

BIBLIOGRAPHY

CATONES , REYNATO S. OCTOBER 2010. Carcass Characteristics of Growing-Finishing Hogs Supplemented With Raw Coconut Meat AND Ripe Banana Peelings. Benguet State University, La Trinidad ,Benguet.

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ABSTRACT

The study was conducted to determine the effect of supplementing raw coconut meat and ripe banana peelings on the carcass characteristics of growing-finishing hogs.

It aimed to measure the effect of supplementing raw coconut meat and ripe banana peeling on growing-finishing hogs on the slaughter and carcass weight, dressing percentage, back fat thickness, carcass length, loin eye area, weight of wholesale cuts and cooked meat quality in terms of aroma, tenderness ad juiciness. The treatments that were used were as follow: T₀ (pure commercial feeds); T₁ (pure commercial feeds supplemented with 1 kg ripe banana peelings); T₂ (pure commercial feeds supplemented with $\frac{1}{2}$ kg raw coconut meat and 1 kg ripe banana peelings). A total of 1 hog from each treatment were slaughtered for the evaluation.

Results revealed that hogs supplemented with raw coconut eat and ripe banana peelings has the heaviest weight in terms of carcass and slaughter weight, weight of wholesale cuts and weight of digestive organs full and empty. Results also revealed that hogs supplemented with raw coconut meat and ripe banana peelings has the highest dressing percentage among the treatments. In terms of back fat thickness hogs supplemented with raw coconut meat and ripe banana peelings has the thickest back fat among the treatments. Results also revealed that hogs

supplemented with raw coconut mea and ripe banana peelings has the longest carcass length and highest loin eye area among the treatments.

On the other hand, significant differences were noted on the cooked meat quality in terms of aroma among the treatments. In terms of juiciness highly significant differences were seen among the treatments while no significant differences were noted on the tenderness on the cooked meat quality among the treatments.



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INTRODUCTION

As of 2007, the national total pork supply reached almost 1.7 million metric tons, of which 97% are produced locally and the remaining 3% as imported. 98% of the local demand for pork is on domestic food consumption with the balance of 2% on canned or processed meat. The 2007 derived consumption of pork (excluding offal and processed meat) is 15.07 kg (PCARRD, 2009).

In Cordillera alone, the demand for pork is very high yet the production is low. Only few farmers engage in commercial swine production because of high investment required. On the other hand, many are still engaged in backyard swine raising as source of family protein and additional income. Most of the hogs are feed with plant products that can be readily available in the farm. Among these are banana peelings and coconut meat.

Coconut (*Cocos nucifera* L.) is popularly known as the “TREE OF LIFE” because of the variety of products being made from the tree which is not only used as food for human but also in livestock and poultry. Coconut meat and juice are the main products which are rich in proteins and which can be used in promoting growth of animals.

Banana peelings are otherwise waste from banana cue and toron stalls. These are rather used as non-conventional feedstuff for growing finishing hogs. Selverio (1981) reported that 8 to 16% crude protein is highly recommended for hog finisher ration. It is therefore of interest to determine the effect of feeding ripe banana peelings as feed supplement to hogs particularly on carcass characteristics.



Generally, this study was conducted to determine the effect of supplementing commercial feeds with ripe banana peelings and raw coconut meat in growing-finishing hogs as far as carcass characteristics is concerned.

Specifically, the experiment aimed to measure the effect of the treatments on the carcass characteristics in terms of slaughter and carcass weight, dressing percentage, back fat thickness, carcass length, loin eye area and cooked meat quality.



REVIEW OF LITERATURE

Banana Peelings as Feed Supplement

Daliling (2006) reported that growing-finishing pigs fed daily with 1-2kg of chopped ripe banana peelings had better results in terms of carcass length, back fat thickness and loin eye area as compared to the controlled treatment. Earlier, Mangusan (2004) reported indigenous feed stuffs like camote leaves, cabbage and banana peelings had significantly differences in terms of final weight, total and average daily gain in weight, total feed consumption, feed conversion ratio and feed cost to produce a kilogram gain in weight on growing-finishing pigs.

