



Performance of Philippine Native Pig Fed with Ensiled Pongapong

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Abstract:

Native animals are regarded as an essential component of most agricultural production systems in rural settings. *Amorphophallus campanulatus* can be used as food and animal feed, however its application is limited due to its high oxalate concentration and low crude protein level. Fermentation with oxalolytic bacteria, such as *Bacillus subtilis*, which produces the oxalate decarboxylase enzyme, has been utilized to boost the nutritional value of pongapong.

This study aims to determine the growth performance of native pig fed with fermented pongapong as feed supplement. Specifically, to determine the effect of fermented/ensiled pongapong on the body weight-gain in weight, growth increment, feed conversion efficiency and feed conversion ratio on Philippine native pigs; determine the best level of silage pongapong to growth of Philippine Native pigs; determine the nutrient composition of fermented *Amorphophallus campanulatus*; and determine the economics of fermented pongapong as feed supplement for native pigs in one production cycle. The Complete Randomized Design (CRD) was utilized in the study. The treatments were follows: T1=Formulated feeds, T2=75% Formulated feeds + 25% silage AC, T3=50% Formulated feeds 50% silage AC, T4=25% Formulated feeds + 75% silage AC, T5= Pure ensiled AC.

Based on the analysis of variance shows insignificant among the treatments as to the initial weight, feed conversion efficiency and growth rate. Also, there are significant differences in the body weight, gain weight and feed conversion ration while it shows highly significant feed consumption throughout the duration of the study. Thus, 75% formulated feeds and 25% fermented *pongapong* and 50% Formulated feeds + 50% fermented *pongapong* results to best growth. It demonstrates that feeding native pigs with formulated feed including fermented pongapong was employed as an alternative diet that is potentially cost effective and useful in native pig production in the province. This information could help growers reduce feed costs.

Keywords: *Pongapong, Growth Performance, Silage Pongapong, Native Pigs, Bacillus subtilis.*

Introduction

Native pigs are characterized by their distinct black color, although it is not uncommon to see breeds with white, red or black spots. Both the sow and boar have an average weight of 40-60kg.

It is low capital requirement. They are easy to raise and are highly adaptable to local conditions. In addition, native pigs can thrive under low management system and does not required a full management like synthetic breed of swine, feeding of local feed sources and simple



management practices it will survive. Their taste appeals to consumers refers mostly delicious compare to hybrid breed of swine which adds to their marketability. The average litter size to 5-8 piglets are produced per farrowing. Aggressiveness of the sows as sign for their care on their young and newly born piglets have natural antibodies against common diseases and parasites.

Native animals are considered as an important component of most agricultural production system in the rural areas for the reason they can survive in a natural environment as they feed on readily available forage on their surroundings. they also provide a high quality protein of food and source of livelihood to rural people.

Native pigs is known to be sturdy and are more resistant to any various diseases. They can survive on kitchen leftover and farm-by product. Good nutrition is necessary for growth, body maintenance and the production of meat and milk. It can use locally available feeds that are less expensive, but can be nutritionally complete when properly prepared such silage. It can be fed well using only kitchen scraps from a family's household. The 6 basic nutrients needs of pig mainly are water, carbohydrates, fat, protein, vitamins, and minerals.

Good feed is necessary for growth, body maintenance, meat production and milk production. Using of readily and expensive locally available feeds on the market can be nutritionally complete. Many feeds are produced by the feed milling industries which provide adequate nutrition to animals.

On the other hand indigenous feedstuff such farm left over is also a common feed source for local livestock raisers. Rapid decrease in food production was observed today due to minimal movements of farmers cause by the pandemic. Many farmers are conducting experiment on the lookout for any alternatives source of feed in uplifting their economic condition. The escalating cost of feed resource is fast becoming prohibited to livestock raiser. This problem to us the direct efforts of optimizing the potential of these locally available feed materials.

