



Up Scaling of Sweet Potato Based Pig Feeding System in Hill Eco-System of Meghalaya- A Case Study

S. K. Baishya^{1,2}, S. K. Ray^{2*}, U. Barua¹, R. M. Bordoloi¹, D. J. Rajkhowa^{1,2}, A. K. Tripathi¹

¹ICAR Research Complex for NEH Region, Umiam, Umroi Road, Meghalaya - 793103

²ICAR Research Complex for NEH Region, Nagaland Centre, Jharnapani-797106

ARTICLE INFO

Article history:

Received 5 November 2017

Revision Received 22 May 2018

Accepted 17 July 2018

Key words:

Feeding system, Hill eco-system, Pig, Sweet potato

ABSTRACT

The aim of the present study was to find out the efficacy of sweet potato based feeding system for pig in order to upscale and promotes in a hill eco-system of Meghalaya. The study was conducted at 16 villages covering 109 farmers under the front line demonstration programme of ICAR-Krishi Vigyan Kendra Ri-bhoi. Three promising sweet potato varieties viz. ST-14, Kokrajhar and Meghalaya local were introduced in the farmers' field to feed 56 numbers of Hampshire cross-breed piglets of 2-3 months age. Piglets were grouped equally into group I and II. The group I was fed with sweet potato tuber and vines (50%) and concentrate feed (50%), and group II fed with local feeding practices. The results of the study revealed that out of the three varieties demonstrated ST-14 was found to be performing well with an average yield of 36 t/ha followed by Meghalaya local (31 t/ha) and Kokrajhar Red (22 t/ha). Significantly higher ($p < 0.01$) body weight gain was recorded in pigs fed with sweet potato based ration than with local feeding ration (32.05 ± 0.50 vs 23.45 ± 0.49 kg) at 6 months of age. In addition, the supplementation of sweet potato (50%) in the pig ration reduced about 65% of total concentrates feed cost. It could be concluded that sweet potato based pig ration could be an economically viable and potential feeding system for pig growers in the hilly ecosystem of Meghalaya.

1. Introduction

Sweet potato (*Ipomoea batatas*) occupies an important place among the root and tuber crops in the hill ecosystem of north-east region of India including Meghalaya. It is due to the rich source of starch, vitamin A, ascorbic acid, thiamine, riboflavin and niacin that sweet potato contained (Nedunchezhiyan *et al.*, 2007). It is also a good alternative for pig rations and nearly half of sweet potato produced in the north-east region is fed to the pigs. (Woolfe 1992). Moreover, the sweet potato was reported to be better than other tubers like colocasia for swine feeding (Yadav and Gupta 1997) in the region. The Ri-bhoi district of Meghalaya has an area of 146 ha under sweet potato cultivation with productivity of 59 q/ha.

It was estimated that the total sweet potato requirement was 10,285 tonnes to feed the total pig population (42,470 nos) in the district for the year 2011-12. There is a deficit of 9,434 tons in the district, which could be achieved by cultivating an additional area of 315 ha of barren/wasteland. The high price of concentrate feed coupled with the poor economic condition of the tribal farmer poses a hindrance for feeding of quality concentrate feed to the pigs which results in poor body weight gain of pigs. However, the cost of concentrate feeding could be reduced by the incorporation of sweet potato in pig ration without hampering the potential growth rate of pig. Moreover, most of the farmers in the hill district are not aware about the scientific feeding and cultivation practices of sweet potato. Considering the about facts, the present study was undertaken

*Corresponding author: sanjayray2006@gmail.com

by ICAR-Krishi Vigyan Kendra, Ri-bhoi, Meghalaya under the front line demonstration programme to assess the efficacy and economy of sweet potato based feeding system over the local feeding practices of pig in order to upscale and promote in the hill eco-system.

2. Materials and Methods

2.1 Location and climate

The present study was conducted at sixteen (16) villages of Ri-Bhoi district of Meghalaya over a period of four years (2009-2013). The district is hilly terrains with elevations ranging of 100 to 1000 meter above mean sea level. It receives an average annual rainfall of 1636.46 mm and temperature ranges from 2 - 12°C during winter and 28-36°C during summer with relative humidity ranges from 54 to 95 per cent.

