BIBLIOGRAPHY

MALANNA, MARIBETH C. APRIL 2013. Growth Performance of Colored Broilers Given Home – Mixed Ration. Benguet State University, La Trinidad, Benguet.

Adviser: Marlene B. Atinyao, Ph.D.

ABSTRACT

The study was conducted to evaluate the growth performance of colored broilers given different home- mixed ration. Specifically, it aimed to determine the gain in weight, feed intake, feed conversion ratio, and profitability of colored broiler fed with home- mixed ration. Following the Completely Randomized Design, 120, 21-day old colored broilers were distributed into three treatments. Each treatment has four replicates with 10 birds per replicate making a total of 40 birds per treatment. The three treatments were commercial feeds (T_0); 40% corn +10 % soybean + 20% rice bran +15% mongo + 15% copra meal (T_1); 40% corn +20% soybean + 18 % mongo + 12% chayote + 10% galliang tubers (T_2).

Highly significant differences were observed in the gain in weight, feed intake, feed conversion ratio, and feed cost to produce a kilogram gain in weight among the treatments.

Birds fed with 40% corn +20% soybean + 18 % mongo + 12% chayote + 10% galliang tubers had significantly higher average daily gain in weight of 0.031 kg with significantly lower FCR of 1.878 as compare to birds fed with 40% corn +10 % soybean + 20% rice bran +15% mongo + 15% copra meal having an average daily gain in weight of

0.028 kg with an FCR of 1.989. Birds fed with commercial feeds had the highest gain in weight of 0.044 kg with the most efficient FCR of 1.782.

Return on investment results showed that better ROI was obtained from birds given commercial feeds of 26. 961% while birds fed with corn + soybean + mongo + chayote and galliang tubers and those that were given corn + soybean + rice bran + mongo and copra meal had -0.339 and - 7.973 % respectively.

Based on the result of the study, commercial feeds is still the best ration for colored broilers. However, it is worth noting that the formulated rations contain no feed additives whereas, commercial feed contain additives particularly antibiotics and growth enhancers and this may be important to health conscious consumers.

INTRODUCTION

The high cost of feeds has encouraged poultry raisers to look into various practices and breeds of poultry on which they can give alternative feedstuffs that are locally available but are equally nutritious just to reduce feed cost.

To counteract the increasing cost of feeds, colored broilers have become a hot item among big and small poultry raisers since they can be grown free- range style or fed with locally formulated ration.

A greater concern is the residual effect of anti- biotic and growth enhancers to poultry consumers. This paved way to the call for growing birds organically using locally available feedstuffs that are also organically grown. Some of these feedstuffs include ground corn, soybean meal, mongo, rice bran, copra meal, chayote fruit, and galliang tubers.

The study aimed to find out whether colored broilers given home-mixed ration can perform just as well as those given commercially mixed ration. Information generated from this study could serve as guide to poultry raisers, researchers, and students.

Generally, the study was conducted to evaluate the growth performance of French chicken given different home – mixed ration.

Specifically, it aimed to determine gain in weight, feed intake, feed conversion ratio, and profitability of raising colored broiler fed with home – mixed ration.

The study was conducted at the BSU Experimental Project Farm in Balili La Trinidad, Benguet from July 2012 to September 2012.

REVIEW OF LITERATURE

Colored broilers, resembling our own native chickens was believed to have descended from French chickens. They grow faster with delicious and tender meat and strong disease resistance. Colored broilers are free - range, affordable, easy to raise which proves to be a profitable livelihood venture. They graze around the field, or backyard running around and eating grass, corn, leaves, and other natural ingredients. They require about20 -22 %CP from 0-28 days and 16- 18% CP from 28 days to slaughter (Regional Agriculture and Fisheries Information Division – DA 2000).

To become an efficient feed producer, one must be acquainted with the fundamentals of feed formulation. He must not only know what animals require in order to grow and reproduce but at least have a knowledge to use locally found materials to reduce the cost of feeds and compounds ration to meet the daily nutrient requirement of the animals (PCARRD, 2003).

Some of the feedstuff used was corn, rice bran, soybean, copra meal, galliang tubers, chayote, and mongo.