Elephant foot yam (*Amorphophallus campanulatus*) locally known as pongapong. This type of yam is a good source of minerals and has a high caloric content. Thus, the elephant foot yam can be utilized as food or feedstuff because of its anti-nutritional value, it must be processed before consumption. The plant is herbaceous which is a native crop of South Asia that is widely distributed in Malaysia, the Philippines, Bangladesh, Indonesia and Southeast Asia. This plant has a low rate of production and underutilized crop in the country. This is not cultivated (it is wild plant), which is the cause of its low productivity.

Amorphophallus campanulatus is an aracea plant that wild grown (Widodo *et.al.*, 2014). The nutrient composition of AC tubers meals contains calcium 50mg/100g (0.05%) and 34mg/100g (0.034%) phosphorus (Ravi *et al* 2009). 7.56% protein, 0.29% crude fiber (Gumilar *et al*, 2011). The metabolize energy of Pongapong was reported by (Koni *et al*, 2017) to be 3570.60 Kcal/kg. Feed stuff containing high oxalate has negative effects such as reduced calcium absorption and reduced growth rate. Therefore, to increase the pongapong proportion in livestock feed, it is necessary to improve the nutrient content and reduce the oxalate content. Fermentation by *Bacillus subtilis* can eliminate oxalate from feed stuff, as this microorganism can produce the oxalate decarboxylase enzyme.

Amorphophallus campanulatus is commonly grown in mountainous and forest areas. This appeared during the wet season from June to December. Elephant foot yam tubers are usually eaten as vegetables after boiling. The tubers have been used as traditional food sources in Malaysia, Philippines, Bangladesh, Indonesia and India as traditional medicine and animal feed. Elephant foot yam tubers contain Phosphorus (34 mg/100 g), calcium (50 mg/100 g), vitamin A (434 IU/100g, crude protein (2.14%), fat (0.46%), calcium (32.1 mg/100 g) and crude fiber (1.68%). The tuber also contains anti-nutrient factors, such as oxalate and phytate. The level of oxalic acid in the elephant foot yam is 1.3%. The nutrient compositions of elephant foot yam tubers vary according to where they are

grown, the soil, the season, the water, and climate situations. The plant will be utilized as feedstuff to lessen the cost of production of native pig growers.

One of the efforts to reduce oxalate content in *Amorphophallus* sp tubers was fermentation using microorganisms that can degrade oxalate. Anaerob fermentation on taro reduced the concentration of soluble and insoluble oxalates over the 21-day fermentation period (Hang *et.al.*, 2018). Some bacteria can degrade oxalates such as *Bacillus subtilis* (Burrell *et.al.*, 2007). Five days of fermentation with *Bacillus subtilis* in *Phaseolus lunatus* can reduced the oxalate content by 70.81%, decline from 1.61 mg/g before fermentation to 0.47 mg/g after fermentation (Tope 2014). Fermentation was expected to degrade and decrease oxalate content in *Amorphophallus* sp., considering it to be utilized as an ingredient in native pig feed stuff.

Some growers will collect the plant and tubers as feedstuff for native pigs in the province. This was done by cooking the plants and tubers before feeding. This study aimed to help native swine raisers minimize feed expenses by having these cheap, locally available feedstuffs as an alternative to the expensive commercial feeds. Hence, this study would like to convert indigenous feedstuff into its valuable form to reduce the oxalate compound of the plants and tubers by utilizing a microorganism to readily available stuff.

Materials and Methods

Materials

The following materials were used in the study: sixteen (16) heads of native pigs, Pongapong (*Amorphophallus campanulatus*) feedstuffs, feeding troughs, weighing scale, layout materials (straw/string, tape measures), housing (cyclone wire, roof), crowbar, bamboo, air tight drum, record book, and camera.

Methods

Weighing of Pigs

After getting the initial weight of the pigs, monthly weighing was done throughout the duration of the study. The experimental pigs were weighed using the hog weighing balance before feeding them in the morning.