Both green and ripe bananas are palatable to ruminants. These are low in fiber, protein and minerals and are therefore usually fed to animals with the proper supplement and some roughage source. In dairy cow production, the use of banana meal and maize at 11% percent ration level has been observed (Garcia,1991). On the other hand, Sison (1982) reported that dried banana peelings are a good feed supplement for finisher hogs, he found that dried banana peelings could be incorporated on the hog finisher diet without adverse effect on the weight gain and feed conversion ratio.

Le Dividich and Canope (1985) showed that the intake of bananas can increased through adlibitum feeding. With 2 adlibitum feeding per day, a hog can increase its intake by 20 to 30%. However, carcass yield is reduced due to enlarged digestive tract. This limits the commercial use of large intake of banana peelings.

Guadalope (1985) found that banana silage is highly acceptable to growing-finishing hogs. Despite the depressing effect of the digestibility on the ration protein, green banana silage has nearly the same value as the ripe fruit. On the other hand,



banana silage make as for poor growth because of its higher cellulose content. Despite poor digestibility of the protein silage-based diets, the carcass is of good quality even if animals are slaughtered at 100kg or more weight.

Coconut Oil as Feed Supplement

Barrick (2009) showed that diet containing coconut oil as a source of fat are produced hogs with extremely hard carcass.



MATERIALS AND METHODS

The materials and equipments that were used in the study were 3 hogs [180 days old], pots for boiling water, knives, basins, chopping board, weighing scale, measuring tape, pen and a record book.

This study made used of the hogs from a previous feeding experiment. These hogs were treated equally in all aspects except for the ration given to them which composed the treatments. The different treatments were as follows;

T₀= Commercial Feeds (CF)

T₁= C F + 1kg Banana Peelings

T₂= C F + 1kg Banana Peelings + ½ kg Raw Coconut Meat

After 90 days of feeding the hogs with their respective rations, one hog per treatment was picked at random as sample for hog evaluation.

These sample hogs were not given food for 12 hours prior to slaughtering. However, drinking water was given to them. After fasting, weight of each animal was taken and slaughtering followed. In slaughtering, the hogs were subjected to bleeding followed by scalding then dehairing process (Figure 1). After removing the hairs, evisceration was done (Figure 2). In eviscerating the hogs, an opening was done at the belly area to remove the stomach, small and large intestines, lungs and heart. Finally, the carcass of each hog was cut to produce the major wholesale cuts namely the head, right and left shoulder, right and left belly and the right and left ham after which, each cut was weighed (Figures 3 and 4).





Figure 1. Scalding process



Figure 2. Carcass of one of the slaughtered hogs after evisceration



Figure 3. Cutting the carcass into whole sale cuts



Figure 4. Weighing of cut carcass

Organoleptic Test

From the carcass of the pigs from each treatment, meat samples were obtained and these were cooked per treatment. After cooking, this were sliced to bite sizes and were placed into containers with code names ready to be evaluated. Meanwhile, each member of the panel of tasters (five professionals and thirteen students) was given a



scorecard to write down his ratings. During the evaluation, each member of the panel of tasters was requested to drink water or rinse his mouth with water after each taste to wash off any remains of the meat previously tasted that might have affected his rating to the succeeding meat sample. The organoleptic test was done at the ATEP 1, Animal Science Department, BSU, La Trinidad, Benguet.

Data Gathered

1. Slaughter and Carcass Data

1.1. Slaughter weight (kg). This was the weight of the slaughtered animal prior to slaughtering using a livestock scale.

1.2. Carcass weight (kg). This was the weight of the carcass with head and feet excluding entrails and hairs.

1.3. Weight of wholesale cuts (kg). This was obtained by weighing each of the different wholesale cuts after chopping the carcass.