Corn is the most common grain used for feeding poultry and swine. There are two types of corn used as feedstuff, the yellow and the white corn. Yellow corn is preferred to white corn because of its carotene and xantophyll contents. Xantophyll provides a yellow pigment to chicken skin and egg yolk (PCARRD, 2000).

Rice bran is composed mainly of the pericarp and germ of rice as a by- product of the milling of raw rice to produced an edible product. It contains about 13% protein, and

about half as much energy as corn. The high fat content of rice bran (13- 15 %) makes it a fairly good poultry feed (North, 1990).

Church (2010) stressed that soybean meal is highly favorable feed ingredients because it is quite palatable, highly digestible, has high energy value and results in excellent performance when used for different species. However, methionine is most limiting for monogastric species and Vitamin B content is low. In overall value, SBM is considered to be the best plant protein source available in any quantity and it is the standard protein source in many nations used for broilers and swine.

As with most other oilseeds, soybeans have a number of toxic, stimulatory, or inhibitory substances. Raw soybeans are of lower nutritional value than heat – treated soybeans or soybean meal.

Soybean also contains at least four proteins which inhibit trypsin activity. The presence of this factor reduces protein digestibility, which is accompanied by increased of N and S. Heat treatments inactivates this factor.

PCARRD (2003) found that coconut meat meal or copra meal are both an energy and protein source but due to some amino acid deficiencies, it is best used in combination with other protein source.

Galliang tubers *(Xanthosoma sagittifolium*; white flesh) as cited by Njoku and Ohia (2007) is an excellent source of energy and is a good source of Na (1365.05), K (3057.16), Mg (313.70), Ca (190.93), Fe (8.28), P (44.39), Zn (2.49), Cu (0.52) (mg/100g).The mineral composition portray the cultivar as good sources of Na, K, Mg, Ca as well as energy source. With these nutrients, galliang tubers could also be utilized as feed substitute for hogs and poultry. However, values obtained for Ca, Fe and Na are less than the daily

requirement but could be augmented by either increasing the quantity consumed or complimenting it with other food sources.

According to the Philippine Food Composition (1997), the edible part of chayote has lower fiber, protein, and vitamin content than other plants. However, the calorie and carbohydrate content are high chiefly from the young shoots, tubers and seed. On the other hand, micro and macro nutrients supplied by the fruit are adequate. The fruit, particularly the seeds, are rich in amino acids such as aspartic acid, glutamic, phenylalanine, glycine, histidine, isoleucine, and methionine and proline, serine, tyrosine, threonine, and valine.

PCARRD (1991) stated that mungbean (*Vigna radiata*) is one of the cheapest and major sources of plant protein. It has 20-25% protein contents, as well as carbohydrates and also has higher calcium, iron, thiamine, and riboflavin contents than rice or corn; however, it is limited or deficient in the sulfur- containing amino acids, methionine, and cystine. With these nutrients, mungbean could be use as a component of a ration for poultry in combination with other protein sources which could mutually supplement the limiting amino acids.

MATERIALS AND METHODS

Materials

The materials and equipment that were used in the study include one hundred twenty (120) 21days - old colored broilers, commercial feeds, home - made ration, brooding- rearing pens, disinfectants, cartoons, cleaning materials, record book, and weighing scale.

In preparation for the arrival of the chicks, brooding- rearing pens, feeding troughs and waterer were prepared, thoroughly cleaned and disinfected. The floor and the sides were covered with cartoons to prevent the chicks from tripping in the holes and help conserve heat.

At 21-days old, the birds were weighed for their initial weight and randomly assigned to three treatments with four replicates following the Completely Randomized Design.