Site Selection

A total area of 96 square meters were used in the study. It was located at Sitio Malmaliga Brgy. Nagtipulan Lagangilang Abra. The area was cleaned and cleared and ready for building a housing for experimental animals. After cleaning, the area was laid-out and followed the different treatments per pigpen. Bamboo sticks and string was prepared as the markers in identifying the edges of different treatments.

Experimental Design and Treatments

The Complete Randomized Design (CRD) was utilized in the study. The treatment are as follows:

T1= Formulated feeds

T2= 75% Formulated feeds + 25% silage

T3= 50% Formulated feeds + 50% silage

T4= 25% Formulated feeds + 75% silage

T5= Pure ensiled AC

The Experimental Animal and Housing Facilities

A total of twenty (20) piglets weighing 6-12 kilograms from native raisers in the Province of Abra were used in this study. The piggery house was made up of hog wire walling as fence, with a dimension of 3m x 1.5 m per pen with feeders. The experimental animals were fed twice a day, at 6:00 am and 4:00 pm and clean drinking water were provided at all times throughout the duration of the study.

Harvesting of a Feed Stuff Source Pongapong (*Amorphophallus campanulatus*)

During the harvesting period (August-December 2022), Pongapong (*Amorphophallus campanulatus*) are abundant in mountainous areas of Abra for its rainy season. Collecting and

hauling was done by cutting the whole plant from the stem. The plant was collected at early morning to prevent the freshness and juiciness of the substrate.

Preparation of Pongapong (*Amorphophallus campanulatus*)

In preparing the (*Amorphophallus campanulatus*), slice the pongapong into small pieces by using a bolo for easy fermentation. Fermentation was done by storing slice pongapong to a sealed container within 7 days in order to ferment and eliminate the oxalate compound of substrate. After 7 days of fermentation, the substrate was utilized as feed supplement.

Process of Making a Substrate

Pour a small amount of nutrient broth in a petri plate and let it be solidified. Isolate the bacillus subtilis in the nutrient broth and seal it with para film to avoid contamination. The prepared pure culture medium for bacillus was placed in an incubation cabinet for 7-14 days. Weigh a 500 grams of rice bran and put in a PVC plastic sheet. Tie it properly. Sterilize the substrate for 1 hour and 30 minutes PSI to avoid contamination. Materials were prepared for inoculation. Bring the pure culture specimen and the substrates in the laboratory. Open the substrate near the alcohol lamp and inoculate an amount of *B.subtilis*. Incubate the inoculated substrates for 7-14 days. After 14 days of incubation, the substrates were mix in the formulated feeds.

Preparation of Formulated Feeds

The feedstuff were used in the study were purchased at ADTEMPCO Cooperative located Mt. Carmel, Pidigan, Abra.

The feedstuff was used the following: rice bran D2, fish meal, limestone, fish meal, salt, corn bran, soybean meal, molasses, enzyme, lysine, methionine, dicaphos, toxin binder and *Amorphophallus campanulatus* Green feeds also given in between of their meals of formulated feeds.

Feeding Management

The formulated feeds + fermented *Amorphophallus campanulatus* following the treatment are given to the native pigs in a semi-

adlibitum and wet feeding. Pigs were fed twice a day at around 6:00 am and 6:00 pm. Green feeds were given to pigs between meals to helps in their digestion.

Water Management

Water were provided to the experimental pigs after feeding to prevent from dehydration. The water was readily available in the site to prevent from heat stroke.

Health, Sanitation and Biosecurity

All experimental animals followed strict quarantine protocols and sanitation practices when there is downer animal. The animals were subjected for quarantined for fifteen (15) days to make sure the experimental animal become healthy and it will not transmit the disease to the other animals. During the quarantine period, deworming and vaccination were also administered to enhance the immune system of the animals.

Cleanliness of the experimental area and its surroundings were observed as well as the proper manure management to prevent from housefly.

