BIBLIOGRAPHY

PUDSOC, JOSIE M. APRIL 2013. Carcass Quality of Native Pigs Given Galiang or Giant Taro (*Alocasia macrorrhiza*). Benguet State University, La Trinidad, Benguet.

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ABSTRACT

This study was conducted at Guinzadan central, Bauko, Mountain Province to determine the effect of galiang or giant taro (*Alocasia macrorrhiza*) to the carcass quality of the native pigs. It also aimed to measure the back fat thickness, dressing percentage, percent of abdominal fat, percent wholesale cuts, edible entrails, loin eye area and carcass length.

The dietary treatments involved were: galiang plus cooked in rice washing ($T_{1)}$, galiang plus commercial feeds (T_2), and galiang plus rice bran (T_3).

Result showed that supplementing galiang with rice bran or commercial feed had no significant effect on dressing percentage, weight of wholesale cuts (shoulder, ham, loin and belly) expressed as percent of carcass weight, weight of edible entrails and empty stomach expressed as percent of slaughter weight, carcass length, loin eye area, abdominal fat and back fat thickness of native pigs. The average dressing percentage of approximately weighing 31kg native pigs was 62.90%. The wholesale cuts expressed as percent of carcass weight were 27.40% for shoulder, 31.02% for ham, 19.15% for loin, and 22.29% for belly. The average weight of edible entrails and empty stomach

expressed as percent of slaughter weight were 12.15% and 1.56%. The average of carcass length, loin eye area and back fat thickness of 31kg native pigs were 64.22cm, 14.09cm and 1.24cm respectively.

INTRODUCTION

An animal carcass is composed of muscle, fat and bone which are the three main constituents. All three increases in total amount as growth occur. However, as one tissue comprises a higher percentage of the carcass the others comprise proportionately less (Pond and Pond, 2000).

The most accurate method for determining value of any kind of carcass is to calculate the total value (weight x selling price/lb) of all wholesale cuts. However this method of evaluation usually is not used because the carcass must be fabricated into these cuts and weighed requiring too much time and effort. When carcasses are not broken into wholesale cuts, other method are made used of in asmeasuring the carcass length, average back fat thickness, loin eye, carcass weight and muscling score (Pond and Pond, 2000).

The concept of quality has both subjective and objective components and may have different meaning for the retailer/wholesaler/packer than for the consumer, although the ultimate objective must be to meet the requirements of the latter(Pond and Pond, 2000).

Science and technology have brought about improvements to common livestock and poultry production. Feed supplements, antibiotics and other medicines have been successfully produced. All of these have been great help to livestock and poultry raisers since they could same animal from pest and disease.

Researches on possible feed substitutes, as well as feed supplements found available and cheaper than commercial one is being encouraged. However, it is necessary to make sure that such available feeds are able to meet nutritional requirements of the animals.

It is recognized that maximum growth performance of swine with decreased high cost of production be achieved only by feeding and supplementing a diet and well-balanced in the required nutrients (Eusebio, 1968). Thus, one of the possibilities to lessen feed cost is to make use of cheaper, economical and nutritive feed supplements found in nearby localities.

Galiang (*Alocasiamacrorriza*) a nationwide herb is popularly used as feeds for pigs by backyard swine raisers.According to surveys and actual observations every pig raiser in the cordillera feed galiang to their pigs. Interviews from these raisers revealed that they have been using galiang feed for their pigs because it is available and could not be eaten by man due to its unpleasant taste. They also observed that grown galiang gives satisfactory growth to pigs. Moreover, galiang leaves and trunk when given to pigs reduced expenses on feeds.

The roots have a potato-like flavor and the white interior of the thick stems can also be eaten. After boiling the cooked stem material is dried then ground into flour. As with most plants in this family the Giant Taro has calcium oxalates, which are needle-shaped crystals. They give an affect of burning if you handle them improperly and can make you ill if you manage to consume them. Cooking breaks down the calcium oxalate making the root and stem material edible. The most common means of preparation is boiling cut up parts of the root (Allen, 1929).

Chemical analysis also shows that grown galiang contain 77.5% moisture, 85% calcium food energy, 0.4g fibers, 0.8 mg thiamine, 0.04 mg riboflavin, 0.7 mg anacin, (Knott and Deanon, 1976). With all these nutrients, galiang tubers could be utilized as feed supplement for greater profit.