2.2 Training cum technology demonstration on sweet potato cultivation for pig feed

A total of sixteen (16) numbers of training cum demonstrations on scientific sweet potato cultivation was conducted in 16 different villages of Ri-Bhoi district to popularize sweet potato for pig feeding. Three promising varieties viz. ST-14, Meghalaya local and Kokrajhar red were introduced in the villages covering an area of 4 ha in the year 2009-10. Demonstrations were conducted on the method of selection of vine cuttings with proper criteria as well as method of planting. The importance of pruning of vines after 30-35 days of planting was also demonstrated. A total of 35,650 nos. vine cuttings of three varieties of sweet potato were distributed to 109 pig farmers of 16 different villages of the district.

2.3 Feeding of pig

A total of 56 numbers of crossbreed piglets of 2-3 months age were selected for sweet potato feeding trial. The animals were randomly divided into 2 groups (Group I and II) consisting of 23 piglets per group. The group I was fed with sweet potato tuber and vines (50%) after boiling and concentrate feed (50%) as rice mill by-product, rice polish and wheat bran on dry matter basis, and group II was fed as per the local feeding practices of farmers (fed with rice mill by-product, rice polish, wheat bran, agriculture by-product, kitchen waste, etc.) up to 6 months of age of pigs. The nutritive value of both the rations was analyzed. Animals were reared under an improved version of the typical traditional housing and management system. Health care measures of piglets were taken by ICAR-Krishi Vigyan

Kendra (KVK), Ri-bhoi, Meghalaya as and when needed by the farmers. The body weight of pigs was recorded up to 6 months of age at 30 days interval.

2.4 Statistical analysis

Data obtained in body weight gain were presented as Mean ± Standard error of mean (SEM) and one way of analysis of variance was done to see the significant difference between two groups (Snedecor and Cochran, 1980).

3. Results and Discussion

The result of the present study revealed that out of the three varieties demonstrated ST-14 was found to be performed well with an average yield of 36 t/ha followed by Meghalaya local (31 t/ha) and Kokrajhar Red (22 t/ha). This might be due to the variation in potential yield of varieties as well as variation in soil status and management practices followed by the different farmers.

Table 1. Body weight gain of pig fed with sweet potato feeding and local feeding

Sl. No	Age (months)	Body weight (Kg)	
		Group I (sweet potato feeding)	Group II (local feeding)
1	2	8.25±0.63	8.31±0.54
2	6	32.05 ^a ±0.50	23.45 ^b ±0.49

Means bearing different superscripts (a, b) in row differ significantly at p<0.01

In the present study, the mean body weight gain of pigs at 6 months of age in group I and group II was recorded as 32.05 ± 0.50 and 23.45 ± 0.49 kg respectively (Table 1). Significantly higher (p< 0.01) body weight gain was found in group I than in group II. This might be attributed to higher nutritive value of sweet potato based pig ration than that of pig ration without sweet potato. The analysis of two feeding regimes showed that sweet potato based ration was higher in DM, CP and P % than non-sweet potato supplemented ration (Table 2). The amount of DM and CP intake had a great influence on the body growth rate of pig. The sweet potato tuber in raw form could be fed to swine up to a maximum level of 40% on DM basis and that boiling of tuber could be fed up to 60% level along with good quality vegetable protein (soybean meal) and mineral mixture for economical production (Gupta *et al.*, 2006). Naskar *et al.* (2008) also reported that boiled sweet potato tubers could be fed to the level of 40% of total dry matter intake to the weaned piglet for better growth rate and nutrient utilization, whereas up to 60% of total dry matter intake to grower pig along with good quality protein supplement for better growth performance.

Table 2. Calculated nutrient composition of pig feed (% DM basis)

Type of pig feed	DM	CP	CF	EE	TA	P
Sweet potato tuber and vines (50%) and concentrate feed (50%) as rice mill by-product and rice polish	52.34	15.45	7.56	3.14	8.90	1.25
Local feeding practices of farmers (fed with rice mill by-product, rice polish, kitchen waste without sweet potato)	45.46	10.87	26.90	3.37	18.64	7.99

DM- Dry matter, CP- Crude protein, CF-Crude fiber, EE- Ether extract, TA- Total ash, P-Phosphorous

Table 3 a. Spread of area under sweet potato cultivation.

