Socio-cultural Characteristics of Educated Small Holder Pig Farmers and the Effects of Their Feeding Practices on the Performance of Pigs in Imo State, Nigeria

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Abstract: Five smallholder piggery farms (A, B, C, D and E) were used to determine the socio cultural characteristics of smallholder pig farmers and the effects of their choice of feeding practices on the performance of pigs during a 14 weeks study period. The farms were categorized into small, medium and large sizes farms, with small farms stocking 70-80, medium 120 – 130 and larger 230-270 pigs. Scheduled interviews were used to elicit information's on socio cultural characteristics of the farmers and their farms. In each farm, six weaner pigs of Large white, Landrace and Duroc breeds were selected on their wearing days and their ages and initial body weights determined. The feeds offered to the weaners were physically characterized for their ingredient contents. Thereafter, representative samples of the feeds were subjected to proximate analysis on the first, seventh and thirteenth weeks of the study. The study revealed that the, small, medium and large sized farms were managed by men aged between 40 and 56 years. Four out of the five had their degrees in agriculture and had farming experiences of 1 to12 years. The farms have been in existences for mostly 12-22 years. Corrugated iron roofing and concrete flooring were common. All the farms utilized palm kernel cake as their major energy feedstuffs, in addition to soy bean, cattle blood, local fish meals and vitamins premix. The mean crude protein values of the feed samples were of similar range (13.49-14.20%), while crude fiber and ether extract values were very high. Calculated metabolizable energy values were also relatively low for growing pigs. There was significance ($p<0.05$) difference in the final body weight of the grower pigs after 14 weeks of feeding across the farms. However, there was no significance ($p>0.05$) difference in weight gain, with farm A, B, C, D and E returning 33.84, 33.72, 32.99, 31 86 and 33.69 kg respectively. The feed conversion ratio across the different farms was 5.0, 4.5, 5.1, 3.9 and 5.0 for farms A, B, C, D and E respectively. The 3.9 feed conversion ratio returned for duroc breed, indicted superior performance of the breed under the feeding and management practices investigated. While growth performance and proximate values of on-farm formulated feeds obtained tended to be lower then those obtained from experimental stations, the educated farmers studied here seemed to prefer their present performance results. There is need to evaluate the production components that drive this choice in order to properly situate pig production and performance in the study area.
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Introduction

A feed of good quality is usually formulated to meet the nutritive requirements of a given class and specie of livestock under specific environmental situation (Iyayi, 2004). Feed represents 55-85% of the total cost of commercial swine production, in most tropical countries (Izunobi, 2006). The economics of feeding pigs apart from depending on availability of feedstuff also depends on competition for the feedstuff between human and other animals found in the same locality (Okoli, 2005). The range of feedstuffs that tropical farmers can offer to their livestock is often less limited, but it is vital that the right feed proportions are fed to the animals. A deficiency of an item in the diet may cause ill-health and hence low productivity (Okoli *et al.*, 2004). For a feed to be regarded as being of good quality, it must contain appropriate levels of carbohydrates, proteins, fats, vitamins and minerals among others. Other secondary considerations include content of anti-nutritional factors and fiber levels (Esonu, 2006). A feed may however contain adequate amount of nutrients in balanced proportions, yet these nutrients may not be available to the animals (Iyayi, 2004).

Many studies have implicated deficiencies of various trace minerals and vitamins, inadequate intake of carbohydrates and protein imbalance as major contributions to poor growth performance in tropical livestock (Lanyasunya *et al.*, 2005; Esonu, 2006; Izunobi, 2006). Availability of these nutrients depends

on their voluntary intake. For this reason, feed intake is one of the most important factors determining both productivity and growth performance of livestock (Lanyasunya *et al.,* 2005). By ingesting sufficient quality feed, the animals will be able to deposit sufficient nutrients in their body to support vital body maintenance processes, growth, milk production and reproduction (Fanimo *et al.,* 2002).

The caloric density of feeds affects the intake of other nutrients in pig rations since monogastrics in general eat primarily to satisfy their energy needs (Esonu, 2006). Inadequacy of calories derived from carbohydrates and fats will therefore affect overall productivity of pigs. Similarly, adequate calorie to proteins ratio has been verified to remarkably affect the physiological well-being, productivity and carcass compositions of animals, especially monogastrics (Ikani *et al.,* 2001).