Information generated from this study may help the swine raisers, students, meat processors, and consumers. It may also serve as reference for students and other researchers in coming up with other related studies.

Generally, this study was conducted to determine the effect of galiang or giant taro (*Alocasiamacrorrhiza*) on some carcass characteristics of native pigs. Especially it aimed to determine:

1. Dressing percentage;
2. Back fat thickness;
3. Percent abdominal fat;
4. Wholesale cuts and edible entrails; and,
5. Loin eye and carcass length of native pigs given galiang supplement with rice bran or commercial feed.

This study was conducted at Guinzadan, Bauko, Mountain Province from December to February 2013.

REVIEW OF LITERATURE

According to Acker (1983), as andgrows older and larger, the proportion of bone and muscle tissue decreases while the percent fat of the carcass increases.

Fat thickness, determined by a probe or ultrasonic equipment and loin eye area, measured by ultrasonic are indicators of the proportions of muscle, fat and bone in the live animal. The larger the loin eye and less external fat, more lean (Acker, 1983).

Whittemore (1998) said that it may be taken for granted that pig meat product must first be needed, and next be safe to eat. It must also be efficiently produced and at the required level of quality, but increasingly meat production must satisfy further criteria in relation to production environment, which must be both sustainable and ethical.

Lawrence and Fowler (2002) stated that the changes in the muscle of the animal to give the lean meat of the carcass are initiated by anaerobic glycolysis proceeding in the post-mortem state until all of the glycogen reserves have been used. As this happens lactic acid accumulates in the muscle but as there is no active circulatory system to remove it the muscle increasingly acidifies until the accumulation of acid is so great that enzyme function is limited.

Tenderization of the lean meat in the carcass occurs after variable periods of time according to species and temperature of the holding environment. Generally speaking, the higher the temperature the more rapid is the rate of tenderization (Lawrence and Fowler, 2002).

According to Allen (1929), the food value of the edible portion of the raw stem tubers of galiang or giant taro has been reported as: energy 293-599 kJ/100 g; water 63-81 per cent; crude protein 0.6-3.3 per cent; fat 0.1-0.2 per cent; carbohydrate 17-27 per cent;

ash 1.1-1.3 per cent; calcium 46-153 mg/100 g; iron 0.5-1 mg/100 g; phosphorus 45-72 mg/100 g; niacin 0.4 mg/100 g; riboflavin 0.02-0.03 mg/100 g; thiamine 0.09-0.1 mg/100 g; ascorbic acid trace. Much of the calcium is in calcium oxalate crystals.

Composition changes with age, older material having lower moisture content and higher solids. Few figures have been published showing starch content but there may be substantial quantities of other carbohydrates associated with it. The starch grains are small, irregularly shaped polygons of four or five sides, 1-5 microns in length, with approximately 21% amylase and 79% amylopectin. Several cultivars of *Alocasiamacrorrhiza* are reported to be cyanogenic; the cyanogenic glycoside is not present in the corms or stems but the young leaves have been found to contain up to 0.018% of hydrogen cyanide(Allen, 1929).

Ynaya (1973) cited that the root crops like gabi, cassava, sweet potato, and ubi contain a lot of food energy. They are rich in protein, vitamins and carbohydrates. They can be a good supplement to rice and other staple foods.

MATERIALS AND METHOD

Materials

The materials used were nine (9) two months old nine native pigs that were fed with galiang, rice bran, and commercial feeds. Other materials used were pens, water, basin, knife, bolo, stunner, LPG, and blow torch.

Methods

Management of the pigs. All pigs were subjected to the same care and management except for the kind of ration offered to them.

Nine (9) weaned pigs were distributed into three (3) treatments following the completely randomized design (CRD). Each treatment was replicated three (3) times with one pig per replication.

The weighing of the weaned pigs was done first before placing them into their respective pens. The following were the different treatment of the study:

Treatments	Description
T_1	galiangcooked in rice washings
T_2	galiang + commercial feeds
T_3	galiang + rice bran

All pigs were fed twice a day at 7:00-7:30 am and 4:30-5:00 pm. The cooked galiang plus 500g feeds, cooked galiang plus 500g rice bran and the pure galiang were given to their respected dietary treatments. The rations were depending on the treatment assigned to individual animal.

Pigs in treatment 1 were fed with galiang in rice washing for first two months. When it was observed that the pigs were not gaining weight, they were fed galiang plus commercial feeds until the attained the live weight of approximate 31kg.

