EFFECT OF LIQUID YEAST CULTURE WITH PLANT HERBAL EXTRACTS ON SOME CARCASS CHARACTERISTICS OF SWINE

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INTRODUCTION

The gross structure of meat consists of lean, fat, and bone. Among the three components, lean is considered as the most important since it comprises the bulk of carcass, 50-65% of the carcass weight. Fat is the most variable component of meat. It comprises 5-30% of carcass. Older animals tend to contain higher amount of fat. Bone, on the other hand, comprises 15-17% of carcass.

Feed additives are compounds added to swine diets for the purpose of enhancing animal performance, either directly or indirectly. These compounds may elicit a response, and that response of the pig's energy, amino acid, and vitamin/mineral requirements. However, the response is dependent on age of pig, disease level, genetics, environment factors, and type of diet/feedstuffs. The purpose of this paper is to provide an overview of the feed additives currently used in swine production, and to provide background information in order to optimize their use.

One of the products that can be used as feed additives is a liquid yeast culture with herbal extracts. This feed additive is a liquid yeast culture rich in fermentation metabolites and herbal extracts composed of organic acids and organic minerals. According to the manufacturer, this feed additive function is to protect the animal's digestive system from the harmful effects of toxins, parasites, and bacterial pathogens whether they are in water or in feeds. Its unique combination of yeast/phototrophic culture and herbal extracts keeps the digestive system healthy for optimum absorption of feed nutrients. Ammonia emissions are dramatically reduced resulting in minimal upper respiratory challenges thus lowering antibiotics cost.

The manufacturer's claimed characteristics of the liquid yeast culture with plant herbal extracts as feed additives that makes the product economically viable when used in feeds or in water are as: probiotic, prebiotic, acidifier, metabolic activity enhancer, ammonia odor suppressant, immunity enhancer as an anti-parasitic agent. This feed additive has been used successfully in broiler, swine, cattle fattening and layer farms.

Information generated from this study maybe used by 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 liquid yeast culture with plant herbal extract on some carcass characteristics of swine.

Specially, it aimed to determine the effect of liquid yeast culture with plant herbal extracts on back fat thickness, dressing percentage, percent abdominal fat, percent whole sale cuts and edible entrails, loin eye, and carcass length of swine.

This study was conducted at Banig, Tawang, La Trinidad, Benguet from February to March, 2012.

REVIEW OF LITERATURE

Analyses of liquid yeast culture with plant herbal extracts as recommended by Gallali IZW Farm Products (2010) are the following:

Yeast			370.000 per gram
Phototrophic			13.000 per gram
pH			4.0-5.0
Ca	422 Mg/L	P	100 Mg/L
K	429 Mg/L	Mg	149 Mg/L
Fe	41 Mg/L	Mn	1.4 Mg/L
Se	0.0002 Mg/L	Others-traces	
Cu	0.07 Mg/L		

Probiotics

Extensive investigation and research has been carried out on those probiotics approved. For used and their benefits as stated by Sainsbury (1998) may be summarized as follows: (a) probiotics can promote growth and productivity in a natural way; (b) it may protect against salmonella infections; (c) they can protect against toxins produced by harmful forms of E. Coli; (d) it stimulate immunity to infections by boosting interferon production, immunoglobin concentration and macrophage activity; (e) probiotic suppress clostridial infestion which are often associated with intensive livestock production.

Probiotics are beneficial microorganism (mainly lactic acid producing bacteria and yeast combinations) added to rations to improve the intestinal microbial balance of the animal (PCCARD, 2005).These bacteria exert their beneficial effects through "competitive exclusion and lactic acid production. In addition to competitive exclusion is reduction in

gut pH, which makes the intestinal environment unfavourable for certain pathogenic bacteria. There has also been increasing evidence that an acidic environment is conductive to increased enzymatic activity within the digestive system that leads to improved production performance (PCCARD, 2002).