Serious investigation into local production paradigms of nutrition, diseases, disease treatment and socio-economic aspects of animal husbandry geared towards proper understanding of animal production systems of southeastern Nigeria and proposing of appropriate solutions has been shown by Okoli *et al.* (2001), Okoli *et al.* (2002) Okoli *et al.* (2003), Okoli *et al.* (2004) and Nwodu (2005) to be imperative. Such information does not only promote the development of useful concepts in animal production but also encourages the maintenance of bio-cultural diversity (Okoli *et al.,* 2002).

There is the need to understand the feeding practices of small–holder pig farmers in Nigeria, since recent studies on poultry have revealed some inadequacies in the field (Okoli *et al.,* 2004; Okoli, 2005; Nwodu, 2005). Furthermore, it has been speculated that the involvement of educated or scientific farmers in farming could make significant impact on the farming processes and output of the region and the tropics in general (Okoli, 2005). This is especially imperative now that the world is continually shrinking and becoming truly a global village, and import barriers as well as trade restrictions are being lifted and replaced with a system of production environment certification. This is to ensure that exporting countries have established a minimum of animal production services and an active disease surveillance network required to protect importing countries from the possible introduction of unwholesome animals and their products (Okoli, 2005). In view of this, any effort made, including the development of appropriate production objective driven animal industry is a welcome development.

This paper assesses the socio-cultural characteristics of educated small holder pig farmers and the effects of their feeding practices on the performance of pigs in Imo state, Nigeria

Materials and Methods

The study area: This study was carried out in Imo state, which is situated in the southeastern region of Nigeria. The vegetation is typically rainforest with two seasons, the rainy and dry seasons. The period of rainy season is from the mouth of April to October, while the dry season runs through November to March. The temperature and humidity ranges from 25-30^{0}C and 70 – 80% respectively. Population density of the area ranges from 500 – 2000 person per Km^2 (NNIC, 1991). People in the rural and semi urban areas keep livestock, such as pigs, cattle, sheep, goat and poultry (Agboola, 1979). They also cultivate crops like yam, maize, cassava, cocoyam, and vegetables among others.

Pig production in the area is a combination of semi-intensive and intensive system. The pigs are mainly exotic breeds and their crosses and few indigenous breeds.

The study farms: An informal diagnostic survey was carried out during which the smallholder pig farms in the study area were identified and informed on the nature of the study. Based on the result of the informal diagnostic survey, five farms managed by educated persons were purposively chosen for the study, based on the willingness of their operators to participate in the study. An educated farmer was determined to be a person having formal tertiary education culminating in the award of a diploma or university degree.

The five selected farms were made up of two small, one medium and two large sized farms. In the present study, small size farms were those that stocked from 70 to 80 pigs, medium sized had between 110 and120 pigs, while large sized had from 230 to 260 pigs. The five farms were identified as treatment A, B, C, D and E. respectively, with farms C and D being small sized, A, medium size and B and E, large sized.

Farm A is located at Ihagwa, in Owerri West Local Government Area (LGA). The farm was established in 1983. It is privately operated and has two piggery houses. Farm B is a private farm located at Okpala, in Ngor Okpala LGA. The farm was established in 1994 and has currently seven piggery houses. Farm C is located at Amauzari, in Isala Mbano local LGA. It was established in 2005. It has two piggery houses and is privately operated. Farm D is located at Umuagwo in Ohaji LGA. The farm was established in 1984 and has two piggery houses. Farm E on the other hand is located at Nekede in Owerri West LGA. The pig farm was established in 1994.

Farm data collection: Primary data used in this study were collected through interviews, field observations and measurements. Interviews were carried out orally twice every month at the study sites. The pig farmers were interviewed on their socio-

economic and cultural backgrounds, and their production characteristics among others.

The pig farms were visited twice every month to take production measurements using appropriate measuring instruments such as weighing scale and scale rule. The parameters measured included, daily feed intake of the pigs over a period of 14 weeks. Body weights of young animals were measured using a platform scale (Avery®, England) according to the method previously described by Obikonu *et al.* (2004), while in the case of larger animals, body weights were determined with the aid of a standardized body weight tape.