The treatments were:

T_0– pure commercial grower ration

T_1- A -35% corn +18 % soybean + 10% rice bran +20% mongo + 15% copra meal from 21 – 28 days old of the birds

B- 40 % corn +10 % soybean + 20% rice bran + 15 mungo + 15% copra meal from 29 days until the end of the study

T_2– A- 40% corn +25% soybean + 23 % mongo + 7% chayote + 5% galliang tubers from 21 – 28 days old of the birds

B-40% corn +20% soybean + 18 % mongo + 12% chayote + 10% galliang tubers from 29 days until the end of the study

Ration A for treatments 1 and 2 were formulated to contain 20.00 % CP based on the book values of each feedstuff while ration B for the same aforementioned treatments were formulated to contain 17.00 % CP as shown below:

INGREDIENTS	FORMULATED RATION(PARTS BY WEIGHT)			
	TREATMENT 1		TREATMENT 2	
	RATION 1	RATION 2	RATION 1	RATION 2
Corn	35	40	40	40
Soybean	18	10	25	20
rice bran	12	20	-	-
copra meal	15	15	-	-
Mongo	20	15	23	18
Galliang tubers	-	-	5	10
Chayote	-	-	7	12

Preparation of Ration

Prior to mixing, chayote and galliang tubers were chopped into small cubes. Each feedstuff was weighed on their corresponding amounts.

Feeding Management

Birds were given commercial feeds *ad libitum* from day old to 21- day- old of age. Formulated rations were offered at day 22 until the end of the study. At day 22, the commercial and formulated rations were offered for three hours twice a day, at 7:00 – 10:00 in the morning and 3:00 – 6:00 in the afternoon only. From 7:00 AM to 3:00 PM, the birds were not given any feed but water was always available.

Data Gathered

1. Initial weight (kg). This was taken by weighing the birds at 21days of age.

2. Final weight (kg). This was determined at 60 days of age of the birds.

3. Feed offered (kg). The weight of the feeds given to the birds from 21-60 days.

4. Feed left over (kg). This is the weight of any feeds spilled, wet, or refused by the birds.

5. Cost of feed (Php, DM basis). This was determined by recording all the expenses incurred for the feedstuff during the study.

Data Computed

1. Total gain in weight (kg). This was computed by subtracting the initial weight taken at 21 days of age from the final weight taken at 60 days of age.

2. Daily gain in weight (kg). This was computed by dividing the total gain in weight by the duration of the experimental period.

3. Average feed consumption (DM basis, kg). This was obtained by subtracting feed left over from the total feeds given to the birds daily.

4. Feed conversion ratio (DM basis). This was obtained by dividing the total feed consumption by the total gain in weight of the birds.

5. Cost of feeds to produce a kilogram live weight of colored broiler (Php). This was taken by multiplying the cost of feeds per kilo by the feed conversion ratio.

6. Morbidity rate (%). This was obtained by dividing the total number of sick birds by the total number of birds in each treatment and multiplied by 100 %.

7. Mortality rate (%). This was obtained by dividing the total number of dead birds by the total number of birds in each treatment and multiplied by 100%.

8. Net gain (Php).This was computed by subtracting the total cost of production from the total sales.

9. Return on investment (ROI)

$$\frac{\text{Total Sales} - \text{Total Cost of Production}}{\text{Total Cost of Production}} \times 100\%$$

Statistical Analysis

All data were subjected to analysis of variance (ANOVA) and treatment means were compared using the Duncan's Multiple Range Test (DMRT).

RESULTS AND DISCUSSION

Initial and Final Weight

Table 1 presents the initial and final weight of the experimental birds in the different treatments. Statistical analysis showed no significant differences in the initial weight taken at 21 days of age of the birds between treatments. This implies that experimental units were homogenous. The average weight of the birds was 0. 438 kg.

Statistical analysis revealed highly significant differences on the final weight of birds taken at 60 days of age. The average final weight of birds given commercial ration of 2.165 kg was the highest final weight among the treatments, followed by birds fed with corn, soybean, mongo, galliang tubers and chayote with a final weight of 1.668 kg. Birds given corn, soybean, mongo, copra meal and rice bran has the lowest average final weight of 1.538 kg.

The difference of 0.627g on the average final weight of the birds given commercial ration and birds given corn, soybean, mongo, copra meal, and rice bran is highly significant. On the other hand, the average final weight of birds given corn, soybean, mongo, galliang tubers and chayote was significantly lower by 0.497 when compared to birds fed with commercial ration, but is significantly higher by 0.130 g when compared with birds given corn, soybean, mongo, copra meal and rice bran. These differences were direct results of differences in average daily gain.

