



Effect of Diets on Growth and Reproductive Performances of Growing Pigs Maintained at Farmer's Door

A. A. Devi¹, Deepak Singh¹ and Hemant Kumar^{2*}

¹Krishi Vigyan Kendra, Chandel, ICAR, Manipur Centre-795127, India.

²Krishi Vigyan Kendra, Purnea, Bihar Agricultural University -854327, Bihar, India.

Authors' contributions

This work was carried out in collaboration among all authors. Authors AAD and HK designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors AAD, DK and HK managed the analyses of the study and the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AIR/2019/V18i430095

Editor(s):

(1) Marco Trevisan, Faculty of Agricultural Sciences, Institute of Agricultural and environmental Chemistry, Catholic University of the Sacred Heart Via Emilia Parmense 84, 29122, Piacenza, Italy.

Reviewers:

(1) Tchoffo Herve, University of Dschang, Cameroon.
(2) Doris Chirinos Peinado, Universidad Nacional del Centro del Perú, Huancayo, Perú.
(3) Emmanuel T. D. Mensah, CSIR-Water Research Institute, Ghana.
Complete Peer review History: <http://www.sdiarticle3.com/review-history/46861>

Original Research Article

Received 28 November 2018
Accepted 05 February 2019
Published 11 March 2019

ABSTRACT

Aims: This study was conducted to study the effect of different types of diets on growth and reproductive performances of pigs under village managerial conditions Chandel, Manipur.

Place and Duration of Study: The study was conducted at Krishi Vigyan Kendra, Chandel, ICAR, Manipur Centre between May 2016 to November 2017.

Methods: The present study was carried out on 36 Hampshire crossbred pigs maintained by 12 farm women of Chandel district of Manipur. Each farm women were provided with 3 weaned piglets having 2 females and one male of about 3 months old. Out of which, the 50% (6 family) farm women were maintained their piglets on 40% wheat bran and 60 % rice fermented waste (D₁), whereas pigs of rest 50% (6 family) farm women were maintained on 30 % crushed maize, 30 % rice bran and 40 % rice fermented waste (D₂). The different parameters like body weight at different stage, age at sexual maturity, age at first farrowing, litter size at birth and litter size at weans were determined.

*Corresponding author: E-mail: hemanrdec20@gmail.com;

Results: Analysis of variance showed non-significant influence of diets on weight at various ages. The average initial body weight of piglets mentioned on D₁ and D₂ diets were 16.86 ± 0.25 and 16.75 ± 0.43 kg, respectively which was increased to 52.17 ± 1.86 and 53.56 ± 0.92 kg within three months of experimental period. Sex had significant influence on weight at 4th and 5th months of age. However, males were heavier than females at all the ages under study, the value at 6 months of age were 54.50 ± 1.66 and 52.04 ± 1.30 kg for males and females, respectively. Influence of diet was found to be non-significant on various reproductive traits. The age at sexual maturity, age at first farrowing, litter size at birth and at weaning were found to be 8.45 ± 0.23 and 8.23 ± 0.25 months, 12.95 ± 0.33 and 12.66 ± 0.30 months, 7.58 ± 0.31 and 7.75 ± 0.63 and 7.17 ± 0.13 and 7.42 ± 0.29 in D₁ and D₂ diets, respectively.

Conclusion: The results indicated that the rice fermented waste may be incorporated in pig grower ration upto 60 % level without any adverse effect on their growth and reproductive performance to cut down the cost on pig feed.

Keywords: Growth; pigs; reproduction; rice fermented waste.

1. INTRODUCTION

Pigs are one of the most important animals for smallholders in the North East India. Piggery is a very good and easy source of regular income for the majority of people of Manipur on account of prolificacy, short generation interval, faster growth rate, better feed conversion efficiency, high dressing percentage and low maintenance cost. The people of Manipur considered pork as delicacy on precious occasions and traditional rituals. Pigs play important roles as sources of income. Although every household of rural area of Manipur reared pigs but they could not get economic benefits as they are not aware of scientific management and feeding of pigs.

In spite of pigs being very important for local people's livelihoods, they are mostly still kept in traditional free- and semi-scavenging systems [1]. Only recently have some farmers started to use more managed systems. Pigs are efficient converters of agricultural, horticultural, industrial by products, rice fermented waste etc. [1] into high quality protein. The greatest hurdle in pig farming as the nutritional aspect as 70-75 % of the production cost of pig is its feed consumption followed by irregular or no vaccination and deworming practices resulted into heavy mortality in pigs [2].

Keeping the above facts in view, it was thought desirable to see the effect of two types of locally available cheap diets on most prestigious characters growth and reproductive performance of pigs under regular vaccination, deworming, health coverage etc. This study was aimed to study the effect of different types of diets on growth and reproductive performances of pigs

under village managerial conditions Chandel, Manipur.