Preparation of the ration. The giant taro was collected at Guinzadan, Bauko, Mountain Province. After the collection the galiang were chopped into small pieces. The chopped galiang were placed on an empty can or cooking vat. Four liters of water were added to ten kilogram chopped galiang. The galiang were boiled 30-45 minutes.

When pigs weighed approximately 30-35kg, they were slaughtered following standard slaughtering procedures as follows:

1. Sticking. It is bleeding the animal by piercing withpointedinstrument such as knife (Figure 1).

Figure 1. Sticking the hog

2. Singeing and Dehairing. Removing the unshaved hair of the animal using a flame (Figure 2).

Figure 2. Singeing and dehairing

3. Evisceration. Removal of the internal organs from the body of the animal such as heart, lungs, stomach and the intestines (Figure 3).

Figure 3. Evisceration

4. Weighing the Carcass. Process of weighing the parts of the body of the animal excluding the head, feet and entrails.

5. Fabrication. Process of cutting the parts of the carcass of the animal into

standard wholesale cuts, and retail cuts (Figure 4 to 8).

Figure 4. Fabrication

Figure 5. Weighing the ham

Figure 6. Weighing the shoulder

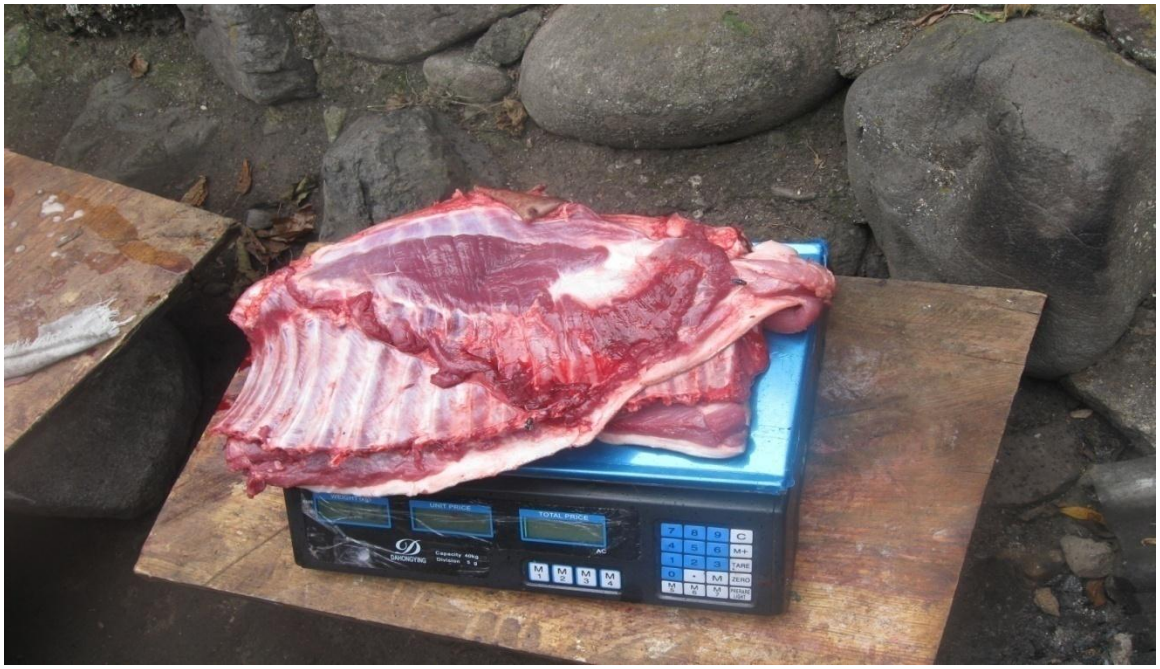
Figure 7. Weighing the belly

Figure 8. Weighing the loin

Data Gathered

1. Slaughter and Carcass Data

   a. Slaughter weight (kg). It wasobtained by weighing the animal priorto slaughter using livestock scale.

   b. Carcass weight (kg). It was the weight of the carcass without head, feet, andthe entrails determined with the same livestock scale.

   c. Weight of wholesale cuts (kg). Chopped of wholesalecuts which were weighed individually with a meat scale

   d. Weight of wholesale entrails (intestines and viscera) (kg). The intestines and viscera weight.

