

# Effect of Feeding Button Weed Silage on the Growth Performance of (*Tenyivo* × *Hampshire*) Upgraded *Tenyivo* Pig

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## Abstract

The present study entitled “Effect of feeding Button weed silage on the growth performance of upgraded *Tenyivo* pig” was carried out to study the effect of feeding button weed (*Borreriaarticularis*) silage on twenty upgraded *Tenyivo* pigs. The experimental animals were divided into two groups of ten animals each. The experimental diet consisted of T1 – 100% conventional feeds and T2 – 80% conventional feeds + 20% button weed silage. The animals were reared under a standard management housing system. The recorded average body weight at ten weeks for T1 and T2 was  $10.97 \pm 0.75$  kg and  $10.46 \pm 0.71$  kg, respectively with no significant difference ( $P \geq 0.05$ ). The average daily gain (ADG) for T1 and T2 was 171.53g and 149.99g respectively. Statistical analysis (*t*-test) showed no significant difference ( $P \geq 0.05$ ) in the second, third, fourth, sixth, seventh, eighth, and tenth weeks however, a significant difference ( $P \leq 0.05$ ) was observed in the first, fifth, and ninth weeks. Feed consumption was significantly higher in T1 as compared to T2. The average feed conversion efficiency (FCE) recorded in T1 and T2 was 2.39 kg and 2.54 kg respectively, with no significant difference ( $P \geq 0.05$ ). The benefit-cost ratio in the group replaced by 20% button weed silage was 1:1.28 with net returns of ₹ 1146.35 and ₹ 1017.28 in the respective treatment groups.

**Keywords:** Button Weeds (*Borreriaarticularis*) Silage, Conventional Feed, Feed Conversion Efficiency, *Tenyivo* Pig

## Introduction

Pigs are known as valuable converters of inedible feeds into nutritious meat and are commonly reared in pens by village farmers as an alternative source of livelihood income. Pork consumption in the world holds a record of 110 million metric tonnes (MMT) and China had about half of the world's pork production, followed by the USA and Germany as the second and third largest in pork production holding a record of 50 MMT, 10 MMT, and 5 MMT, respectively (McGlone, 2013). According to All India 20th livestock census (2019), pigs constituted about 1.7 percent of the country's livestock with a record total pig population of 9.06 million where total exotic/crossbred pigs accounted for 1.90 million and total indigenous/non-descript breed accounted for 7.16 million.

Pig production in India constitutes about one percent of the world's pig population and the piggery sector is largely owned by small farmers and landless laborers. The majority of pigs in India are reared in traditional small-scale and subsistence production systems utilizing low-input feeding systems that provide value-added output for farmers by converting feed unfit for a human that would otherwise be lost. Smallholder pig farming systems improve livelihood and food security for the people living in rural areas with fewer facilities. In addition, from providing protein for human consumption, pigs are often one of the main sources of cash income in rural areas and provide manure for crop cultivation.

Pig rearing is considered as an integral part of the farming system of almost all the tribal populations of the North Eastern region of India. About seventy percent of the pig population is reared under a traditional smallholder, low-input demand-driven production system. Over one-quarter of the pigs in India (3.8 million) are found in the North-East region, which bears testimony to the importance of pig rearing in the Livelihood systems of farmers (Zaman *et al.*, 2015). The North Eastern accounted for the highest consumption of pork with Assam having the highest pig herd of 2.10 million (20<sup>th</sup> Livestock Census, 2019). Pig keeping had been an important part of the culture in tribal communities of Assam and Nagaland where pigs were reared in the backyard. Due to the increased demand for pork and the rise in price, pig rearing played a significant role in the income generation of the people. Smallholder pig-rearing communities of tribal India are benefited from pig farming as it provides nutritional and financial benefits as well as conversion of household wastes into manure for agricultural crops (Chauhan *et al.*, 2016). A total of seven breeds of pigs had been registered by ICAR- NBAGR, Karnal, India wherein four breeds were registered from the North Eastern region of the country viz. *Niang Megha*, *Tenyivo*, *Doom*, and *Zovawk* (Talukdar *et al.*, 2019) from Meghalaya, Nagaland, Assam, and Mizoram respectively.