2. MATERIALS AND METHODS

Chandel district is one of the 16 districts of Manipur state in northeastern India. As of 2011 it is the second least populous district in the state, after Tamenglong. The District lies in the south-eastern part of Manipur at 24°40' N Latitude and 93°50' E Longitude.

The feeding trial was carried out on two groups of growing Hampshire crossbreed piglets with an objective to examine the effect of following two diets on growth role of piglets and reproductive performance of shows:

Diet 1 (D₁) - 40% wheat bran + 60% rice fermented waste.

Diet 2 (D₂) - 30% crushed maize + 30 % wheat bran + 40 % rice fermented waste.

Few of the households prepared a popular drink from the fermentation of rice which is popular in the state. The residue (rice fermented waste) is fed to pigs as feed which was utilized 60% and 40 % in D₁ and D₂ diets, respectively in present study to cut down the cost on pig feeding.

The twelve farm women families from Chandel district of Manipur were selected to conduct the present experiment. The 12 farm women families were randomly divided into two groups having six in each group.

Each family was provided with three Hampshire crossbreed weaned piglets of about 3 months old comprising of 2 female and one male piglets. Out of two groups, 18 piglets of first group were

maintained on diet 1 (D₁) and another 18 piglets of second group were maintained on diet 2 (D₂).

Health care with regular deworming against parasitic infestation and vaccination against swine fever and foot and mouth disease was provided to all the piglets regularly. Before distribution to piglets all the 12 beneficiaries were exposed for pig farming training through learning by doing for 10 days duration at Pig Breeding farm of Krishi Vigyan Kendra, Chandel. Experimental pigs were weighed at the start of experiment and at monthly interval thereafter with the help of spring balance. Litter sizes at birth and at weaning were also recorded just after the farrowing and at the time of weaning i.e. 2 months of age. All the newly born piglets were injected with iron tonic (Ferities) @ 1 ml deep intramuscular at 3 days and again at 13 days of age to protect piglets growth and mortality due to piglets anemia.

The data collected were compiled and properly tabulated for statistical analysis. The data was analyzed statistically using One-way Analysis of Variance (ANOVA). The data were expressed as Mean±SE. *P*-values less than 0.05 imply significance [3].

3. RESULTS AND DISCUSSION

3.1 Growth Performance

3.1.1 Diet

Analysis of variance presented in Table 1 indicated non-significant effect of diet on body weight at all the ages under study. The average initial body weight of piglets of D₁ and D₂ were 16.86 ± 0.25 and 16.75 ± 0.43 kg, respectively which was increased to 52.17 ± 1.86 and 53.56 ±

0.92 kg within three months of experimental period (Table 2). In this way mean live weight gain in piglets of D₁ and D₂ diets were found to be 35.31 and 36.81 kg, respectively during the whole experimental period of 3 months which did not differ significantly from each other indicating that inclusion of 60 % rice fermented wastes in pig ration has no adverse effects on growth rate of pigs.

Rice and marua fermented wastes had no adverse effect on growth of "T & D" piglets upto 30 % replacement of wheat bran by rice and marua fermented waste [4]. She considered highest of only 30 % replacement of wheat bran by rice fermented wastes [5]. Non-significant effect of replacement of rice polish by 0, 10, 20 and 30% rice fermented waste in Hampshire crossbreed (Hampshire X desi) piglets. Better performance of Japanese quails maintained on rice fermented waste [6]. She got progressive increase in body weight gain with the increase of level of rice fermented waste from 0% to 25 % level.

Performance of pure Hampshire pigs in Mizoram and Nagaland, respectively and found lower body weight to be 43.44 ± 0.22 and 51.10 ± 2.10 kg at 8 months of age, respectively in comparator to present findings in Hampshire crossbreed, (52.86 ± 1.03 kg at 6 months of age) [7,8]. The higher body weight observed during the present study might be due to the better management practices since there was a regular visit of scientists of Krishi Vigyan Kendra, Chandel during the whole experimental period to improve the scientific management practices through appropriate feeding, regular health coverage with proper cleaning of pig sheds and pigs.