Other parameters, such as breeds of pigs in the farm, parity status of the dam, birth weight, weaning weight as well as husbandry practices and animal building characteristic and measurements were also recorded.

Growth performance determination: In each farm, 6 weaner pigs were selected for the study of growth performance. The weaning age and weight of the selected weaners were recorded. The feeds offered to the weaners were physically characterized to determine the common feedstuff used in formulating them. Thereafter, representative samples of the feeds were collected on the first, seventh and thirteenth weeks of the study for proximate analysis. At each of the two weekly visits**,** the sub-samples of feed collected were homogenized to make a single representation of the feed sample. They were collected in a clean polythene bags and labeled properly.

Similarly, the daily feed intakes of the animals were determined by weighing the amount of feed offered per day. The experimental animals were also weighed every two weeks and at the end of the 14 weeks period. Weight gain and feed conversion ratio were calculated.

Laboratory analysis: The feeds samples were taken to the Animal Science and Technology Laboratory of the Federal University Technology, Owerri and analyzed according to the methods of (AOAC, 1990). The metabolizable energy values were also calculated with the prediction equation of Morgan *et al.* (1975), based on the proximate composition.

Data analysis: All the quantitative data obtained were subjected to analysis of variance (ANOVA) and where statistical significance was observed, the means were compared using the Duncan Multiple Range Test (Steel and Torrie, 1980).

Results and Discussion

The information in table 1 indicated that the pig farmers were all male with their ages ranging from 40 – 56 years and were educated and married. This is in agreement with the earlier reported of Okoli *et al.* (2004) that in Imo state younger people are not actively involved in piggery or any other type of commercial livestock farming. Most of hired labors in the farms were illiterate. The farms had been in existences for mostly 12-22 years except one that was started the previous years. The two small sized farms had 60 and 75 pigs, while the medium sized has 110 and the two large sized had 207 and 256.

The result in table 2 showed that large white and landrace breeds were mostly preferred by farmers than Duroc breeds. Weaning age ranged from 46- 56 days with the weaned animals weighing between 8.72 and 10.29 kg. The large white and landrace breed had visual weaning size advantage over the duroc and may be part of the reasons why the farmers preferred them. This is in agreement with the reported characteristics of these animals (Devendra and Fuller, 1979).

Table 1: Socio cultural characteristic of the educated farmers

Farms	Age of farmers	Sex	Age of farm	Ed. of farmer	Marital status	No of children	Years of experience	No of pigs	Labor
C	50	M	1	B.Sc / Chart Acct.	Married	5	1	60	self
D	52	M	22	B. Sc Agric	Married	3	5	75	Hired
A	40	M	22	OND Agric	Married	3	5	110	Hired
B	56	M	12	BSc MGT	Married	4	12	207	Hired
E	47	M	22	MSc Agric	Married	3	7	256	Hired

Table 3 showed that all the farms had concrete floor pen. Concrete floor in a piggery house reduces helminthes infestations and makes it easy for cleaning and sanitation (Izunobi, 2006). Corrugated iron sheet was used in roofing most of the farm structures. This has also been observed by Okoli *et al.* (2004), in poultry farms in the study areas. However, when the height of floor to roof is low, radiation heat from corrugated iron roofs have been shown to course heat stress to livestock (Izunobi, 2006). Most of the farms studied provided essential rearing equipment like feeding, drinking and wallowing troughs.

Table 2: Characteristic of the weaner pigs used in the growth performance study

	Farm	No of pigs	Breed	Dam parity status	Weaning age (days)	Weaning weight
SS	C	6	LW	1	56	9.96
	D	6	D	2	49	8.72
Subtotal		12				
MS	A	6	LR	2	46	9.89
Subtotal		6				
LS	B	6	LW	2	56	10.29
	E	6	LR	2	56	10.27
Subtotal		12				
Grand Total		30				

Note: SS = Small size, MS = Medium size, LS = large size, LW = Large white, LR = Landrace, D = Duroc.