Table 1. Average initial and final weights of birds at 21 and 60 days of age respectively

TREATMENT	INITIAL WEIGHT (KG)	FINAL WEIGHT (KG)
Commercial feeds	0.037[a]	2.165[a]
Corn + SBM + mongo + coconut meal + rice bran	0.039[a]	1.538[c]
Corn + SBM + mongo + chayote + galliang tubers	0.037[a]	1.668[b]

Means with common superscripts are not significantly different 0.05% by DMRT

Gain in Weight of Birds
from 21-60 Days of Age

Table 2 shows the mean total and daily gain in weight of the birds from 21 to 60 days of age in the different treatments for a feeding period of 39 days. Following the trend in final weight, statistical analysis revealed highly significant differences in the total and daily gain in weight of the birds. Average total and daily gain in weight of birds fed with commercial ration (1.728 and 0.044 kg respectively) was highly significant by 0.0629g and 0.0160g than birds given with home-mixed ration of corn, soybean, mongo, rice bran and copra meal (1.099 kg and 0.028 kg respectively) and with those given a ration of corn, soybean, mongo, chayote and galliang tubers (1.230 kg and 0.031 kg respectively) by 0.498g and 0.028g.

Differences on the total and daily gain in weight of the birds may be attributed to the nutrient composition of the ration used in this study. Furthermore, commercial feeds contain feed additives that could enhance growth performance of the animals, hence, the significant difference in the performance.

Table 2. Average total and daily gain in weight of the birds

TREATMENT	GAIN IN WEIGHT (KG)	
	TOTAL GAIN	DAILY GAIN
Commercial feeds	1.728[a]	0.044[a]
Corn + SBM + mongo + coconut meal + rice bran	1.099[c]	0.028[c]
Corn + SBM + mongo + chayote + galliang tubers	1.230[b]	0.031[b]

Means with common superscripts are not significantly different 0.05% by DMRT

While the home-mixed rations used were formulated to contain the recommended crude protein (CP) of a poultry ration, other nutrients were not considered in the formulation.

It may be worth noting however, that despite this, birds still gained weight when fed with the home-mixed ration with no additive added.

In addition, colored broilers fed with the commercial ration was given a grower ration that contains 20% CP for the whole 39 days experimental period, while those given the home-mixed ration were given home-mixed ration that contain 20% CP from day 21-28 (7 days) and another ration that contain 17% CP (32 days) from day 29 to 60.

Feed Consumption of the Birds from 21 to 60 Days of Age

Table 3 shows the average feed consumption of the birds from 21- 60 days. Commercial ration having dry matter content of 90.643% has the highest consumption as revealed by statistical analysis having an average of 3.076 kg. This is significantly higher

by 0.892 than the average feed intake of birds given corn +soybean + rice bran + mongo + and copra meal having DM content of 86.677% with an average of 2.184 kg. Also, with

Table 3. Average feed consumption of the birds

TREATMENTS	FEED CONSUMPTION (KG)	
	AS FED	DRY MATTER
Commercial feeds	3.403[a]	3.076[a]
Corn + SBM + mongo + coconut meal + rice bran	2.522[c]	2.184[c]
Corn + SBM + mongo + chayote + galliang tubers	3.054[b]	2.311[b]

Means with common superscripts are not significantly different 0.05% by DMRT

those birds fed with corn + soybean + mongo + chayote and galliang tubers by 0.765 with an average feed intake of 2.311 kg DM (content of 75.789%).

Differences on the consumption implied that feed consumption of the birds was directly affected by the type of ration given. It appears that bird's find the ration compose of corn + soybean + mongo + copra meal + rice bran less acceptable hence, having the lowest intake among the treatments. As observed, the birds might find the mungbean less palatable as it was always found retaining on the bird's feeder and also with the rice bran because it is too fine on which the birds could hardly picked. These factors have led to lot of left-over thus, the lower consumption as well as the lower gain in weight of birds.

Feed Conversion Ratio

Table 4 shows the feed conversion ratio of colored broiler from 21 to 60 days of the birds. This was obtained by dividing the total feed consumption by the total gain in weight of the birds. The lower the FCR, the better is the performance of the bird. Statistical analysis

revealed significant differences in the feed conversion ratio (FCR) as fed and dry matter basis.