Statistical Analysis of Data

The data were organized, tabulated and analyzed using the analysis of variance (ANOVA) in determining the level of significance following the Complete Randomized Design (CRD). The Least Significant Difference (LSD) test was used to determine the significant difference between treatments.

Results

The study was conducted to determine the growth performance of native pig fed with fermented pongapong as feed supplement. It was conducted from April, 2023 to June, 2023 . The native pigs were collected in Barangay Cabarruan and analyze at Sitio Malmaliga, Brgy. Nagtipulan, Lagangilang, Abra.

The objectives were a) determine the effect of fermented/ensiled pongapong on the body weight-gain in weight, growth increment, feed conversion efficiency and feed conversion ratio

on Philippine native pigs; b) determine the best level of silage pongapong to growth of Philippine Native pigs; c) determine the nutrient composition of fermented *Amorphophalus campanulatus*; and d) determine the economics of fermented pongapong as feed supplement for native pigs in one production cycle. Complete Randomized Design (CRD) was utilized in the study. The treatments were T1=Formulated feeds ,T2=75% Formulated feeds + 25% silage AC ,T3=50% Formulated feeds + 50% silage AC, T4=25% Formulated feeds + 75% silage AC, T5= Pure ensiled AC.

During the conduct of the study the initial weight, feed conversion efficiency and growth rate shows insignificant among the treatments. Also, in terms of body weight, gain weight and feed conversion ration revealed significant differences while it shows highly significant feed consumption throughout the duration of the

study. Thus, 75% formulated feeds and 25% fermented *pongapong* and 50% Formulated feeds + 50% fermented *pongapong* results to best growth. It demonstrates that feeding native pigs with formulated feed including fermented pongapong was employed as an alternative diet that is potentially cost effective and useful in native pig production in the province. This information could help growers reduce feed costs.

Discussion

Table 1 showed the initial and monthly body weight of native pigs fed with ensiled pongapong. The initial body weight of native pigs is not significant in between and among treatment. This means that there was a comparable weight at the start of the study.

Table 1. Initial and Monthly Body Weight of Native Pigs Fed with Ensiled Pongapong

Treatments	Initial Weight ^{ns}	April [*]	May ^{**}	June [*]
T1 - T1= Formulated feeds	6.08 ^a	9.9 ^b	15.18 ^{bc}	20.30 ^b
T2 -75% Formulated feeds + 25% silage AC	6.99 ^b	12.05 ^a	20.63 ^a	32.33 ^a
T3- 50% Formulated feeds + 50% silage AC	6.17 ^a	9.65 ^b	15.60 ^b	27.03 ^{ab}
T4 - 25% Formulated feeds + 75% silage AC	6.23 ^a	7.875 ^b	11.92 ^c	22.93 ^b
T5 -Pure ensiled AC	6.20 ^b	11.5 ^a	16.00 ^b	21.13 ^b

The body weight of the pigs under study after a month of implementing the feeding of the feed formulation with different percentages of fermented *pongapong*. Treatment 2 had significantly highest weight of 12.05 kgs followed by Treatment 5 having 11.50kgs, Treatment 1 with 9.90kgs, Treatment 3 recording 9.65kgs, and the least is Treatment 4 with 7.88kgs.

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Result entails that the pigs that consumed 75% of formulated feeds mixed with 25% silage pongapong had better growth compared to others that consumed different ratio of mixtures. This could mean that the feed conversion ratio of the pigs is high in the treatment with 75% feed and 25% silage AC mixture.

The second highest considering the full or 100% silage pongapong consumption implies that pongapong could be used as substitute of the formulated feeds when the availability is essential. Considering the fermentation process, the economics and other factors like health and marketability need to be studied if it is worth the shifting of the formulated feedstuff.

Findings show that having 25% of fermented pongapong as additives of formulated feeds or fully feeding the pigs with fermented pongapong results to heavier weight compared to pure

formulated feeds on the first month growth of the animals.

