Feeding behavior of crossbred pigs reared intensively in Southeastern Nigeria.

B.I.Odo ^a, S.O Alaku ^a and B.U. Ekenyem ^b

a. Department of Animal Science, Faculty of Agriculture & Natural Resources Management, Enugu State University of Science and Technology, P.M.B 01660, Enugu, Nigeria.

b. Department of Animal Science and Fisheries, Faculty of Agriculture and Veterinary Medicine, Imo State University, P.M.B 2000, Owerri, Nigeria.

Abstract

The in situ feeding behavior of pigs was studied for a period of 18 weeks using 3 different but clinically healthy crossbred pigs of varying genotypes. Results showed that there was no marked difference in the pre-feeding, feeding and post-feeding behaviors of the different hybrids used. Observation of feeding behavior showed that all animals fed (picked feed) very intensively during the first 35 minutes of introduction of feed. Other activities observed include playing/bullying, drinking, wallowing, social and courtship behaviors. Rooting and other behaviors like climbing of pen walls were also observed. There was no significant difference ($P > 0.05$) in time spent during ingestion (picking of feed) between LW x LC and LC x L crosses. However there was significant difference ($P < 0.05$) in time spent during ingestion between LWxLC with LWxL crosses, and LCxL with LWxL crosses. The total feeding time was slightly higher ($P < 0.05$) in LWxL than, either of the other groups. Rooting time was slightly lower in LW x L crosses than in any other group. Total time spent on other major activities like drinking, wallowing, playing/ bullying, social/courtship behaviors was slightly higher ($P < 0.05$) in LWxLC and LWxL than LWxLC crosses. Knowledge of animal behavior is important for improved productivity as well as animal welfare since a deviation from the normal behavior is an indication of ill health.

Keywords: Hybrids; indoor; feeding behavior; southeastern Nigeria.

Introduction

Pig farming has played a very great role in human development through the provision of pork, bacon, lard, manure, employment and

income (Payne, 1990). Its potentialities as an effective provider of meat and other products have been well recognized (Serres, 1992). Various workers (Fetuga *et al.* 1976; Mukiibi, 1983)

stated that these potentialities varies from their high litter size, short generation interval, high fecundity and growth rate to ability for disease resistance, high prolificacy and low capital requirement. These unique qualities of the pig plus the recent increase in price of beef, downward trends in availability of poultry feed and the devastating diseases of poultry (e.g. Avian Influenza) have favoured pig enterprise.

Reported estimate of pig production varies from country to country and from continent to continent. FAO (1999) reported that there are 913 million pigs in the world out of which 58% is found in Pacific region of Asia, 22% in Europe and countries of the former Soviet Union, 11% in North and central America, and 3% in Africa. It is expedient therefore that pig keeping constitutes an important source of protein without which the current human population would not be sustained. Odo *et al* (2000) confirmed the usefulness of the pig in respect of meat supply in old Enugu State of Nigeria. He reported a non-specific trend in pig meat supply with an overall average of $6.5\% \pm 0.46$ during an 8-year period (1988 – 1995).

Pigs also have an advantage on environmental ground (Spore magazine, 2007). They make good use of waste, do not degrade soil and contribute less to the greenhouse effect than ruminants since they give off less methane. When pigs are reared *in-situ*, farmers can collect their dung (slurry) and whether they compose it or not, they can use it to fertilize their land or transform it into biogas with a digester.

Intensive system of pig production is characterized by the fact that the pigs are housed

and fed indoors (*in situ*) on concrete or even earthen floor. Pigs reared in this way grow rapidly and are relatively free from worms and other parasitic diseases (Ositelu, 1981). Also, the arrangement makes for easier management (Joy and Wibberly, 1981).

The pig like other animal species has certain behavioral characteristics that helped to make domestication possible. These are the ability of pigs to feed on the same type of feeds humans feed on, feed on wide varieties of feeds, ability to withstand tropical climate and resistance to major tropical animal diseases. The pig is omnivorous, and therefore, can eat all types of food. It can also graze or chew forage because of its ability to digest fibre to an extent but unlike the ruminants, it cannot live entirely on roughage.

The feeding behavior of animals varies according to species (Paggot, 1992). The simple-stomached animals eat their food slowly, chewing it finely before swallowing it, while animals with fore-stomach swallow forage quickly after chewing it into coarse pieces, then in the course of rumination, they regurgitate the food back into the mouth where it is finely grounded down by a slow but powerful action of the jaw. The possibility of variation in feeding behavior among breeds within a particular species or even crossbreeds cannot be ruled out.