1.4. Weight of digestive organs (Full and Empty) (kg). This was obtained by weighing the stomach, large and small intestines as a whole before and after cleaning process.

2. Carcass Measurements

2.1. Back fat thickness (cm). This was the thickness of the back fat measured at the area opposite the first rib, last rib and at the lumbar vertebra of the splitted carcass.

2.2. Carcass length (cm). This was taken by measuring from the first rib to the base of the tail of the suspended carcass in centimeter.



2.3. Loin eye area (cm). This was the cross sectional area of the longissimus dorsi found between the tenth and eleventh rib using the formula $CA = LXWX0.08$.

3. Dressing Percentage (%). This represents the carcass yield. This was computed using the formula;

$$\text{Dressing Percentage} = \frac{\text{carcass weight}}{\text{slaughter weight}} \times 100\%$$

4. Cooked Meat Evaluation. This was the result of the cooked meat evaluation rated by the panel of tasters. The results from the evaluation were recorded, tabulated and subjected to statistical analysis. The parameters used were as follows:

4.1 Aroma. These was evaluated as follows:

<u>Scale</u>	<u>Remarks</u>
1	Very good
2	Good
3	Fair
4	Poor
5	Very poor

4.2 Tenderness. These were evaluated as follows:

<u>Scale</u>	<u>Remarks</u>
1	Very tender
2	Moderately tender
3	Slightly tender
4	Slightly tough



5

Tough

4.3 Juiciness. This was evaluated as follows:

<u>Scale</u>	<u>Remarks</u>
1	Very juicy
2	Moderately juicy
3	Slightly juicy
4	Slightly dry
5	Very dry



RESULTS AND DISCUSSION

Slaughter and Carcass Weights and Dressing Percentage

The slaughter and carcass weights and the dressing percentages of the hogs under the different treatments are shown in Table 1. Results revealed that the hog given banana peelings and coconut meat supplementation had the highest weights in terms of slaughter and carcass weights (103 kg and 90 kg, respectively). This was followed by the hog given banana peelings supplementation that slaughter and carcass weights of 101 kg and 89, respectively. The hog given no feed supplementation had the lowest weights of 92kg and 80 kg, respectively also.

In terms of dressing percentage, it is revealed in the Table that the hog given banana peelings supplementation registered the highest percentage of 88.12. This was followed by the hog given both banana peelings and coconut meat supplementation with a dressing percentage of 87.38 and finally the hog given no feed supplementation with a dressing percentage of 86.96.

Table 1. Slaughter and carcass weight and the dressing percentages of the hogs in the different treatments

TREATMENT	SLAUGHTER WEIGHT (kg)	CARCASS WEIGHT (kg)	DRESSING PERCENTAGE (%)
Control, Commercial Feeds (CF)	92.00	80.00	86.96
CF + 1 kg Banana Peelings	101.00	89.00	88.12
CF + Banana Peelings + ½ kg Coconut Meat	103.00	90.00	87.38



Carcass Length, Back Fat Thickness
and Loin Eye Area

Table 2 presents the carcass lengths, back fat thickness, and loin eye area measurements obtained from the hogs in the different treatments. It is shown in the table that the hog given the combination of banana peelings and coconut meat supplementation had the longest carcass length of 98.1 cm and had the highest loin eye area measurement of 1128.18 cm. The hog given banana peelings supplementation follows with a carcass length of 97.5 cm and a loin eye area measurement of 1096.24 cm. The hog given no feed supplementation registered the shortest carcass length of 96.5 cm and a loin eye area measurement of 1096.24 cm.

However, the carcass of the hog given both the banana peelings and coconut meat supplementation had the highest back fat thickness of 2.6 cm and this was probably attributed by the coconut meat given to the pigs. The carcasses of the hogs given banana peelings supplementation and the one given no feed supplementation (control) had back fat thickness of 2.1 cm and 2.3, respectively (Figure 5 and 7).