Over the last 10-15 years, probiotics have been proposed as an alternative to antibiotics (Jensen, 2010). On the other hand, Close and Alberta (2010) said that unlike antibiotics, probiotics introduce live beneficial bacteria into the intestinal tract. Accordingly, several authors have assessed the efficacy of probiotics as growth promoters for pigs. Most concluded that when result is averaged over several trials, there is an improvement in growth rate and in the efficiency of feed utilization. However, the results are highly variable. The effects of the may be probiotics more consistent and positive in piglets than in growing-finishing animals.

Prebiotics

Common examples of prebiotics used in research or on farms include oligosaccharides (McDonald *et al*., 2002), oligofructose, fructooligosaccharide (FOS), mannanoligosaccharides (MOS), dietary fibers and insulin. Oligosaccharides have been claimed as beneficial nutritional modifiers for monogastric farm animals. They fall into the group of materials also known as prebiotics, which are defined as compounds, other than dietary nutrients, that modify the balance of the microbial population by promoting the growth of beneficial and thereby provide a healthier.

Certain dietary fibers have been shown to improve intestinal secretions and growth of the digestive mucosa (Mateos *et al*., 2000) and a number of different fiber fractions have been tested for their ability to enhance pig growth and suppress pathogenic bacteria

colonization. The mode of action of the dietary fibers is believed to depend on the specific fraction in question readily fermentable non-digestible oligosaccharides (e.g. fructo-oligosaccharide, galacto-oligosaccharide, and Transco-galactosaccharides) are believed to improve pig performance by stimulating the proliferation of Bifidobacteria in the large intestine, which in turn reduces colonic pH and increases the concentration of lactic acid (Houdijk et al., 2002).

Acidifier

Acidifier is made of organic acid or mixture of organic acid when incorporated in the ration. They exert their effect on the gastrointestinal environment by lowering the stomach pH. Low stomach pH prevents the growth band proliferation of pathogenic microorganisms, thus promoting better feed efficiency (PCCARD, 2000).

Acidifier are believed to enhance growth by improving gut health through reduction of pH and buffering capacity of diets, improvement of pancreatic sections that increase nutrient digestibility, or promotion of beneficial bacterial growth while inhibiting growth of pathogenic microbes (Jacela *et al*., 2009).

Acids generally lowered the pH and buffering capacity of the diet, reduced the pH within the stomach, increase nutrients digestible, promote the performance and improved feed efficiency. The growth promoting effects of acids are most prominent in the first few weeks after weaning (Close and Alberta, 2010).

MATERIALS AND METHODS

Materials

The materials used were six heads of swine given yeast culture with plant herbal extract as feed additive and commercial ration.

The other materials that were used include the following: livestock scale, measuring tape, weighing scale, knives, bolo, stunner, LPG, blow torch, lighter, chopping board, water, and basin.

Preparation of the Ration

The yeast culture was mixed thoroughly with the commercial ration following the dosage recommended by the manufacturer. The feed mixture was given immediately to the pigs after mixing. The dosages of the feed yeast culture to be mixed with the commercial ration were as follows:

Weaners	1.5ml per kilogram of feeds
Starters	0.63ml per kilogram of feeds
Growers	0.40ml per kilogram of feeds
Finishers	0.88ml per kilogram of feeds

Experimental Treatments

The ten weaned pigs were grouped into two treatments following the completely randomized design (CRD). Each treatment was replicated five times with one pig per replication. The individual weights of the experimental animals was taken first and recorded before placing them into their respective pens. The following were the different treatments in the study.

T_0- without liquid yeast culture with plant herbal extracts additive

T_1- with liquid yeast culture with plant herbal extract additive

All experimental animals in each factor were subjected to uniform slaughtering procedures. The following approved practices in slaughtering hogs were followed:

1. Stunning. This is the process of making animals unconscious, prior to bleeding. It is using a GI pipe applied on the forehead at the cross section of the imaginary line between the eye and ears (Figure 1).

2. Sticking. It is bleeding the animal with the used of seven-inch sticking knife. The head is held with the left hand and sticking is done on the hallow portion above the tip of the breast bone (Figure 2).

3. Singeing. Application of flame to a carcass for the purpose of burning the uncraped or unshaved hair and killing some microorganism (Figure 3).