Birds given corn, soybean, mongo, chayote, and galliang tubers had a higher FCR (as fed basis) of 2.482 on the birds given corn, SBM, mongo, copra meal and rice bran of 2.295 was due to the high water content of chayote and galliang tubers.

However, on dry matter basis birds given corn, mongo, chayote and galliang tubers having an average FCR of 1.878 was significantly better in utilizing the feed they consumed in a unit gain in weight than birds fed with corn, soybean, rice bran and copra meal which has an average feed conversion ratio of 1.989. Birds given commercial ration has the most efficient FCR (as fed and DM basis) of 1.969 and 1.782 respectively, among the treatments.

Higher feed conversion ratio on formulated ration was due to the lack of some essential nutrients needed for growth on the ration given to the birds.

While the ration was formulated to contain 17% crude protein based on the book values of the feedstuff and on the CP requirement of poultry ration, the ration was

Table 4. Feed conversion ratio (FCR)

TREATMENT	**FEED CONVERSION RATIO**	
	AS FED	DRY MATTER
Commercial feeds	1.969[a]	1.782[a]
Corn + SBM + mongo + coconut meal + rice bran	2.295[b]	1.989[c]
Corn + SBM + mongo + chayote + galliang tubers	2.482[c]	1.878[b]

Means with common superscripts are not significantly different 0.05% by DMRT

analyzed at the DOST-CAR using Kjeldhal method. It was found that ration composed of corn, soybean, mongo, copra meal, and rice bran has an actual composition of 14% CP and 4.729% ash while the ration with corn, soybean, mongo, galliang tubers and chayote has 19.70% CP and 2.523% ash content.

The lower or higher CP content of the ration than on the intended amount on the formulation was maybe due to the differences on the quality of the feedstuff used on those that were stated on the books.

Another factor could be the less consumption. That the feed consumed were probably used for body maintenance and less was put on the growth of the birds.

Feed Cost to Produced a Kilogram Gain

Birds given pure commercial feeds (Php27 per kg) has the lowest feed cost of Php53.163 to produce a kilogram of colored broiler. The feed cost to produced a kilogram of colored broiler under formulated ration composed of corn + soybean + mongo + chayote and galliang tubers (Php31.996 per kg) was Php73.43. Birds fed with corn + soybean + rice bran + mongo and copra meal (Php33.145 per kg) incurred the highest feed cost of Php76.068.

Formulated ration has the highest feed cost to produced a kilogram of colored broiler because of the high prices of the feedstuff used such as the mongo, soybean and also with the copra meal.

Table 5. Feed cost to produce a kilogram gain

TREATMENTS	FEED COST TO PRODUCE A KILOGRAM OF COLORED BROILER (PhP)
Commercial feeds	53.163[a]
Corn + SBM + mongo +coconut meal + rice bran	76.068[c]
Corn + SBM + mongo + chayote+ galliang tubers	73.431[b]

Means with common superscripts are not significantly different 0.05% by DMRT

Return on Investment

Table 6 presents the return on investment among treatments. Birds given pure commercial ration (control) had the highest return on investment of 26.961%.

Negative ROI was obtained on birds given formulated ration because of the higher market prices of the feedstuff used in the formulation and preparing the ration is a bit laborious so the labor is higher than the birds fed with commercial ration. In addition, low sales of birds were obtained due to their lower gain in weight.

However, positive ROI could possibly be obtain when an individual has resources on his own, like by-products of his farm or seeds from grasses which are not used as food but are still fairly edible and nutritious for birds. Another possible way is to buy feedstuff by bulk to obtain lower cost of feedstuff.

Table 6. Return on investment

TREATMENT	TOTAL COST (PhP)	TOTAL SALES (PhP)	NET INCOME (PhP)	ROI (%)
Commercial feeds	9, 202	11, 683	2, 481	26. 96
Corn + SBM + mongo +coconut meal + rice bran	10, 522	9, 683	- 839	-7.97
Corn + SBM + mongo +chayote + galliang tubers	10, 017	9, 622	-34	-0.34

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary

The study was conducted to determine the effect of home – mixed ration on the growth performance of colored broiler, from 21 to 60 days of age of the birds. Specifically, the gain in weight, feed consumption, and feed conversion ratio.