2. Carcass Measurements

   a. Carcass length (cm). This was taken by measuring from the first ribto the base of the tail on the suspended carcass in centimeter

   b. Back fat measurements (cm). This were measured from the first rib,last

rib and at the lumbar vertebra of the splitted carcass. The average six measurements represent the back fat thickness in centimeter.

c. Loin eye area (cm^2). This was taken by measuring the loin between the tenth and eleventh rib.

3. Meat Data

a. Proximate composition. The amount of moisture, crude protein, crude, fat, and ash were analyzed at the Regional Standard and Testing laboratory of the DOST-CAR. The samples were taken from the lumbar portion of each pig.

Data Computed

1. Carcass Yield.Proportion ofthe animal's live weight salvaged at carcass point called as dressed weight, killing out percentage.

$$\text{Dressing Percentage} = \frac{\text{Carcass Weight}}{\text{Slaughter Weight}} \times 100$$

2. Percentage of the Abdominal Fat

$$\text{Percentage of the Abdominal Fat} = \frac{\text{Weight of Abdominal Fat}}{\text{Carcass Weight}} \times 100$$

3. Percentage of the Wholesale Cuts

$$\text{Percentage of Wholesale Cut} = \frac{\text{Cut Weight}}{\text{Carcass Weight}} \times 100$$

4. Percent of the Edible Entrails

$$\text{Percent of Edible Entrails} = \frac{\text{Weight of Edible Entrails}}{\text{Slaughter Weight}} \times 100$$

5. Back Fat Thickness. This was determined by computing the average of back fat measurement taken at the opposite of P_1 first rib), P_2 (last rib), P_3 (lumbar vertebra).

Statistical Analysis of Data

All data were subjected to analysis of variance (ANOVA) for a Completely Randomized Design (CRD) experiment. Duncan's Multiple Range Test (DMRT) was used to compare treatment means.

RESULTS AND DISCUSSION

Slaughter Weight, Carcass Weight and Dressing Percentage of Hogs

Table 1 shows the slaughter weight, carcass weight and dressing percentage of the slaughtered hogs. Statistical analysis revealed that there were no significant differences in the slaughter weight, carcass weight and dressing percentage of native pigsfed with galiangcooked in rice washinglater fed with galiang plus commercial feeds and galiang plus rice bran. The average slaughter weight of approximately 5 to 6 months old native pigs was 31.22kg with an average carcass weight of 18.88kg.

The dressing percentage of slaughtered animals is an indicator of carcass yield. The average dressing percentage was 62.90% for native pigs with an average slaughter weight of 31.22kg. This is relatively lower than the dressing percentage of 69.93% reported by Ibarra (1983) from hogs with a slaughter of 87.80kg. The small discrepancy may be due to the condition of the carcass when the carcass weight was taken. In this study, carcass weight was taken from a freshly slaughtered hog while that in Ibarra (1983), it was taken from chilled carcass. It has been reported that carcass weight tends to decrease by 2% after it has been chilled (Ibarra, 1983). Furthermore the dressing percentage in Ibarra (1983) was obtained in bigger finished hogs while that in this study was obtained in smaller native pigs. The differences in the breed and body weight at slaughter may have contributed in the discrepancy in dressing percentage.

Table 1. Slaughter weight, carcass weight and dressing percentage of hogs at 155 days

TREATMENTS	SLAUGHTER WEIGHT (Kg)	CARCASS WEIGHT (Kg)	DRESSING PERCENTAGE
Galiangcooked in rice washing fortwo months and galiang plus Commercial feeds for one month	30.333[a]	18.88[a]	62.263[a]
Galiang + commercial feeds	33.000[a]	20.44[a]	61.893[a]
Galiang + rice bran	30.333[a]	19.57[a]	64.537[a]

*Means with the same letter superscripts are not significantly different at 5% level of significance by DMRT.

Weight of Wholesale Cuts

Table 2 shows the weight of shoulder, ham, and belly expressed as percent slaughter weight of hogs with an average slaughter weight of 31.22kg. Statistical analysis revealed no significant difference in the percent shoulder, ham and belly of hogs between treatments. The average percent shoulder, ham and belly of hogs weighing 31.22kg were 17.23%, 14.69% and 12.72%, respectively. On the other hand, statistical analysis revealed a significant difference in the percent loin between treatments. The average percent loin of hogs given galiang cooked in rice washing then later given galiang plus commercial feeds (13.06%) was relatively lower than the percent loin of hogs fed with galiang plus commercial feeds (17.17%) and those given galiang plus rice bran (19.17%). This tend to show that the slower growth rate native pigs during the first two months when the pigs were given pure galiang cooked in rice washing affected the development of the loin. While these pigs were able to attain the desired slaughter weight after the ration was shifted to galiang plus commercial feeds, the loin in these pigs was significantly smaller relatively to body weight.