Figure 1. Stunning the Hog

4. Evisceration. It involves the opening of the carcass up to the complete removal of the internal organ from the body cavity (Figure 4).

5. Weighing the Carcass. It is the process of weighing the hog after slaughter excluding the entrails, head and feet (Figure 5).

6. Fabrication. Cutting the carcass into whole sale cuts, namely: shoulder, ham, belly, and loin, then weighing (Figure 6 to 9).

Figure 2. Sticking the Hog

Figure 3. Singeing and Scalding the Hog

Figure 4. Evisceration of Hog

Figure 5. Weighing the Carcass Hog

Figure 6. Weighing the Ham

Figure 7. Weighing the Shoulder

Figure 8. Weighing the Belly

Figure 9. Weighing the Loin

Data to be Gathered

1. Slaughter and Carcass Data

a. Slaughter weight (kg). This was obtained by weighing the animals prior to slaughter using livestock scale after 24 hours of fasting.

b. Carcass weight (kg). It is the weight of the carcass without head, feet and the entrails.

c. Weight of wholesale cut (kg). The carcass was chopped into wholesale cuts which were being weighed individually with a meat scale.

d. Weight of edible entrails (kg). Edible entrails were separated from the carcass and then weighed. Edible entrails consisted of heart, liver, lungs, spleen, kidneys, pancreas and intestines.

2. Carcass Measurement

a. Carcass length (cm). This was taken by measuring from the first rib to the base of the tail on the suspended carcass in centimetre (Figure 10).

b. Back fat measurement (cm). This was measured from the first rib ($P_{1)}$), last rib ($P_{2)}$), and at the lumbar vertebra ($P_{3)}$) of the splitted carcass (Figure 11).

c. Loin eye area (cm^2). This was taken by cutting the loin between the tenth and eleventh rib; the muscle area was carefully traced on an ordinary graphing paper. An ordinary graphing paper was placed at the bottom of the tracing on the acetate paper and the number of squares will be counted. Meat graphing papers are calibrated twenty squares per square inch. The area was been determined using an ordinary graphing paper. The formula that was used was length x width x 0.8. Length was the longest straight line that can be made within the tracings while the width will be the straight line that bisects the length at right angle (Figure 12).

From the above data, the fallowing parameters were computed:

1. Carcass yield. The carcass yield was expressed in terms of dressing percentage using the formula:

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

2. Percentage of abdominal fat

$$\text{Percent of Abdominal Fat} = \frac{\text{Weight of Abdominal Fat}}{\text{Carcass weight}} \times 100$$

3. Percentage of wholesale cuts

$$\text{Percent of Wholesale Cuts} = \frac{\text{Cut weight}}{\text{Carcass weight}} \times 100$$

4. Percent of edible entrails

Percent of Edible Entrails = Weight of edible entrails x 100
Slaughter weight

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) and P_3 (lumbar vertebra).

Figure 10. Measuring the carcass length

Figure 11. Measuring the back fat thickness

Figure 12. Measuring the loin eye area

RESULT AND DISCUSSION

Slaughter Weight, Carcass Weight and Dressing Percentage of Hogs

Table 1 shows the slaughter weight and the dressing percentage of the slaughtered hogs. Statistical analysis showed no significant differences in the slaughter weight, carcass weight, and dressing percentage of hogs feed with pure commercial feeds and those given with pure commercial feeds with liquid yeast culture with plant herbal extracts.

Dressing percentage of slaughtered animals is an indicator of carcass yield. The average dressing percentage of hogs used in this study was 71.54 % for hogs weighing about 85.83 kg slaughter weight. This is relatively higher than the dressing percentage of 69.93% reported by Ibarra (1983) from hogs with a slaughter weight of 87.80 kg. The small discrepancy may be due to the condition of the carcass when the carcass weights were 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).