In Nagaland, pig rearing is practiced under a low-input production system where non-conventional feed resources contribute the majority of the feedstuffs offered to the animals. Small landholders in Nagaland are adopting more profitable and less labor-intensive backyard pig production to increase cash returns and accumulate capital in banks (Moanaro *et al.*, 2011). The pig population in Nagaland as per the 20<sup>th</sup> Livestock Census (2019), was 11,785 of which 2, 07,090 are crossbreds and 4, 04,695 are indigenous. Nagaland is considered the highest importer and consumer of pork in the country which provides prospects for a promising sector for piggery enterprise.

Availability, accessibility, and affordability of quality feed remain major constraints for pig rearing and utilization of conventional feed ingredients is not economical for small-scale farmers because of its high cost. Since feed is the single most important factor that determines the productivity and profitability of pig production, identifying and utilization of locally available low-cost feed resources can be well-targeted interventions to improve pig production and bring significant livelihood benefits for tribal and other marginalized pig-rearing communities in the region. Hence, constant efforts are being made to explore new and alternative feed resources which are being evaluated for their optimum inclusion and utilization.

Button weed (*Borreriaarticularis*) originally native to the temperate and tropical Asia regions is an annual herb found in the forest of Nagaland. The plant mainly available in the autumn season contains 16.81% crude protein (Padmakumar *et al.*, 2015) where leaves and stems of the plant are used as non-conventional feeds for pigs by the farmers. Button weed silage can be made for long-term storage and utilization as low-cost feed for pigs. Silage of the end product of fermenting high moisture crop containing 40-80% water and storing the product is called ensiling. The process is carried out under acidic conditions with a pH of 4-5 in order to retain the nutrients and palatability for pigs for consumption. Silage feeds can be stored around the year even during the lean season which is an advantage for pig farmers utilizing the available rich fodder crops.

## Materials and Methods

The study entitled “Effect of feeding button weed silage on the growth performance of upgraded *Tenyivo* pig” was carried out to study the effect of feeding button weed silage on body weight, growth rate, feed intake, feed conversion efficiency, and the economics of rearing pigs. The materials and methods used for the study are given under the following sub-headings:

### **Experimental Diet**

Standard conventional feed containing eighteen percent (18%) of crude protein was followed as prescribed by Bhat *et al.* (2010). The concentrated ration consisted of feed ingredients viz. wheat bran, grounded maize, groundnut oil cake, fish meal, common salt, and mineral mixture. The compounded feeds were freshly prepared manually on the farm and go down once a week

### **Treatment and Feeding**

The conventional feeds were provided to the T1 group at 2000g per day i. e. 1000g in the morning and 1000g in the evening during the initial stages of the experiment and steadily increased at the rate of 200g at weekly basis. While Button weed (*Borreriaarticularis*) silage was given at the rate of 20% (400g) along with 80% (1600g) of concentrated feed i. e. 800g concentrated + 200g silage in the morning and 800g concentrated + 200g silage in the evening for the T2 group and was increased by 50g of button weed silage on weekly basis. The quantity of conventional ration and ensilage feeds supplied to the experimental animal groups were distributed as follows:

T1- Ten weaned piglets fed with 100% concentrated feed.

T2- Ten weaned piglets fed with 80% concentrated feed + 20% Button weed (*Borreriaarticularis*) silage.

The experimental piglets were fed twice daily once during the active period in the morning 07:00-08:00 hours and the second feeding was given in the afternoon 15:00-16:00 hours. Clean drinking water was provided ad libitum throughout the experimental period.

### **Statistical Analysis**

The data collected were statistically analyzed to interpret the results and to derive a conclusion. The data so obtained were statistically analyzed by using paired T-test as described by Snedecor and Cochran (1994). All statistical analysis were performed using Microsoft excel. The level of statistical analysis was defined at a 5 % level of significance.