Statistical result shows that there is significant difference on the growth of pigs as effect of the treatments used at the first month of the study revealing a computed F-value of 4.09 with p-value of 0.0257 which is within the 5% level of significance.

Using the Least Significant Difference test, the result shows that Treatment 2 and Treatment 5 are statistically higher than Treatment 1, 3 and 4. This implies that the right mixture of formulated feeds and fermented pongapong or the usage of pure silage AC is substantially better for the growth of the pigs on the first month.

On the results of the study, pigs under Treatment 2 weighed the highest with 20.63kgs mean weight followed by Treatment 5 having a record of 16kgs. For the third, Treatment 3 had a slight edge over Treatment 1 with 15.60kgs and 15.18kgs, respectively. The least in weight is Treatment 4 having 11.92kgs.

The body weight of the native pigs implies that having one fourth additives of fermented pongapong to a three-fourth formulated feeds gives the best growth over the other treatments. This means that the mixture of the formulated feeds containing a higher percentage and the small percentage of fermented pongapong have good effect to the native pigs' digestion and absorption of the nutrients.

On the other hand, as the fermented pongapong equates and increases over the formulated feeds, the effect decreases. But feeding the native pigs with pure fermented pongapong comes next to the highest recorded increased in weight. The nutrients result of the mixture of 50%/50% and 25%/75% on formulated feeds to fermented pongapong needs to further be studied to know the reason for this matter.

On the second month, results revealed that the treatments data have a highly significant result with F-computed value of 7.19 with p-value of 0.0034. This indicates that the differences in weight of the native pigs under study is the effect of the treatments used. Test result shows that Treatment 2 is significantly higher than

Treatment 5, Treatment 3 and partly Treatment 1, and highly significant with Treatment 4.

Result emphasizes that using a 75% formulated feeds added to 25% fermented pongapong had substantially outweighed the rest of the treatments. This entails that for the first two months of growing pigs using the mixture would result to heavier weight compared to the other mixture ratios as well as plainly using the pure formulated feeds.

On the third month of production. Results revealed that native pigs fed with 75% of formulated feeds plus 25% of fermented pongapong consistently recorded the highest mean weight of 32.33kgs. For this third month, it was followed by the native pigs fed with 50% formulated feeds plus 50% fermented pongapong having a mean weight of 27.03kgs. The third is Treatment 1 that were fed with pure or 100% formulated feeds recording a 25.30kgs and followed by Treatment 4 where native pigs were fed with 25% formulated feeds mixed with 75% fermented pongapong recording a 22.93kgs. The least in weight for this third period is Treatment 5, which consistently was the second during the first and second month, with mean weight record of 21.13kgs.

The above result shows a new pattern wherein the mixture of the formulated feeds and the fermented pongapong. Findings show that having 25% ensiled pongapong added to 75% of the formulated feeds could give the best growth to native pigs. Meanwhile, the significance of the data differences is further assessed using analysis of variance following the Complete Randomized Design (CRD).

Statistical result reveals a significant difference at 5% level of significance on the treatments as shown by the F-computed value of 3.88 with p-value of 0.0302. The formulated feeds with various volume of fermented pongapong as additives in the study show that there is significant effect on the body weight if the native pigs.

Feeding the native pigs with 75% of the formulated feeds with 25% fermented pongapong results to a significantly higher

weight compared to other treatments used in the study with that 32.33kgs that has 5.30kgs difference with the next in rank weight of 27.03kgs (refer to Table 5). This entails that the 3:1 ratio of the formulated feeds and fermented pongapong has the best effect in the growth of the native pigs.

Feed Consumption

Table 2 presents the feed consumption of the native pigs fed with fermented *pongapong* from April to June. Result shows a consistent high feed consumption of the native pigs in Treatment 2 for three consecutive months as

revealed by the record of 22.15kgs for April, 27.58kgs for May, and 31.60kgs for June. The second highest recorded feed consumption is Treatment 5 with 18.88kgs for April, 20.55kgs for May, and 26.48kgs for June. The third and fourth in rank on the feed consumption are Treatment 3 and 4 having a record of 15.78kgs and 15.18kgs for April, 19.18kgs and 18.88kgs for May, and a slight twist for June with 23.88kgs and 23.95kgs, respectively. The least recorded feed consumption is Treatment 4 with 11.81kgs for April, 14.63kgs for May, and 19.58kgs for June.