Table 2. Carcass length, back fat thickness, and loin eye area measurements of the carcasses of the hogs in the different treatments.

TREATMENT	CARCASS LENGTH (cm)	BACKFAT THICKNESS (cm)	LOIN EYE AREA (%)
Control, Commercial Feeds (CF)	96.50	2.30	1096.24
CF + 1 kg Banana Peelings	97.50	2.10	1117.74
CF + Banana Peelings + ½ kg Coconut Meat	98.10	2.60	1128.18





Figure 5. Carcass cut obtained from the hog given no feed supplementation



Figure 6. Carcass cut obtained from the hog given banana peelings supplementation



Figure 7. Carcass cut obtained from the hog given both banana peelings and coconut meat supplementation



Weights of Wholesale Cuts

The weights of the 7 major wholesale cuts of the hogs under the different treatments are shown in Table 3. These 7 major wholesale cuts were composed of the head, right and left belly, right and left shoulder and the right and left ham. Because the hog given banana peelings and coconut meat supplementation had the highest slaughter and carcass weights, it followed that in all of the above wholesale cuts, it had registered the highest weights also. The weights of the wholesale cuts derived from the hog given banana peelings supplementation come next and the hog given no feed supplementation (control) registered the lowest weights.

Table 3. Weights of the 7 major wholesale cuts derived from the hogs in the different treatments (kg)

TREATMENT	HEAD	SHOULDER		BELLY		HAM	
		L	R	L	R	L	R
Control,Commercial	8.0	12.6	12.4	11.3	11.5	12.2	12.0
Feeds (CF)							
CF + 1 kg Banana Peelings	9.0	14.7	14.8	12.2	12.0	13.2	13.1
CF + Banana Peelings + ½ kg Coconut Meat	9.2	14.8	14.9	12.5	12.3	13.3	13.0



Weights of the Digestive Organs
(Stomach and Large and Small
Intestines)

The weights of the digestive organs composed of the stomach and the small and large intestines (full and empty) of the slaughtered hogs from the different treatments are shown in Table 4. As expected, it is revealed in the Table that both the hogs given banana peelings and the one given both banana peelings and coconut meat supplementation had higher weight losses of 6.7 kg and 6.6kg, respectively when comparing weight of digestive organs, full and empty, compared to the hog given no feed supplementation which had a weight loss of 6.5 kg this is expected.

Cooked Meat Evaluation

The rating of the cooked meat derived from the hogs in the three treatments are presented in Tables 5-7. The cooked meat was evaluated in terms of aroma, tenderness and juiciness by a panel of evaluators.

Table 4. Weights of digestive organs, full and empty derived from the hogs in the different treatments (kg)

TREATMENT	FULL	EMPTY	DIFFERENCE
Control, Commercial Feeds (CF)	12	5.5	6.5
CF + 1 kg Banana Peelings	12	5.3	6.7
CF + Banana Peelings + ½ kg Coconut Meat	13	6.4	6.6



Table 5. The tenderness of the meat derived from the hogs in the three treatments as rated by the panel of evaluators

TREATMENT	MEAN	DESCRIPTIVE RATING
Control, Commercial Feeds (CF)	1.78 ^a	Moderately Tender
CF + 1 kg Banana Peelings	1.22 ^a	Very Tender
CF + Banana Peelings + ½ kg Coconut Meat	1.45 ^a	Very Tender

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

Table 6. The aroma of the meat derived from the hogs in the three treatments as rated by the panel of evaluators

TREATMENT	MEAN	DESCRIPTIVE RATING
Control, Commercial Feeds (CF)	1.61 ^a	Good
CF + 1 kg Banana Peelings	1.39 ^b	Very Good
CF + Banana Peelings + ½ kg Coconut Meat	1.17 ^c	Very Good

Means with different superscripts are significantly different at 5% level of significance (DMRT)



Table 7. The juiciness of the meat derived from the hogs in the three treatments as rated by the panel of evaluators.