## Results and Discussion

The present study entitled “Effect of feeding button weed silage on the growth performance of upgraded *Tenyivo* pig” was undertaken using twenty experimental animals ranging from 42 to 60 days of age which were divided into two treatment groups. The experimental diet consists of T1 - 100% conventional feeds and T2 - 80% concentrated feed + 20% Button weed (*Borreriaarticularis*) silage. Data on body weight, average daily gain, feed intake, and feed conversion efficiency. The economics of production was calculated to find out the profit and loss. The findings from the study were discussed in this chapter under the following sub-headings:

### **Growth Performance**

#### **Body Weight**

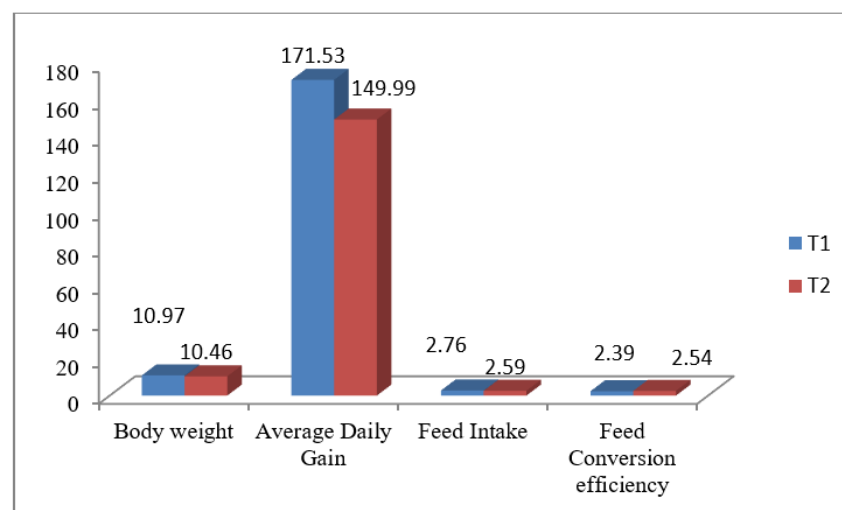
The average initial body weight at the onset of the experiment was recorded as 5.64kg and 5.92 kg for the treatment groups T1 and T2, respectively. The corresponding average body weight at the end of the experiment was 17.65 kg and 16.42 kg for the T1 and T2 groups, respectively. Statistical analysis indicated no significant difference ( $P \geq 0.05$ ) between the treatment groups. The results were in conformity with the findings of Dang *et al.* (2010) who reported the that weight of pigs did not vary among the treatment groups replacing commercial feed with sweet potato silage.

### Average Daily Gain (ADG) in Body Weight

The average daily gain (ADG) in body weight for groups T1 and T2 recorded was 171.53 g and 149.99 g, respectively. Statistical analysis showed no significant difference ( $P \geq 0.05$ ) between the treatment groups which was in conformity with Dang *et al.* (2010) and Seshoka *et al.* (2020) who had reported no significant difference in growth performance in silage-fed treatment groups. The findings were in line with the reports made by Moanaro *et al.* (2011) who had recorded similar daily weight gain when non-conventional feeds were offered to local pigs. However, a significant difference was observed in the first week, fifth week, and ninth week with recorded values of  $99.69 \pm 6.52$  g,  $156.90 \pm 8.08$  g, and  $210.70 \pm 8.41$  g respectively. The T1 group showed a higher daily gain in body weight and agreed with the findings of Kennedy and Sherne (1980) who had reported a low growth rate in pigs when fed with non-conventional feeds as compared to conventional feeds. Similar results were made by Wallenbeck *et al.* (2014); Lule *et al.* (2017) and Akerfeldt *et al.* (2018) who reported that groups fed commercial feeds showed higher weight gain than silage-fed groups. The difference may be due to type of breed used and the variation in the management system.

