	69
3	Two feedings, 60 min each	133	212	2.30	117	102	69
4	Three feedings, 30 min each	151	228	2.83	118	103	69
5	*Ad lib.* feeding, night	16	239	2.43	122	100	69

[1] Treatment means with different superscripts are statistically significant at 5% probability level; all others are not; data based on seven experimental animals per treatment.

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