Table 2. Monthly Feed Consumption of the Native Pigs Fed with Fermented Pongapong

Treatment	Month		
	April	May	June
T1 - Formulated feeds	15.18 ^{bc}	18.88 ^{bc}	23.95 ^{bc}
T2 - 75% Formulated feeds + 25% silage AC	22.15 ^a	27.58 ^a	31.60 ^a
T3- 50% Formulated feeds + 50% silage AC	15.78 ^{bc}	19.18 ^{bc}	23.88 ^{bc}
T4 - 25% Formulated feeds + 75% silage AC	11.81 ^c	14.63 ^c	19.58 ^c
T5 -Pure ensiled AC	18.88 ^{ab}	20.55 ^b	26.48 ^b
p-value	0.0069	0.0038	0.0020
CV(%)	19.11%	17.62%	12.23%

Highly significant result from the first month up to the third month of the study. Implies the substantial difference on the consumption of the native pigs based on the ratio of the formulated feeds and fermented pongapong.

The test results signifies that the 75% formulated feeds added with 25% fermented pongapong have considerable high consumption over the other mixture ratios. When the fermented pongapong increases in the ratio of the feeds, the lesser consumption is recorded. Anyhow, the data reveals that the pure fermented pongapong consumption by the native pigs comes second.

Based on the data, the 75% formulated feeds mixed with 25% fermented pongapong is more consumed by the native pigs that results to the observable gain weight on the second and third month (refer to Table 4). This mixture could be studied further by letting the mixture be analyzed for its nutritive value and other characteristics that made it more consumed.

As results of the Histopathological analysis of the intestine, treatment 2 observed to have a highest villi length and villi height that helps in nutrient absorption of experimental animals as stated by (Asiss et. al. 2010) shortening of intestinal villi is associated to pathogen or chemical that modify the intestinal morphology which decreases nutrient absorption.

Gain in Weight

The gain in weight of the native pigs fed with fermented pongapong in three months' study period is presented in Table 3. During the first month, Treatment 4 stands out among other treatments on gain weight with mean weight of 8.02kgs followed by Treatment 3 having a mean weight of 5.56kgs, then Treatment 2 recording a mean weight of 4.82kgs followed by Treatment 1 with 4.34kgs mean weight, and the least is Treatment 5 recording a mean weight of 4.07kgs.

Table 3. Gain in Weight of Native Pigs Fed with Fermented *Pongapong* in Three Months

Treatment	Month		
	April	May	June
T1 - Formulated feeds	4.34 ^b	5.28	10.13
T2 -75% Formulated feeds + 25% silage AC	4.82 ^b	8.58	11.70
T3- 50% Formulated feeds + 50% silage AC	5.56 ^b	5.95	11.43
T4 - 25% Formulated feeds + 75% silage AC	8.02 ^a	4.03	11.01
T5 -Pure ensiled AC	4.07 ^b	4.50	5.13
p-value	0.0211	0.1210	0.1290
cv	28.50%	41.79%	37.07%

The above data were treated using analysis of variance following the completely randomized design and shows a significant result at 5% level of significance. Employing the Least Significance Difference (LSD) test, Treatment 4 is significantly higher over the other treatments. The gain in weight by the native pigs under the Treatment 4 have weighed substantially heavier than the other pigs under the other treatments. It means that the 75% of formulated feeds added to 25% of the fermented pongapong had a great effect on the growth of the native pigs based on their initial weights.