Table 1. Analysis of variance showing the effect of sex and diet on growth value of pigs

Sources of Variation	D.F	Weight at			
		3 rd Month		4 th Month	
		M.S	F	M.S	F
Between Sex	1	1.84	0.80 ^{NS}	55.12	5.62**
Between Diet	1	0.11	0.05 ^{NS}	1.36	0.14 ^{NS}
Error	33	2.29		9.80	
Sources of Variation	D.F	5 th month		6 th month	
		M.S	F	M.S	F
Between Sex	1	58.68	12.10**	48.35	1.25 ^{NS}
Between Diet	1	4.69	0.97 ^{NS}	17.36	0.45 ^{NS}
Error	33	4.85		38.68	

NB: NS – Non significant, ** - *P* < 0.01

Table 2. Average weight at different ages various sex and diets

Sex	D ₁	D ₂	Pooled
3rd Months			
Male	17.17 (6)	17.08 (6)	17.13 ± 0.48 (12)
Female	16.71 (12)	16.58 (12)	16.64 ± 0.29 (24)
Pooled	16.86 ± 0.25 (18)	16.75 ± 0.43 (18)	16.81 ± 0.25 (36)
4th Months			
Male	29.17 (6)	28.50 (6)	28.83 ± 0.75 (12)
Female	26.33 (12)	26.08 (12)	26.21 ± 0.67 (24)
Pooled	27.78 ± 0.94 (18)	26.89 ± 0.59 (18)	27.08 ± 0.55 (36)
5th Months			
Male	41.00 (6)	42.33 (6)	41.67 ± 0.83 (12)
Female	38.75 (12)	39.17 (12)	38.88 ± 0.36 (24)
Pooled	39.50 ± 0.47 (18)	40.22 ± 0.70 (18)	39.86 ± 0.42 (36)
6th Months			
Male	54.17 (6)	54.83 (6)	54.50 ± 1.66 (12)
Female	51.17 (12)	52.92 (12)	52.04 ± 1.30 (24)
Pooled	52.17 ± 1.86 (18)	53.56 ± 0.92 (18)	52.86 ± 1.03 (36)

NB: Figures in parenthesis indicate number of observations

3.1.2 Sex

Sex had significance effect at all the ages under study except all 3rd and 6th month of age (Table 1). However, higher weight in male than those of female was recorded at all the ages under study (Table 2). The weight of male and female pigs at 6 month of age were found to be 54.50 ± 1.66 and 52.86 ± 1.03 kg, respectively. It was as per our expectation and majority of workers reported higher weight of male and female in their study.

3.2 Reproductive Performances

3.2.1 Age at Sexual Maturity (ASM)

Tables 3 and 4 indicated non-significant influence of diet on ASM, the value being 8.45 ± 0.23 and 8.23 ± 0.25 months in sows maintained on D₁ and D₂ diets, respectively. Present finding with respect to ASM is almost comparable to those of NRC on pig, Rani, Guwahati [9] who observed ASM to be 65 ± 65 and 270.00 ± 6.15 day in crosses of Hampshire with Ghungharoo and Niang Meghe, respectively.

3.2.2 Age at First Farrowing (AFF)

Analysis of variance (Table 3) and average reproductive performance (Table 4) showed non-significant effect of diet on AFF. The values in D₁ and D₂ diets were 12.95 ± 0.33 and 12.66 ± 0.30 months, respectively. Our finding with respect to AFF is comparable to those of Kumaresan et al (2006) who observed AFF to be 14.23 ± 0.32 and 12.11 ± 2.51 months in cross breeds and Mizo local. However, they recorded higher values of AFF to be 14.88 ± 0.26 months in exotic pigs. It is as per expectation because exotic pigs

matured latter than local and crossbred pigs higher AFF (476.31 ± 10.38 days) in exotic pigs (landrace) [10].

3.2.3 Litter Size at Birth (LSB)

Analysis of variance presented in Table 3 and average reproductive performance presented in Table 4 recorded non-significant influence of diet on LSB. The average LSB (7.58 ± 0.31 and 7.75 ± 0.63) observed during the study is almost comparable to 7.41 ± 0.21 [11] and 8.15 ± 0.08 [12] respectively. Almost similar LSB was also noticed by AICRP on pig located at CAU, Aizwal in different genetic group of pig with range of 6.78 ± 0.64 and 8.50 ± 1.50 [9]. On the contrary higher LSB value of 9.97 ± 0.52 [10] was reported. Higher LSB was also reported [7] in exotic pigs (9.78 ± 0.48) and crossbreeds (10.44 ± 0.59) maintained at Mizoram. NRC on pig. LSB in crosses of Hampshire with Ghungharoo and NiangMegha to be 9.86 ± 0.25 and 6.94 ± 0.61, respectively in Assam [9].

3.2.4 Litter Size at Weaning (LSW)

Tables 3 & 4 indicated non-significant effect of diet on LSW. Almost similar LSW was noticed in D₁ (7.17 ± 0.13) and D₂ (7.42 ± 0.29) diets. Present findings of litter size at weaning is comparatively higher than 5.51 to 6.02 in Hampshire [11], 5.93 ± 1.33 in Landrace [12], 6.52 ± 2.14 and 7.03 ± 1.32 in Landrace and "T & D", respectively [13] and 6.11 ± 0.35 in "T & D" [10] as reported. The litter size at weaning reported were 8.33 ± 0.55, 8.06 ± 0.66 and 5.20 ± 0.66 in exotics, crossbreeds and Mizo locals, respectively [7].