Table 3 shows the weight of shoulder, ham, belly and loin expressed as percent of carcass weight of native hogs with an average slaughter weight of 31.2kg. Statistical analysis revealed that no significant differences in the percent of shoulder, ham, loin and belly of hogs between treatments. The average percent of shoulder, ham, belly and loin of 31.22kg native hogs with a carcass weight of 19.63kg were 27.40%, 31.02%, 19.15% and 22.29%, respectively.

Table 2. Weight of wholesale cuts expressed as percent of slaughter weight

TREATMENTS	SHOULDER	HAM	LOIN	BELLY
Galiangcooked in rice washing For two months and galiang plus Commercial feeds for one month	17.64[a]	18.17[a]	13.06[b]	12.48[a]
Galiang + commercial feeds	16.49[a]	13.72[a]	17.71[a]	14.23[a]
Galiang + rice bran	17.55[a]	12.19[a]	19.17[a]	11.45[a]

*Means with different letter superscripts are significantly different at 5% level of significance by DMRT.

Table 3. Weight of whole sale cuts expressed as percent of carcass weight

TREATMENTS	SHOULDER	HAM	LOIN	BELLY
Galiangcooked in rice washing for two months and galiang plus Commercial feeds for one month	28.37[a]	30.30[a]	20.97[a]	19.948[a]
Galiang + commercial feeds	26.64[a]	33.06[a]	17.69[a]	22.966[a]
Galiang + rice bran	27.19[a]	29.71[a]	18.78[a]	23.963[a]

*Means with the same letter superscripts are not significantly different at 5% level of significance by DMRT.

Abdominal Fat, Edible Entrails and Empty Stomach of Hogs

Table 4 shows the weight of abdominal fat, edible entrails and empty stomach of hogs expressed as percent of slaughter weight. Statistical analysis revealed that there were no significant differences between the treatments. The average percent of abdominal fat, edible entrails and empty stomach of native hogs slaughtered at 31.22kg live weight and with a carcass weight of 19.63kg were 0.29%, 12.15% and 1.56%%, respectively.

Back Fat Thickness

Table 5 shows the back fat thickness of native hogs slaughtered at an average weight of 31.22kgliveweight. Back fat measurement was taken at the back of the animal one inch below the midline in the three locations: opposite of first rib ($P_{1)}$, last rib (P_2) and opposite of lumbar vertebrae (P_3). Statistical analysis revealed no significant differences between treatments in the average back fat thickness measured. The average of the three back fat measurements of native hogs slaughtered at 31.22kg was 1.24cm.

Table 4. Weight of abdominal fat, edible entrails, and the empty stomach expressed as percent of slaughter weight

TRETMENTS	ABDOMINAL FAT	EDIBLE ENTRAILS	EMPTY STOMACH
Galiang cooked in rice washing fortwo months and galiang plus commercial feeds to one month	0.31[a]	11.012[a]	1.66[a]
Galiang + commercial feeds	0.29[a]	13.726[a]	1.26[a]
Galiang + rice bran	0.26[a]	11.711[a]	1.76[a]

*Means with the same letter superscripts are not significantly different at 5% level of significance by DMRT

Table 5. Average back fat thickness of native pigs at an average of 31.22kg body weight

TREATMENTS	BACK FAT THICKNESS (cm)
Galiang cooked in rice washing For two months and galling plus Commercial feeds for one month	1.11[a]
Galiang + commercial feed	1.50[a]
Galiang + rice bran	1.11[a]

*Means with the same letter superscripts are not significantly different at 5% level of significance by DMRT.

Carcass Length and
Loin Eye Area

Table 6 present the carcass length. Statistical analysis revealed a highly significant difference in the treatments. Native hogs given galiang plus commercial feeds had a shorter carcass length (56.67cm), compared with native hogs given galiang in rice washing then later galiang + commercial feeds (67.67cm) and those given galiang plus rice bran (68.33cm). The carcass length was taken at the tip of symphysis pubis to the forward edge of the first rib.

On the other hand, statistical analysis revealed no significant difference in the loin eye area. The average loin eye area was 14.09cm for native hogs slaughtered at an average weight of 31.22kgliveweight. Loin eye area was computed by multiplying the length and width by 0.08cm.