On May, the second month of the feeding of formulated feeds with fermented pongapong, Treatment 2 had a higher gain in weight with mean of 8.58kgs followed by Treatment 3 recording a mean gain weight of 5.95kgs, then Treatment 1 with mean gain weight of 5.28kgs, tailed by Treatment 5 recording a mean gain weight of 4.50kgs, and last is Treatment 4 with mean gain weight of 4.03kgs. This shows a change in the leading of gain weight among the treatments where the leading in gain weight (Treatment 4, April=8.02kgs) became the last

after a month (Treatment 4, May=4.03kgs). Treating the data using ANOVA showed no significant differences among the treatments with F-computed value of 2.27 that has a high p-value of 0.1210.

The third month (June) data revealed a consistent leading of the gain weight by Treatment 2 recording a mean of 11.70kgs, followed by Treatment 3 recording a mean of 11.43kgs, then Treatment 1 with mean of 10.13kgs, followed by the twisting of rank of Treatment 4 and Treatment 5 recording a mean gain weight of 11.01kgs and 5.13kgs, respectively.

Feed Conversion Ratio

Table 4 presents the feed conversion ratio of native pigs fed with formulated feeds and fermented pongapong. Results show that on the first month (April) the native pigs in Treatment 4 have the best feed conversion ratio recording a mean of 8.02 followed by Treatment 3 with mean of 5.56. The third up to the fifth are Treatments 2, 1 and 5 with FCR mean of 4.82, 4.34, and 4.07.

Table 4. Feed Conversion Ratio of Native Pigs Fed with Formulated Feeds and Fermented Pongapong

Treatment	Month		
	April	May	June
T1 - Formulated feeds	4.34 ^b	5.28	10.13
T2 -75% Formulated feeds + 25% silage AC	4.82 ^b	8.58	11.70
T3- 50% Formulated feeds + 50% silage AC	5.56 ^b	5.95	11.43
T4 - 25% Formulated feeds + 75% silage AC	8.02 ^a	4.03	11.01
T5 -Pure ensiled AC	4.07 ^b	4.50	5.13
p-value	0.0211	0.1210	0.1290
CV	28.50%	41.79%	37.07%

The above data were tested using analysis of variance resulting to F-computed value of 4.35 and findings reveal a significant difference on the feed conversion ratios among the treatments at 5% level of significance. Treating further the data using the Least Significant Difference reveals that only Treatment 4 have substantial ratio compared to the other treatments. Treatment 4 showed a noteworthy difference among the other treatments. This means that Treatment 1, 2, 3, and 5 have slight differences but are not significant.

Data on the second month showed that there was a changed in the feed conversion ratio such that the leading had turned to be Treatment 2 having an FCR mean of 8.58 followed by Treatment 3 with 5.95 mean. Treatment 2 comes third with mean of 5.28, then Treatment 5 having a mean of 4.50, and the last is Treatment 4 with mean of 4.03. The result had revealed a twist outcome where the native pigs under Treatment 4 with high feed conversion ratio during the first month turned out to be the least on the second month. This could be traced to the effect of the high mixture of the fermented pongapong mixed in the formulated feeds given to the native pigs under Treatment 4. Anyhow, treating the data using the analysis of variance showed no significant difference among the five treatments as revealed by the F-computed value of 2.27.

Consequently, the result on the third month showed another twist wherein Treatment 2

remained leading with an FCR mean of 11.70 and was followed by Treatment 3 having a mean of 11.43, but the third in rank revealed to be Treatment 4 with FCR mean of 11.01. The fourth is Treatment 1 having a mean of 10.13 and the least is Treatment 5 recording a mean of 5.13. Analyzing through analysis of variance showed no significant difference between and among the treatments as revealed by computed F-value of 2.21.

Overall, finding shows no significant impact of the fermented pongapong on the feed conversion ratio of the native pigs. On this finding, the feed conversion efficiency is also assessed to support the above outcome.