Table 3: Characteristics of housing and equipment of small holder farms in Imo State

	Farm	Roof materials	Floor type	Feeding trough	Water trough	Wallowing trough
SS	C	CIS	Concrete	-	+	-
	D	CIS	Concrete	+	+	+
MS	A	CAS	Concrete	+	+	+
LS	B	CIS	Concrete	+	+	+
	E	CAS	Concrete	+	+	+

Key: CIS = Corrugated iron sheet
CAS = Corrugated asbestos sheet
SS = Small size,
MS = medium size,
LS = Large size

Table 4 showed that most of the farms fed their animals twice daily. Twice daily feeding enhances growth and reproduction among other good benefits. This agrees with the report of Fanimo *et al.* (2002) that the methods of feeding greatly influence the feed efficiencies, growth rate, breeding efficiency, carcass quality and the general health of animals. Most of the farms included fodder in the feeding of pigs. Inclusion of fodder plants in the feeding of animals helps to control some disease and supplies essential vitamins and minerals (Okoli *et al.*, 2002).

Table 4: Feeding practices by small holder farms in Imo State

	Farm	Once feeding	Twice feeding	3 time feeding	Fodder
SS	C	-	+	-	-
	D	+	-	-	+
MS	A	-	+	-	+
LS	B	-	+	-	+
	E	-	+	-	+

Similarly, the representation in table 5 implied that PKC is the most common energy feed used by all the farmers. This is probably because PKC is a readily available industrial by-product to the farmers, since Imo state is situated within the palm oil tree belt of Nigeria. Soyabean meal, vitamins and mineral premix and local fishmeal were also in common use. These constitute indispensable feedstuff for profitable intensive production of monogastric animals (Esonu, 2006).

Table 5: Types of feedstuffs utilized by small holder farms in Imo State

	Treatment	Pkc	Sg	Wo	Mo	M	GNC	BM	SBM	LFM	SAA	A.o	VMP	GP	EE
SS	C	+	+	-	-	+	-	+	+	+	-	-	+	-	-
	D	+	-	-	-	-	-	-	+	+	-	-	+	-	-
MS	A	+	+	-	-	-	-	-	+	+	-	-	+	-	-
LS	B	+	-	+	-	-	+	+	+	+	-	-	+	-	-
	W	+	-	+	+	-	+	+	+	+	-	+	+	-	-

Note: PKC = palm kernel cake
SG = spent grain, GNC = Groundnut cake
Wo = wheat offal, LFM = Local Fish meal
MO = Maize offal, VMP = vitamins mineral premise
M = Maize, A O = Anti Oxidant,
SBM = Soya bean meal, SAA; Saturated amino acids.
GP = Growth Promoter, EE Additive enzyme

Table 6 showed the husbandry practices of the farmers. In all the farms, wastes were removed early in the morning since the farmers saw the need to protect their animals from infections caused by contamination with dung (Izunobi, 2006). Medium and large sized farms applied the same type of routine management. Only large sized farms allowed veterinary visits probably because the number of animal they have will be able to pay the cost of veterinary services (Okoli *et al.*, 2002).

Table 7 showed the means of proximate compositions of feed sample collected from farm A, B, C, D and E. The crude protein content of the feed samples was of similar (13.49 – 14.20%). These figures are relatively low when compared with previous published result (Devendra and Fuller, 1979; Izunobi, 2006). The values are normal for the first few weeks of weaning, but do not agree with range of crude protein suggested for growering pigs in the literature (Izunobi, 2006).

Table 6: Husbandry practices by smallholder farmers in Imo state

	Treatment	Intensive	Time removal of waste	Routine mgt	Farm record	Vet visit	Castration	Tail duckling teeth clipping
SS	C	+	Early Morning	DIA	+	-	-	-
	D	+	“	DIA	+	-	-	-
MS	A	+	“	DIAE	+	-	-	+
LS	B	+	“	DIAE	+	-	-	-
	E	+	“	DIAE	+	+	-	-

Note: D = Deworning, I= iron ingection, A = Anitibiotics, E = Ectoparastic control, .