Table 1. Effect LYC with PHE on the slaughter weight, carcass weight and dressing percentage of hogs

TREATMENTS	SLAUGHTER WEIGHT (Kg)	CARCASS WEIGHT (Kg)	DRESSING PERCENTAGE (%)
Without LYC with PHE	85.33[a]	61.50[a]	72.07[a]
With LYC with PHE	84.33[a]	61.32[a]	71.01[a]

*LYC with PHE- liquid yeast culture with plant herbal extract

Percent Weight of Cuts

Table 2 shows the weight of shoulder, ham, belly and loin expressed as percent of slaughter weight of hogs with an average slaughter weight of 85.83 kg. Statistical analysis showed no significant differences in the percent shoulder, ham and loin of hogs given commercial feeds and those given with pure commercial feeds with liquid yeast culture(LYC) with plant herbal extract. The average percent of shoulder, ham and loin of 85.83 kg hogs were 20.39%, 21.59% and 14.16%, respectively. On the other hand, statistical analysis showed a highly significant difference in the percent belly between treatments. The percent belly of hogs given no LYC supplement (16.31%) was higher thnt the percent belly of hog given LYC (13.40%). The lower percent belly in hogs given LYC could be attributed to a lesser layer of fat observed in this cut.

Compared to the standard average yield in hogs stated by Ibarra (1983), the percent whole sale cuts obtained in this study is relatively higher. The percent whole sale cuts of 87.90 kg reported by Ibarra were 15.99% shoulder, 16.74% loin, 19.20% ham, 16.37% belly having a slaughter weight of 87.90 kg.

Table 2. Whole sale cuts of swine expressed as percent of slaughter weight

TREATMENTS	PERCENT SHOULDER	PERCENT HAM	PERCENT LOIN	PERCENT BELLY
Without LYC with PHE	20.39[a]	21.59[a]	14.16[a]	16.31[a]
With LYC with PHE	20.14[a]	22.10[a]	14.90[a]	13.40[b]

*LYC with PHE- liquid yeast culture with plant herbal extract

Table 3. Whole sale cuts of swine expressed as percent of carcass weight

TREATMENTS	PERCENT SHOULDER	PERCENT HAM	PERCENT LOIN	PERCENT BELLY
Without LYC with PHE	28.34[a]	29.95[a]	19.66[a]	22.64[a]
With LYC with PHE	28.71[a]	31.12[a]	21.00[a]	18.87[b]

*LYC with PHE- liquid yeast culture with plant herbal extract

Table 3 shows the weight of shoulder, ham, belly and loin expressed as percent of carcass weight of hogs with an average slaughter weight of 85.83 kg. Statistical analysis showed no significant differences in the percent shoulder, ham, and loin of hogs between treatments. The average percent of shoulder, ham and loin of 85.83 kg hogs were 28.34%, 29.95% and 19.66%, respectively. On the other hand, statistical analysis showed a highly significant different in the percent of belly. The percent belly of hogs given no LYC supplement (22.64%) was higher than the percent belly of hog given LYC (18.87%).

The trend is similar when the weights of cuts were expressed as percent of slaughter weight and as percent of carcass weight.

Percent of Abdominal Fat
and Percent of Edible
Entrails of Hogs

Table 4 shows the weight of abdominal fat and edible entrails of hogs expressed as percent of carcass weight. Statistical analysis showed a highly significant difference in percent abdominal fat between treatments. The percent abdominal fat of hogs given no

Table 4. Effect of liquid yeast culture with plant herbal extract on the abdominal fat and edible entrails of hogs

TREATMENTS	PERCENT ABDOMINAL FAT	PERCENT EDIBLE ENTRAILS
Without LYC with PHE	1.93[b]	13.10[a]
With LYC with PHE	2.93[a]	12.84[a]

*LYC with PHE- liquid yeast culture with plant herbal extract

LYC supplement (1.93%) was lower than the percent belly of hog given LYC (2.93%). It appears that more fat was deposited in the abdominal with LYC supplementation.

Statistical analysis showed no significant differences in percent edible entrails between treatments. Edible entrails included lungs, liver, heart, spleen, stomach and small intestines. The average percent edible entrails in 85.83 kg hogs was 18.13%.