Feed Conversion Efficiency

The feed conversion efficiency of the native pigs fed with formulated feeds with fermented pongapong additives is presented in Table 6. As can be seen in the table, the feed conversion efficiency does not support the outcome and pattern of the feed conversion ratio for during the first month, Treatment 5 ranked first with mean efficiency of 26.19 where Treatment 1 comes next having an efficiency mean of 25.26, then Treatment 2 followed with mean of 24.92. The fourth rank is Treatment 3 having a mean efficiency of 19.33 and the last is Treatment 4 with mean of 13.98. This implies that the efficiency is not patterned to the feed conversion ratio for the highest recorded ratio is Treatment 4 but came out to be the least efficient one.

Table 5. Feed Conversion Efficiency of Native Pigs Fed with Formulated Feeds and Fermented Pongapong

Treatment	Month		
	April	May	April
T1 - Formulated feeds	25.26	25.00	43.29
T2 -75% Formulated feeds + 25% silage AC	24.92	31.04	38.16
T3- 50% Formulated feeds + 50% silage AC	19.33	35.55	50.77
T4 - 25% Formulated feeds + 75% silage AC	13.98	27.15	57.46
T5 -Pure ensiled AC	26.19	21.84	19.39
F computed value	3.99 ^{ns}	0.78 ^{ns}	2.08 ^{ns}
p-value	0.0624	0.5580	0.1460
CV	27.35%	42.90%	48.11%

On the second month (May), the highest mean feed conversion efficiency is 35.55 that is represented by Treatment 3, followed by Treatment 2 having a mean efficiency of 31.04, then Treatment 4 recording a mean efficiency of 27.15. The fourth is Treatment 1 recording a mean efficiency of 25.00 and the least is Treatment 5 with mean efficiency of 21.84. This proves that findings in the first month wherein the feed conversion efficiency is not aligned to the pattern of the feed conversion ratio.

The last month of data gathering (June) reflect that Treatment 4 recorded the highest feed conversion efficiency mean of 57.46 followed by Treatment 3 having a mean of 50.77. Third in rank is Treatment 1 having an efficiency mean of 43.29, and the last two are Treatment 2 and 5 having a mean efficiency of 38.16 and 19.39, respectively.

Using the analysis of variance, results on the three gathered data from April to June are all not significant with F-computed values of 3.99, 0.78, and 2.08. The differences are within the range that doesn't make a significant difference that may affect the growth of the native pigs.

Percentage Growth Rate

Table 6, revealed the percentage of growth rate of native pigs fed with formulated feeds and fermented *pongapong*. The data revealed the highest growth rate in Treatment 3 with 44.20 mean followed by Treatment 2 with 43.48 mean. Second, Treatment 4 with 43.46 mean followed by Treatment 1 with 37.78 mean and lastly, Treatment 5 with -29.76 mean which has the least growth rate among the treatments.

Table 6. Percentage Growth Rate of Native Pigs Fed with Formulated Feeds and Fermented Pongapong

Treatment	Growth Rate (%)
T1 - Formulated feeds	37.78
T2 -75% Formulated feeds + 25% silage AC	43.48
T3- 50% Formulated feeds + 50% silage AC	44.20
T4 - 25% Formulated feeds + 75% silage AC	43.46
T5 -Pure ensiled AC	29.76

This implies the feed conversion ratio and feed efficiency utilized by the experimental animals throughout the duration of the study. This results the feeding management of formulated feeds and fermented pongapong absorb the nutrients needed by the native pigs.

Based on the uniform amount feeding was improve the management practices being followed which is restricted feeding.

Conclusion

The study shows that the different percentage of fermented pongapong could be useful as source of regular ration on native pigs. The use of different percentage of fermented pongapong have a potential to improve the growth

performance of native pigs. Furthermore, Based on the results of the study, it's inferred that feeding the native pigs with 75% formulated feeds and 25% fermented pongapong results to best growth. Therefore, it concluded that using 75% of formulated feeds and 25% of fermented pongapong obtained significant in terms of gain in weight and feed conversion

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Conflict of Interests

No conflict of interest.

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