TREATMENT RATING	MEAN*	DESCRIPTIVE
Control, Commercial Feeds (CF)	1.94 ^a	Moderately Juicy
CF + 1 kg Banana Peelings	1.78 ^a	Moderately Juicy
CF + Banana Peelings + ½ kg Coconut Meat	1.44 ^b	Very Juicy

Means with different superscripts are significantly different at 5% level of significance (DMRT)

In terms of tenderness, statistical analysis revealed no significant differences between treatment means. However, the meat of the hog given no feed supplementation had a descriptive rating of moderately tender and the meat of the hogs given feed supplementation had a descriptive rating of being very tender.

In terms of aroma, statistical analysis revealed that the meat derived from the three treatments differ significantly from each other. The meat of the hog given the combination of banana peelings and coconut meat supplementation had the best aroma, followed by the meat of the hog given banana peelings supplementation and finally the meat of the hog given no feed supplementation [control]. However, both the meat of the hogs given feed supplementation had a descriptive rating of being very good and the meat of the hog given no feed supplementation was rated as good only. The results reveal that giving banana peelings alone or in combination with fresh coconut meat to growing-finishing hogs as feed supplements improves the aroma of the resulting meat when cooked.



Likewise in terms of juiciness, statistical analysis revealed significant differences between treatment means also. The meat of the hog given the combination of banana peelings and raw coconut meat supplementation was observed to be more juicy compared to the meat derived from the hogs in the other treatments. In fact it had a descriptive rating of being very juicy. This was probably attributed by the coconut meat given to the hog. Both the meat derived from the hog given no feed supplementation and the meat derived from the hog given banana peelings supplementation had a descriptive rating of being moderately juicy.



SUMMARY, CONCLUSION AND RECOMMENDATION

Summary

The study was conducted to determine the effects of supplementing the commercial feeds with ripe banana peelings and raw coconut meat on the carcass characteristics on the carcass characteristics of growing-finishing hogs. Specifically, it aimed to determine effect on the carcass characteristics in terms of carcass weight and length, dressing percentage, weights of wholesale cuts and digestive organs, back fat thickness, and loin eye area and also the effect on the cooked meat quality in terms of aroma, tenderness and juiciness.

The results revealed that the hogs supplemented with both banana peelings and raw coconut meat had the highest weights in terms of slaughter and carcass weights and weights of wholesale cuts. It had also the longest carcass and the highest loin eye area measurement. However, in terms of back fat thickness, it had the thickest back fat. The dressing percentages obtained from the three treatments ranged from 86.965% - 88.12%

In terms of cooked meat evaluation, statistical analysis revealed no significant differences between the treatments. Significant differences were observed in terms of aroma and juiciness. Both the meat of the hog given banana peelings and the one given a combination of banana peelings and coconut meat supplementation had a more desirable aroma compared the to the aroma of the meat derived the hog given no feed supplementation. Also, the meat of the hog given the combination of banana peelings and raw coconut meat supplementation was more juicy than the meat derived from the hog given no feed supplementation and the hog given banana peelings supplementation.



Conclusion

Based on the results of the study, it is therefore concluded that supplementing the commercial feed intake of growing finishing hogs with ripe banana peelings alone or in combination with raw coconut meat results to heavier carcass weights, higher loin eye area measurements and the resulting meat has a more desirable aroma and more juicy. Also, hogs, when given banana peelings supplementation results to thinner back fat thickness but giving the hog a combination of banana peelings and raw coconut meat supplementation results to thicker back fat thickness.

Recommendations

Based on the results of the study, ripe banana peelings which used to be wasted may be given to growing finishing hogs as “merienda” or snack. It can also be given in combination with raw coconut meat but the coconut meat should not exceed ½ kg daily. However, a related study should be conducted but should include the nutrient composition of the resulting meat.