Meat Composition

Table 7 shows the proximate analysis of the meat samples obtained at the region of the lumbar as analyzed by (DOST-CAR) Department of Science and Technology Laboratory, La Trinidad, Benguet. Only one sample taken at the loin area of hogs was sent to analysis.

Table 6. Measurements of carcass length and loin eye area

TREATMENTS	CARCASS LENGTH (cm)	LOIN EYE AREA (cm)
Galiang cooked in rice washing For two months and galiang plus Commercial feeds for one months	67.67[a]	13.60[a]
Galiang + commercial feed	56.67[b]	15.00[a]
Galiang + rice bran	68.33[a]	13.68[a]

*Means with the different letter superscripts are highly significantly different at 5% level of significance by DMRT.

Table7. Proximate analysis of pork samples

TEST	GALIANG COOKED IN RICE WASHING	GALIANG + COMMERCIAL FEEDS	GALIANG + RICE BRAN
Moisture	74.72	69.97	68.95
Crude Protein	20.41	19.26	17.26
Crude Fat	1.52	14.10	12.27
Ash	1.12	0.97	1.02

Moisture content. Oven method was used in obtaining the moisture content of the different meat samples of the different treatments. Table 7 shows the moisture content of the meat samples obtained from the pigs meat given galiang plus cooked in rice washing

was74.72%, from pigs given galiang plus commercial feeds was 69.97% and from the pigs given galiang plus was 69.95%.

Crude protein. Kjelhadl method was used in obtaining the crude protein of the different meat samples of the different treatments. As shown in Table 7, the crude protein of the meat samples obtained from the pigs given galiang plus cooked in rice washing, thosegiven galiang plus commercial feeds was 19.26 and those given galiang plus rice bran were 17.26%, were 20.41%, 19.26% and 17.26%, respectively.

Crude fat. Table 7 shows the crude fat contents of the meat samples derived from the pigs under the different treatments. The crude fat obtained from meat of native pigs given galiang plus commercial feeds was 14.10%, from hogs given galiang cooked in rice washing the later commercial feed and galiand was 1.52%, from hogs given galiang plus rice bran was 12.27%.The procedure used in determining crude fat was Soxhlet extraction.

Percent ash. The gravimetric method was used in obtaining the ash percentage of the meat samples of the different treatments. The meat sample from the native pigs given galiang plus cooked in rice washing has an ash content of 1.12%, those given galiang plus rice bran has an ash content of 1.02% and those given galiang plus commercial feeds has an ash content of 0.97%.

Owing to the fact that only one sample in each treatment was sent for analysis. The differences in nutrient content of meat analyzed cannot be attributed to the treatment imposed, with high level of confidence. Furthermore, difference in the analyzed value may be attributed in part to sampling errors.

SUMMARY, CONCLUSION AND RECOMMENDATION

Summary

The study was conducted to determine the effect of galiangor giant taro (*Alocasciamacrorrhiza*) on the dressing percentage, wholesale cuts, abdominal fat, edible entrails, back fat thickness, carcass length and loin eye area of native pigs. Nine hogs were distributed to three treatments: galiang plus cooked in rice washing, galiang plus commercial feeds and galiang plus rice bran. Each treatment has three replicates.

Result showed that supplementing ration of native pigs with galiang has no significant difference effect on dressing percentage, wholesale cuts which is the shoulder, ham, loin and belly expressed as percent of carcass weight, weight of edible entrails and empty stomach expressed as percent of slaughter weight, carcass length, loin eye area, abdominal fat and back fat thickness. The average dressing percentage of approximately weighing 31kg native hogs 62.90%. The average wholesale cuts expressed as percent of carcass weight were 27.40% shoulder, 31.02% ham, 19.15% loin, and 22.29% belly. While the average weight of edible entrails and empty stomach expressed as percent of slaughter weight were 12.15% and 1.56%. The average of carcass length, loin eye area and backfat thickness of native pigs were 64.22cm, 14.09cm and 1.24cm, respectively.

Conclusion

Based on the result of the study, galiang or giant taro (*Alocasia macrorrhiza*) relatively to treatment hasno variable effect on the growth performance of the native pigs.

Recommendation

Based on this study, galiang or giant taro (*Alocasia macrorrhiza*) can be used as feed to native swine in combination with rice bran or commercial feeds. Further studies on rations to maximize performance of native pig are recommended.

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