Table 3. Analysis of various showing the effect of diet on reproductive performance of Show

Source of variation	Diet	Age of sexual maturity		Age of 1 st farrowing		Litter size at birth		Litter size at weans	
		MS	F	MS	F	MS	F	MS	F
Between diet	1	0.30	0.43 ^{NS}	0.31	0.43 ^{NS}	0.17	0.06 ^{NS}	0.38	0.29 ^{NS}
Error	22	0.69		0.72		2.96		1.30	

*NS- Non Significant

Table 4. Average reproductive performance of shows maintained on different diets

Parameters	Diets	
	D ₁	D ₂
Age at sexual maturity (Month)	8.45 ± 0.23	8.23 ± 0.25
Age at first farrowing (Month)	12.95 ± 0.33	12.66 ± 0.30
Litter size at birth	7.58 ± 0.31	7.75 ± 0.63
Litter size at weans	7.17 ± 0.13	7.42 ± 0.29

Each value is the average of 12 observations

4. CONCLUSION

The results indicated that the rice fermented waste may be incorporated in pig grower ration upto 60 % level without any adverse effect on their growth and reproductive performance to cut down the cost on pig feed. It improves socio-economical status through better livelihood and nutritional security of rural people by augmenting their income through scientific managemental practices including training through learning by doing at farmer's door. Performance appraisal of improved variety of pigs at their agro climatic conditions also help in planning strategies of their state with respect to pig farming. It also helps in stopping migration of rural people by providing income round the year from pig farming.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

- Phengsavanh, Phonepaseuth, Ogle, Brian, Stür, Werner, Frankow-Lindberg, B, Lindberg, Jan. Feeding and performance of pigs in smallholder systems in Northern Lao PDR. *Tropical Animal Health and Production*. 2010;42: 1627-33. DOI:10.1007/s11250-010-9612-4.
- Available:<http://vikaspedia.in/agriculture/livestock/technologies-for-north-eastern-region/management-practices-for-enhancing-productivity-of-piggery-farm>
- Snedecor CW, Cochran WG. *Statistical methods*. 8thEdn. TL Iowa State University Press, Ames, Iowa, USA; 1989.
- Tirkey RP. Utilization of the mixture of rice (*Oryza Sativa*) and Marua (*Eleusine Coracana*) (80:20) fermented waste in pig grower ration, M.V.Sc. Thesis, Birsa Agricultural University, Ranchi. (Jharkhand); 1998.
- Bhuyan R, Medhi D, Saikia BN, Saika JK. Utilization of rice fermented waste in grower ration of pigs. *Indian Vet. J.* 2005;82:169-172.
- Kujur AST. Utilization of fermented rice waste in Japanese quail ration. M.V.Sc. Thesis, Birsa Agricultural University, Ranchi (Jharkhand); 2010.
- Kumaresan A, Pathak KA, Bujarbarua KM, Das Anubrata. Swine production in Mizoram. Technical Bulletin No. 50. ICAR Research Complex for NEH Region, Mizoram Centre, Kolasib, Mizoram; 2006.
- Karunakaran M, Kumaresan A, Bhatt BP, Bujarbarua KM, Bardoloi RK, Das Anubrata, Nagachan SV. Small holder pig production system in Nagaland. ICAR Research Complex for NEH Region, Nagaland Centre, Nagaland; 2008.
- Anonymous. Annual Report, 2013-14, National Research Centre on Pig, ICAR, Rani, Guwahati (Assam); 2014.
- Singh SK, Devi AA. Performance of reproductive traits in various genetic groups of pigs. *Indian J. Anim. Sci.* 1997;67:1021-22.
- Singh SK, Sharma BD, Singh RL, Dubey CB. Litter traits and pre-weaning mortality in Hampshire pigs. *Indian J. Anim. Sci.* 1989;59:612-14.
- Kumar S, Singh SK, Singh RL, Sharma BD, Dubey CB, Verma SS. Effect of

genetic and non-genetic factors on body weight, efficacy of feed utilization, reproductive performances and survivability in Landrace, *desi* and their half bred. Indian J. Anim. Sci. 1990;60:1219-23.

non-genetic factors of Landrace, Tamworth, *desi* pigs and their crosses on some reproductive characters. Indian J. Anim. Sci. 1992;62:482-84.

13. Mukhopadhyay A, Singh RL, Singh SK. A comparative study on effect of genetic and

© 2019 Devi et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:

The peer review history for this paper can be accessed here:
<http://www.sdiarticle3.com/review-history/46861>