Table 7: Mean proximate composition of feed sample collected from the different farms

Parameters	Farm A	Farm B	Farm C	Farm D	Farm F
DM	92.39±1.46	93.24±0.27	94.48±1.27	93.06±1.77	93.40±0.20
CP	19.34±0.30	14.01±0.72	13.60±0.05	13.49±0.06	14.20±0.04
CF	19.34± 0.07	19.42±0.59	19.12± 0.18	19.37±0.03	19.37±0.66
Ash	2.89± 0.01	3.06±0.13	3.02±0.17	2.98±0.12	3.08±0.08
EE	8.80±0.10	8.73± 0.13	8.83±0.30	8.93± 0.10	9.09± 0.02
NFE	47.54± 0.91	47.69± 1.07	47.24±1.90	47.94± 0.07	46.65± 0.47
ME	1989.33±3.72	2043.5±4.63	1977.38 ±3.19	93.06±1.77	2009.24± 2.46

DM = Dry matter; CP = crude protein; CF = crude fiber; EE = Ether Extract; NFE = nitrogen free extract; ME = metabolizable energy

The crude fiber content was high for monogastric animal like pigs, which means that the proteins are probably locked up in these fiber materials of the feeds and can only be released with the aid of appropriate additive enzymes (Okoli, 2005). Calculated metabolizable energy values of feed were also relatively lower for growing pigs and may also have contributed to the lower growth performance obtained in the present study. The Ether Extract content of the feed sample was very high and would be of benefit to the animals. High fat content can also predispose feedstuff to rancidity. Performance of the grower pigs presented in table 8 showed that weight gains were not significantly ($p>0.05$) difference among the treatments. There were however significant ($p<0.05$) differences in the final body weights among the treatments. Similarly the feed conversion ratio of the animals ranged from the 3.9 recorded in farm D, to 5.1 recorded in farm C. The animals in farm D therefore utilized their feeds better than all the other farms. The lower weight gain of the growers may be due to inefficient utilization of the constitute nutrients in the feed (Fanimo *et al.,* 2002).

Table 8: Performance of the grower pigs at the different farms

Parameters	A	B	C	D	E	SEM
No of animals	6	6	6	6	6	
Initial body weight (kg)	9.89^a	10.29^a	9.96^a	8.72^b	10.27^a	0.21
Feed intake (kg)	2.0	1.8	2.0	1.5	2.0	
Final body weight (kg)	43.73^a	44.01^a	42.95^a	40.58^b	43.96^a	0.55
Weight gain (kg)	33.84	33.72	32.99	31.86	33.69	2.5NS
Daily weight gain (kg)	0.40	0.40	0.39	0.38	0.40	0.1NS
Feed conversion ratio	5.0	4.5	5.1	3.9	50	

ab means within a row with different superscript is significantly difference ($p< 0.05$).
NS: Different between means are not statistically significant.

Table 9 showed breed comparison of the performance characteristics and proximate composition of feeds offered the animals.

The weight gain obtained in the study area agrees with the range reported by Williamson and Payne (1978) and Izunobi, (2006) but did not agreed with the range reported by Orheruata (2001) and Fanimo *et al.* (2002).

The present result also showed that breed that recorded 3.9 feed conversion ratio was Duroc. This result is interesting because most of the farmers showed preference for lager white and landrace breeds over duroc. It would seem from the present study that duroc should be the preferred animal under the type of feeding managements practices in the study area.

Table 9: A comparison of performance of breeds and feed characteristic of growers pigs

Farm	Final weight (kg)	Weight gain (kg)	FCR	CP	ME	Breed.
A	43.73	33.84	5.0	13.49	1989.33	LR
B	44.01	33.72	4.5	14.01	2043.50	LW
C	42.95	32.99	5.1	13.60	1977.38	LW
D	40.58	31.86	3.9	13.49	2041.91	D
E	43.96	33.69	5.0	14.20	2009.24	LR

LW = Large white; LR = Landrace; D = Duroc; FCR = Feed conversion ratio; CP= Crude protein; ME= metabolizable energy

Conclusion

Generally, it would seem from this study that even though the persons involved in pig farming in the study area are educated, accumulated field experiences has tended to tailor their choices of feedstuffs, feeding standard and breed of pigs among others away from official standards approved for tropical environment (Okoli, 2005). While growth performance and proximate values of feedstuff tended to be lower than those obtained from experimental stations, these educated farmers seemed to prefer their present performance results.

There is the need to evaluate the production components that derive this choice in order to properly situate pigs production and performance in the study area.

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