An understanding of animal behavior is essential for those concerned with animal managements. Good knowledge of the behaviors (such as feeding, sexual, maternal and social) of animals will help stockowners to improve the husbandry of their animals, and possibly, their productivity (Xavier and Anthony, 2002). This

study was therefore conducted to find out the feeding behavior of crossbred pigs reared intensively.

Materials and methods

2.1 Location and Experimental area

The experiment was carried out at Onyehalu farm, Enugu, Nigeria. The area lies between latitude 06°26' North and Longitude 07°31' East. It has an annual rainfall which range from 1580 to 1800mm and a mean temperature of 30°C during the very hot weather (February – April) and 22 °C during the coldest period of the year (December – January) (Ofomata, 1975). The vegetation of Enugu encompasses trees, shrubs, herbs, grasses and legumes.

2.2 Experimental animals

The study was conducted with a flock of 15 clinically healthy crossbred pigs in 3 different treatments. This comprised 5 each of large white and local (Lw x Lc), Large white and Landrace (Lw x L), and local and landrace (Lc x L) crosses. The animals were reared under intensive technique of management. They were fed twice daily (morning, 8.00am and evening 4.00pm), with locally compounded feed containing 16% crude protein. They were also indentified by ear notching, and routinely dewormed with Ivermectin. Acaricidal baths were also given before the study started.

2.3 Experimental procedures

A total of 15 crossbreed pigs (5 Lw x Lc; 5 Lw x L; 5 Lc x L) which originated from three

litters born and reared indoor were postpuberally observed before, during and after feeding, once a week, for a period of 18 weeks. This is to monitor the activities exhibited by the different hybrids. Each hybrid group of five gilts (averaging 8 months and 85kg of age and initial body weight respectively) constitute a treatment group.

The pre-feeding observation was undertaken between 7.30-8.30am in their pens while the feeding observation covered the entire period of feeding. This involves monitoring the animals quietly and patiently to observe all activities exhibited by them. Post-feeding behavior was monitored 30 minutes after feeding. The weekly observations were done in two sessions of the days (morning and evening). Other behavioral elements such as attempts to root, social and estrus behaviors were also monitored and recorded for each individual pig within the groups according to Stern and Andresen (2003).

The time spent by each animal in the different groups feeding on the same quantity of feed without walking one full step was also estimated and recorded according to Osolo *et al.* (1994).

2.4 Statistical analysis

All data were subjected to Analysis of variance (ANOVA) in a completely randomized design according to the procedure described by Steel and Torrie (1980). Separation of treatment means were by Duncan's multiple range test (Duncan, 1955).

Results

Table 1 shows the pre-feeding activities of the different hybrids used in the experiment. There was no marked difference in behavior during pre-feeding observation between the treatment groups. All animals were usually seen, lying down, and may or may not be making noise. Some of the animals on sighting the observers would stand up, make noise, play or bully each other, and may later lie down again with or without making noise.

Activities observed during feeding are shown in Table 2. All animals were found picking feed, playing, drinking, and wallowing. Both social and courtship behaviors as well as rooting tendencies were also exhibited. Other behaviors such as climbing of pen walls and lying down with eyes closed or open were noticed.

Table 3 shows the post-feeding activities of the animals. Generally, all animals after feeding, to satisfaction may stand, play around, wallow,

Table 1 Pre-feeding activities shown by the individual pigs *in situ*.

Breeds	Animal no.	Pre-feeding activities
Lw x Lc	1	0, 3, 5, 6, 7
	2	0, 1a, 2, 3, 5, 6, 7, 9
	3	0, 2, 3, 4, 5, 6, 7
	4	0, 2, 3, 4, 5, 7
	5	0, 1a, 3, 4, 6, 7
Lw x L	1	0, 2, 3, 5, 6, 7
	2	0, 2, 3, 5, 9
	3	0, 2, 3, 4, 5, 6, 7
	4	0, 3, 4, 7
	5	0, 3, 4, 5, 6, 7
Lc x L	1	0, 2, 3, 5, 7
	2	0, 3, 4, 5, 6, 7
	3	0, 1a, 2, 3, 4, 5, 7
	4	0, 1a, 2, 3, 4, 7
	5	0, 2, 3, 4, 6, 7

Key: Lw x Lc = cross of large white and local
 Lw x L = cross of large white and landrace
 Lc x L = cross of local and landrace
 0 = lying down making noise,
 1a = bullying