Back Fat Thickness

Table 5 shows the back fat thickness hogs slaughtered at an average weight of 85.83 kg. Back fat measurement was taken at the back of the animal one inch below the midline in three locations: opposite of first rib (P_1), opposite of last rib (P_2) and opposite of lumbar vertebra (P_3). Statistical analysis showed no significant differences between treatments in the backfat thickness measured at P_1 and P_3. The average back fat measurements of hogs slaughtered at 85.83 kg taken at P_1 and P_2 were 3.0cm and 2.17 cm, respectively. However, the back fat thickness taken at P_2 of hogs given no LYC supplement (3.0 cm) was significantly higher than that taken from hogs given LYC (2.6 cm) supplement.

No significant differences were obtained when the average of the three back fat measurements was taken, despite a significant difference in the P_2 measurement.

Carcass Length and Loin Eye Area

Table 6 present the average carcass length and the loin eye area. Statistical analysis revealed no significant difference between treatments. The average carcass length was 67.00 cm and the average loin eye area was 28.91 cm for hogs slaughtered at an average of 85.83 kg. The carcass length was taken at the tip of symphysis pubis to the forward edge of the first rib. However the loin eye area was computed by multiplying the length and width by 0.08 cm.

Table 5. Back fat thickness of hogs given diets with or without liquid yeast culture with plant herbal extract (cm)

TREATMENTS	BACK FAT THICKNESS (P_1,) (cm)	BACK FAT THICKNESS (P_2) (cm)	BACK FAT THICKNESS (P_3) (cm)
Without LYC with PHE	3.00[a]	3.00[a]	2.33[a]
With LYC with PHE	3.00[a]	2.60[b]	2.00[a]

*LYC with PHE- liquid yeast culture with plant herbal extract

Table 6. Measurement of carcass length and loin eye area

TREATMENTS	CARCASS LENGHT (cm)	LOIN EYE AREA (cm)
Without LYC with PHE	66.33[a]	18.17[a]
With LYC with PHE	67.67[a]	18.09[a]

*LYC with PHE- liquid yeast culture with plant herbal extract

SUMMARY, CONCLUSION AND RECOMMENDATION

Summary

The study was conducted to determine the effect of liquid yeast culture with plant herbal extract on dressing percentage, whole sale cuts, abdominal fat, edible entrails, back fat thickness, carcass length and loin eye area. Six hogs were distributed to two treatments: pure commercial feeds and commercial feeds supplemented with liquid yeast culture (LYC) with plant herbal extract. Each treatment has three replicates.

Data were analyzed using analysis of variance appropriated for CRD. Duncan's Multiple Range Test was used to compare treatment means.

Result showed that supplementing swine rations with liquid yeast culture with plant herbal extract has no significant effect on the dressing percentage, whole sale cuts like shoulder, ham, and loin expressed as percent of carcass weight, weight of edible entrails expressed as percent of slaughter weight, carcass length and average back fat thickness. The average dressing percentage of approximately 85 kg hogs was 71.54%. The wholesale cuts expressed as percent of carcass weight were the following; 20.27% shoulder, 21.85% ham, 14.53% loin. While the average weight of edible entrails express as percent of slaughter weight was 12.97%. The averages of carcass length and back fat thickness were 67 cm and 2.65 cm.

On the other hand, highly significant differences in the weight of belly expressed as percent of carcass weight, back fat thickness at P_2 and weight of abdominal fat expressed as percent of slaughter weight. The weight of belly expressed as percent of carcass weight of hogs given no LYC supplement (22.64%) was significantly higher than that of hogs given the LYC supplement (18.87%). Similarly, back fat thickness at P_2 of hogs given no

LYC supplement (3.00 cm) was significantly higher than that in hogs given the LYC supplement (2.60 cm). On the other hand, weight of abdominal fat expressed as percent of carcass weight in hogs given no LYC supplement (1.93 %) was significantly lower than that in hogs given the LYC supplement (2.93%).

Conclusion

Based on the results of the study, liquid yeast culture with plant herbal extracts may be used as supplement to swine as appears to lower the fat in the belly and in back fat in the region of the last rib.

Recommendation

Based on the findings, liquid yeast culture with plant herbal extract may be used as feed supplement in swine rations.

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