LITERATURE CITED

- BARRICK, M. 2009. Pigs Diets Containing Coconut Oil. Retrieved October 27, 2009 from [http:// www.google.com](http://www.google.com).
- CANOPE, H. 1985. Raising of Intake of Fresh Bananas through Adibitum feeding. Retrieved October 27, 2009 from [http:// www.google.com](http://www.google.com).
- DILILING, M.K. 2006. The effect of ripe banana peeling as feed supplement on the performance of growing finishing pigs. BS Thesis. BSU La Trinidad, Benguet.
- GARCIA,F.B. 1991. Carcass Yield and Characteristics of Hogs Slaughter in Sagada Mountain Province. BS Thesis. BSU La Trinidad. Pp. 6-9.
- GUADALOPE, A. 1985. Ensiled and dehydrated Bananas. Retrieved October 27, 2009 from [http:// www.google.com](http://www.google.com).
- LE DIVIDICH, J. 1985. Raising of Intake of Fresh Bananas through Adibitum Feeding. Retrieved October 27, 2009 from [http:// www.google.com](http://www.google.com).
- MANGUSAN, E. T. 2004. Respond of growing finishing pigs to some indigenous feedstuffs (camote leaves, cabbage, banana peelings) in the cordillera region. BS Thesis. BSU La Trinidad, Benguet. P. 16.
- PHILIPPINE COUNCIL FOR AGRICULTURE, FORESTRY AND NATURAL RESOURCES AND DEVELOPMENT (PCARRD). 2009. Bureau of Agriculture Statistic per Capita Consumption of Pork (kg/yr).
- SISON, J.A. 1982. Animal Food Service Bulletin,6:3, Animal Feed Control Division. Bureau of Animal Husbandry, Visayas Avenue, Diliman, Quezon City.
- SILVERIO, V.G.1981. The Utilization of Banana Meal in Hog Ration. Bureau of Animal Industry and National Science Development Board. P. 24.



APPENDICES

Appendix Table 1. Cooked meat quality evaluation in terms of aroma

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
T ₀	1.67	1.67	1.50	4.84	1.61
T ₁	1.17	1.17	1.17	3.51	1.39
T ₂	1.33	1.50	1.13	3.96	1.17
GRAND TOTAL				12.31	
GRAND MEAN					1.39

ANALYSIS OF VARIANCE

SOURCE OF TABLE VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARE	MEAN SQUARE	CF	TABULAR F	
					0.05	0.01
TREATMENT	2	0.295	0.147	22.96 ^{**}	5.14	10.92
ERROR	6	0.033	0.006			
TOTAL	8	0.328				

** = highly significant

Coefficient of Variance = 5.77 %



Appendix Table 2. Cooked meat quality evaluation in terms of tenderness

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
T ₀	2.00	2.00	1.33	5.33	1.78
T ₁	1.33	1.33	1.17	3.83	1.28
T ₂	1.50	1.67	1.17	4.34	1.45
GRAND TOTAL				13.50	
GRAND MEAN					1.50

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARE	MEAN SQUARE	CF	TABULAR F	
					0.05	0.01
TREATMENT	2	0.465	0.2325	3.13 ^{ns}	5.14	10.92
ERROR	6	0.446	0.0743			
TOTAL	8	0.911				

^{ns} = not significant

Coefficient of Variance = 18.39 %



Appendix Table 3. Cooked meat quality evaluation in terms of juiciness

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
T ₀	2.17	1.83	1.83	5.83	1.94
T ₁	1.67	2.00	1.67	5.34	1.78
T ₂	1.50	1.50	1.33	4.33	1.44
GRAND TOTAL				15.50	
GRAND MEAN					1.72

ANALYSIS OF VARIANCE

SOURCE OF VARIANCE	DEGREES OF FREEDOM	SUM OF SQUARE	MEAN SQUARE	CF	TABULAR F	
					0.05	0.01
TREATMENT	2	0.390	0.195	6.93*	5.14	10.92
ERROR	6	0.169	0.028			
TOTAL	8	0.559				

* = significant

Coefficient of Variance = 9.74 %