1b = picking feed
 2 = standing and making noise
 3 = lying down and not making noise
 4 = playing
 5 = standing and not making noise
 6 = wallowing
 7 = lying down and sleeping
 8 = estrus behavior
 9 = climbing of wall of pens
 10 = attempting to rot or dig floor

Table 2. Activities shown by the individual pigs during feeding

Breeds	Animal no.	Pre-feeding activities
Lw x Lc	1	1a, 1b, 2, 4, 5
	2	1a, 1b, 4, 10
	3	1a, 1b, 2, 4, 8
	4	1b, 2, 4, 5, 8
	5	1a, 1b, 4, 8, 10
Lw x L	1	1a, 1b, 2, 4, 5, 9
	2	1a, 1b, 2, 4, 5, 8, 9
	3	1a, 1b, 2, 5, 9, 10
	4	1a, 1b, 2, 9, 10
	5	1a, 1b, 2, 4, 8, 10
Lc x L	1	1a, 1b, 2, 9, 10
	2	1b, 5, 8, 9, 10
	3	1a, 1b, 2, 4, 5, 9
	4	1a, 1b, 2, 4, 8
	5	1a, 1b, 2, 4, 8, 10

Key: same as for Table 1.

Table 3 Post-feeding activities shown by the pigs

Breeds	Animal no.	Pre-feeding activities
Lw x Lc	1	0, 2, 3, 5, 8
	2	0, 2, 3, 4, 5, 10
	3	0, 2, 3, 4, 6, 8
	4	0, 2, 5, 6, 10
	5	0, 2, 3, 5, 8
Lw x L	1	0, 2, 3, 4, 6, 10
	2	0, 2, 5, 6, 8
	3	0, 2, 4, 5, 10
	4	0, 2, 4, 5, 6, 8
	5	0, 2, 3, 4, 5, 6, 7
Lc x L	1	0, 2, 5, 6, 8
	2	0, 2, 4, 5, 10
	3	0, 2, 4, 5, 6, 8
	4	0, 2, 3, 4, 5, 10
	5	0, 2, 3, 4, 6, 8

Key: same as for Table 1

Table 4 Mean time (in minutes) $\pm$ SE spent by the three crossbred pigs in carrying out the activities observed during feeding

Observed activity	Lw x Lc	Lw x L	Lc x L
• Picking feed (ingestion)	52.1 $\pm$ 2.44 ^a	63.0 $\pm$ 1.63 ^b	50.2 $\pm$ 2.01 ^a
• Attempting to root or dig floor	8.2 $\pm$ 0.70 ^a	12.7 $\pm$ 0.81 ^b	13.4 $\pm$ 1.22 ^b
• Other activities:			
- Drinking	16.5 $\pm$ 1.82 ^a	20.8 $\pm$ 2.04 ^b	20.6 $\pm$ 2.47 ^b
- Wallowing			
- Playing/ bullying			
- Social and estrus behaviors			
• Passive activities			
- Resting/lying with eyes closed or open	8.7 $\pm$ 1.82 ^a	9.9 $\pm$ 1.3 ^a	7.8 $\pm$ 2.5 ^a
Total time	85.5 $\pm$ 9.02	106.4 $\pm$ 10.69	92.0 $\pm$ 8.17

Means with different letters on same row are significantly different ($P < 0.05$)

attempt to dig soil, lie down with eyes open or closed. There was no marked difference in behavior at post-feeding period between the different groups.

The mean time spent by the different crosses in carrying out the activities observed during feeding is shown in Table 4. There was no significant difference ($P > 0.05$) in time spent during ingestion between Lw x Lc and Lc x L crosses. However significant differences ($P < 0.05$) existed in time spent during ingestion between Lw x Lc with Lw x L crosses, and Lc x L with Lw x L crosses. The Lw x L crosses spent a significantly longer time ($P < 0.05$) picking feed than any of the other groups. There was no significant difference ($P > 0.05$) in the mean time spent in attempting to root or dig soil between Lw x L and Lc x L crosses but was significantly higher ($P < 0.05$) in Lw x L and Lc x L than Lw x Lc crosses. The total time spent drinking, wallowing, bullying and social and estrus behavior was significantly shorter in Lw x Lc crosses than the others.

Discussion

Pre-feeding observation showed a manifestation of similar activities by the 3 different groups of pigs. All pigs were seen lying down with or without making noise. Some animals on seeing the observers will stand, make noise, play or bully each other. These activities are normal signs of good health in animals.