Spread of the area (ha)	Year	% of adoption	Village
4	2009-10	65	Bangla, Umsariang
8	2010-11	70	Bangla, Umsariang, Umdoh, Byrthih, JaiawPdeng, Kyrdem
15	2011- 13	75	Bangla, Umsariang, Umdoh, Byrthih, JaiawPdengBhoiryombong, Umdihar, Nongthymai, Kyrdem, Umkon, Sanidan, Umsning, Umroi, Pyllun, Sohreblei, Labansaro

Table 3b. Spread of technology

Spread of technology	Primary level	Secondary level
	Intervention (2009 – 2010)	Diffusion (2010 – 2013)
KVK	Farmers (10 nos.) under demonstration	Women SHG (3 nos.)
	Trainee participants (farmers) (89 nos.)	Men SHG (2 nos.)
	Training to veterinary extensionfunctionaries(1 no.)	Regular piggery farmers (105 nos.)

Most of the tribal farmers of the hilly area used to provide poor quality of feed to pigs, which resulted in low body weight gain of pigs. Owing to the high cost of concentrate pig feed and poor economic condition of tribal hill farmers could not afford to supply quality feed to nourish the energy and protein requirement of pig. The farmers were not aware about the quantity of sweet potato supplementation in the ration and method of sweet potato feeding. Realizing this bottleneck, KVK initiated training and technology demonstration programmes to popularize inclusion of sweet potato in the pig ration to attain an optimum growth rate. After demonstration of the technology to the selected farmers, KVK also explained in proper diffusion of the technology through farmers led approach. Being domain by matriarchal society in Meghalaya active women groups were selected for adoption and large-scale diffusion of the practices. Several focus group discussions and meetings were organized for it. Successful farmers were also used as trainers in different subsequent programmes in nearby villages, which helped the spread of area under sweet potato cultivation. (Table 3a and 3b). It was also observed that when farmers gathered knowledge through 'experiential learning' their interest and enthusiasm also sustained for a long time.

Table 4. Economics of sweet potato feeding for pig

Sl. No.	Parameters	Cost (Rs.)
1	Total cost of cultivation of sweet potato for 0.1 ha land in a farmers field Total production of tubers and vines : 2350 + 2700 = 5050 kg Total Dry matter content (considering 30%) = 1515 kg Hence, the total cost to produce 1515 kg dry matter of sweet potato	6950.00 6950.00
2	Cost of production of 1 kg dry matter of sweet potato	4.58.00 (say 5.00)
3	Cost of 1 kg rice polish/wheat bran (present market price in the district)	17.00
4	Hence, farmers saved per kg of pig feed	12.00

In the current study economic analysis of sweet potato feeding revealed that the supplementation of sweet potato (up to a level of 50%) in the pig ration, farmers could save Rs. 12 /kg of feed which was about 65% of the total feed cost without hampering the potential growth rate of pig (Table 4).Through farmer feedback it was found that tuber and vine cuttings are good feed sources for pigs.

The result of growth performance of pigs under this system had motivated other farmers of the village/nearby villages and they were also practicing this system. Presently a total of 105 numbers of pig growers were adopting this practicing. It was also expected that within a short span of time, more number of farmers would follow this system in the hilly ecosystem of the Ri-bhoi district. Finally, it could be concluded that supplementation of 50% sweet potato in pig ration not only increased the body weight gain of pigs, but also reduced the cost of concentrate pig feed; thus sweet potato based pig ration could be a viable feeding system for pig growers in the hilly ecosystem of Meghalaya.

Acknowledgement

The authors are very thankful to the Director, ICAR Research Complex for NEH Region, Umiam, Meghalaya for providing this facility to carry out the research work under Krishi Vigyan Kendra Ri-Bhoi, Umiam, Meghalaya.

References

- Gupta JJ, Bordoloi RK, Reddy PB, and KM Bujarbaruah (2007). Performance of crossbred pigs fed on boiled sweet potato supplemented with soybean meal. *Indian J Anim Nutr* 24(1): 44-46
- Naskar SK, Gupta JJ, Nedunchezhiyan M, and RK Bardoli (2008). Evaluation of Sweet Potato Tubers in Pig Ration. *J Root Crops* 34(1): 50-53
- Nedunchezhiyan M, Byju G, and SK Naskar (2007). Sweet potato (*Ipomoea batatas*L.) as an intercrop in a coconut plantation: growth, yield and quality. *J Root Crops* 33(1): 26-29
- Snedecor GW, and WG Cochran (1980). Statistical Methods, 7thEdn. Iowa State Univ. Press, Ames, Iowa.
- Woolfe JA (1992). Sweet potato: An untapped food resource. New York, Cambridge University Press.
- Yadav BPS, and JJ Gupta (1997). Nutritional evaluation of tubers in pigs. *Indian J Anim Nutr* 14: 61-63