**Table 1:** Means + SE of feeding button weed silage on the growth performance of upgraded Tenyivo pig.

Traits	Growth performance of upgraded Tenyivo pig (gram)	
	T1	T2
Body weight	10.97±0.75	10.46±0.71
Average Daily Gain	171.53±7.20	149.99±4.08
Feed Intake	2.76±0.01	2.59±0.01
Feed Conversion efficiency	2.39±0.13	2.54±0.09



**Figure 1:** Show feeding button weed silage on the growth performance of upgraded *Tenyivo* pig.

### Feed Intake

The average feed intake recorded for the T1 and T2 groups was 2.76 kg and 2.59 kg, respectively. Statistical analysis indicated a significant difference ( $P \geq 0.05$ ) between the treatment groups. Feed consumption increased in all the treatment groups from the first week to the tenth week. Feed intake increased from  $1.17 \pm 0.01$  kg in the first week to  $4.35 \pm 0.03$  kg in the tenth week. A similar trend was observed in treatment two with feed intake starting from  $0.96 \pm 0.02$  kg and  $4.19 \pm 0.04$  kg in 1st week and 10th week respectively. The findings were in line with Loc *et al.* (2000) who reported similar feed intake.

### Feed Conversion Efficiency (FCE)

The average feed conversion efficiency (FCE) was recorded as 2.39 and 2.54 for the respective treatment groups. Statistical analysis did not show any significant difference ( $P \geq 0.05$ ) between the treatment groups.

## Economics of Pig Rearing

The total cost of production was Rs. 3860.65 and Rs. 3637.52 for the T1 and T2 groups, respectively. The total receipts from the sale of pigs, manure, and gunny bags were Rs. 5007.00 and Rs. 4654.80 in the two treatment groups, respectively. The net return was Rs. 1146.35 and Rs. 1017.28 for the T1 and T2 groups, respectively. The Benefit Cost Ratio is 1:1.30 and 1:1.28 in the respective treatment groups. The result findings were in line with Moanaro *et al.* (2011) who had reported a benefit-cost ratio of 1:2.52 when pigs were offered non-conventional feed resources. The cost of feeds was observed to be lower in T2 as compared to the T1 group. Similar reports were made by Loc *et al.* (1997); Singh *et al.* (2008); Moanaro *et al.* (2011); Nguyen *et al.* (2011); Kambashi *et al.* (2014) and MarsyAsindu *et al.* (2019) that feeding non-conventional ensiled feeds to pigs can be economically efficient and could facilitate in lowering the feed cost.

**Table 2:** Economics of Rearing Upgraded Tenyivo Pigs in Two Treatment Groups

Sl. no.	Particulars	Treatment groups	
		T <sub>1</sub>	T <sub>2</sub>
1.	Cost of piglets (Rs.)	2500.00	2500.00
2.	Cost of feeds (Rs.)	1115.65	892.52
3.	Miscellaneous cost (Rs.)	15.00	15.00
4.	Cost of labour (Rs.)	230.00	230.00
5.	Total cost of production (Rs.)	3860.65	3637.52
6.	Final body weight (kg)	17.65	16.42
7.	Sale of pig @Rs.280 per kg live weight	4942.00	4597.60
8.	Sale of manure (Rs.)	50.00	50.00
9.	Sale of gunny bags @Rs.5/bag	15.00	7.20
10.	Total receipt (Rs.)	5007.00	4654.80
11.	Total profit (Rs.)	1146.35	1017.28
12.	Profit ( Rs./kg live weight)	64.95	61.95
13.	Benefit Cost Ratio	1.30	1.28

## Conclusion

Upgraded *Tenyivo* pigs under an intensive housing system have the potential the development of sustainable pig farming in North East India. The present study recorded suitable daily gain and better feed conversion efficiency under Nagaland environmental conditions. Pigs serve as a valuable source of protein, vitamins, and minerals and an important income source for the rural mass. The results generated from the study could support developing further research and aim to improve swine production and reproduction sector enhancing economic benefits for the farmers in particular and the country as a whole.

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## Contribution by Authors

Equal contribution

## Conflict of Interests

There is no conflict of interest.

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