Feeding observation revealed that animals feed intensively as soon as feed was introduced in the first 35 minutes and slowed down suggesting that their food requirements are gradually being met. Animals when served with feed always move inquisitively in search of large feed particles. This is in accordance with the report by Payne (1990) that pigs always search for large particles during feeding. Availability and palatability are major factors determining feeding behavior (Andreson and Redbo, 1999; Odo *et al* 2001) in both outdoor and indoor animals. Another major activity exhibited by all the animals was attempt to root or dig the floor. In addition, the pigs displayed other major activities such as drinking, wallowing, social and

courtship behavior. These are normal signs of good health. There was no significant difference ($P > 0.05$) in the mean time spent rooting between Lw x L and Lc x L crosses but rooting time was significantly higher ($P < 0.05$) in Lw x L and Lc x L than Lw x Lc crosses.

In addition, the pigs displayed other major activities such as drinking, wallowing, social and courtship behavior. The wallowing activity is a major means through which the pigs regulate their body temperature (Xavier and Anthony, 2002) since they generally lack sweat gland and wallow when their body temperature is higher than their thermoneutral zone. The estrus behavior in manifest could be due primarily to the secretion of estrogen which plays the key role in estrus behavior (Wikipedia, 2009). After an overall average time of 94.63 ± 10.7 minutes, all animals rested by lying down with eyes closed or open. This suggest that the cross breeds of pig have an average feeding time of 94.63 ± 10.7 minutes to satisfy their energy requirement especially, when the feed is of good quantity and freely available.

Conclusion

The three hybrids of pigs manifest similar activities during *in situ* feeding. Some of these major activities include picking of feed, playing/ bullying, drinking, wallowing, as well as social/ courtship behaviors. On the average, a period of about 95 minutes is enough for these three hybrids of pigs to satisfy their satiety or appetite for food when reared under confinement.

It is essential for pig rearers to have a good and detailed knowledge of feeding behavior of their animals on confinement. This will help them

to improve on the husbandry of the animals and therefore, their overall productivity. It is also important because animal behavior is closely linked to animal welfare.

References

- Andresen, N. and Redbo, I., 1999. Foraging behavior of growing pigs on grassland in relation to stocking rate and feed crude protein level. *Appl. Anim. Behav. Sci.* 62, 183-197.
- Duncan, D.B., 1955. New Multiple Range and Multiple F-tests. *Biometrics* 11, 1-42.
- FAO, 1999. Quarterly bulletin of statistics, Food and Agricultural Organization of The United Nations (FAO). Rome, Italy.
- Fetuga, B.L., Babatunde, G.M. and Oyenuga, V.A., 1976. Performance of indigenous pigs of Nigeria under intensive management conditions. *Nig. J. Anim. Prod.* 3, 148-153.
- Joy, F.G. and Wilberly, J.F., 1991. Animal Husbandry in the Tropics. Longman Group Ltd, London.
- Mukiibi, J.K., 1983. Agriculture in Uganda. Vol. iv. Livestock and fishery, pp. 58-63.
- Odo, B.I. Omeje, F.U. and Okwor, J.N., 2001. Forage species availability, food preference and grazing behavior of goats in southeastern Nigeria. *Small Rumin. Res.* 42, 163 - 168.

- Oformata, G.E.K., 1975.** Nigeria in Maps, Eastern States. Ethiope publishing House, Benin city, Nigeria, 52 pp.
- Osolo, N.K., Kimthia, J.N., Gachairi, C.K. and Okoye, A.M.,** Abundance food preference and nutrient value of diet in semi-acid lands of east central Kenya. *In : Small ruminant Research and Development in Africa. Proceedings of the African Small Ruminant Research Network UICC, Kampala, Uganda, 5 - 9 December 1994, pp. 231 - 243.*
- Payne, W.J.R. 1990.** An Introduction to Animal Husbandry in the Tropics, 4th Edition, Longman group ltd, London, pp. 626 - 681
- Pagot, J. 1992.** Animal Production in the Tropics and subtropics, First edition, Macmillan, London, 166 pp.
- Spore magazine, 2007.** Pigs. Assets under threat No. 132, pp. 11
- Serres, H., 1992.** In Manual of pig production in the Tropics. CAB International, wallingood pp. 133-134.
- Steel, R.G.D. and Torrie, J.A., 1980.** Principles and Procedures of statistics. A. Biometrical Approach, 2nd edition. McGraw Hill, New York.
- Stern, S. and Andresen, N. 2003.** Performance, site preference, foraging and excretory behavior in relation to feed allowance of growing pigs on pasture. *Livestock Prod. Sci.* 79, 257 - 267.
- Xavier, M.V. and Anthony, J.S. 2002** Livestock behavior, Management and Welfare, Macmillian Publisher.

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