A total of 120, 21- day old birds were used in the study. Following the Completely Randomized Design (CRD) the birds were distributed into three treatments. Each treatment was replicated four times with ten birds per replicate completing a total of 40 birds per treatment. The different treatments were as follows: control or pure commercial feeds (T_0); corn + soybean + rice bran + mongo and copra meal (T_1); corn + soybean + mongo + chayote and galliang tubers (T_2).

Statistical analysis showed no significant differences in the initial weight taken at 21 days of age of the birds between treatments. This indicated that the experimental units were homogenous. The average weight of the birds was 0. 438 kg.

Statistical analysis revealed highly significant differences in the final weight of the birds. The average final weight of birds given commercial ration of 2.165 kg was the highest among the treatments, followed by birds fed with corn, soybean, mongo, galliang tubers and chayote with final weight of 1.668 kg. Birds given corn, soybean, mongo, copra meal and rice bran had the lowest average final weight of 1.538 kg.

Likewise, statistical analysis revealed highly significant differences in daily gain in weights of birds. The daily gain in weight of birds fed with commercial ration of 0.044 kg was 0.0160kg higher than the daily gain of birds given with home-mixed ration of corn,

soybean, mongo, rice bran and copra meal of 0.028 kg and 0.028 kg higher than the average daily gain of birds given corn, soybean, mongo, chayote and galliang tubers of 0.031 kg. Birds given commercial ration has the highest consumption with an average of 3.076 kg. This is significantly higher compared to the feed intake of birds fed with corn + soybean + mongo + chayote and galliang tubers having an average of 2.311kg. Birds given corn +soybean + rice bran + mongo + copra meal has the lowest consumption with an average of 2.184 kg.

Birds given corn, mongo, chayote and galliang tubers had an average FCR of 1.878 was significantly better in utilizing the feed they consumed in a unit gain in weight than the birds given corn, soybean, rice bran and copra meal with an average feed conversion ratio of 1.989. Birds with commercial ration have the most efficient FCR of 1.782 among the treatments.

Returns on investment result shows that better ROI was obtained from birds given commercial feeds of 26. 961% while birds fed with corn + soybean + mongo + chayote and galliang tubers and those that were given corn + soybean + rice bran + mongo and copra meal had resulted to -0.339 and - 7.973 % respectively.

Conclusion

Based on the study, colored broilers fed with commercial ration have the best overall growth performance compared to the other treatments given home- mixed ration.

Recommendations

From the results, commercial feeds on colored broiler gave a better performance and therefore giving the used home – mixed ration in the study is not recommended. However,

health conscious raisers, aiming to raise their colored broilers using non-commercial feeds and having resources could still modify and improve the formulation for a better effect on colored broilers.

For further study on home- mixed ration, it is necessary to have up-to-date cost of likely constituents so that a complete economical ration can be made up to the constraints given and formulate a home-mixed ration having a CP content which is equal to the CP content of commercial ration.

It is also recommended that energy; amino acid and other nutrients would be considered in balancing ration rather than crude protein content only to assure that other nutritional needs of the birds are met. Phytogenics grown organically could also be added on the ration to enhance the bird's appetite and consumption.

LITERATURE CITED

CHURCH, D. C. 2010. Livestock Feeds and Feeding.6th Edition. Prentice Hall.P. 74.

NJOKU P. C. and C. C. OHIA. 2007.Spectrophometric Estimation Studies of Mineral Nutrient in Three Cocoyam Cultivars. Federal University of Technology. Owerri, Nigeria. Retrieved 06 February 2013 from. http://pjbs.org/pjnonline/fin766.pdf.

NORTH, M. O. 1990. Commercial Chicken Production Manual. 4th Edition. Van Nostrand Reinhold New York. P. 574.

PHILIPPINE FOOD COMPOSITION. 1997. Nutrition and You. Retrieved on 09 July 2012 from http://www.nutrition-and-you.com/chayote.html.

PHILIPPINE COUNCIL FOR AGRICUTURE, FORESTRY AND NATURAL RESOURCES AND DEVELOPMENT (PCARRD). 1991. The Philippines Recommends for Mungbean. Los Banos, Laguna. P. 69.

PHILIPPINE COUNCIL FOR AGRICUTURE, FORESTRY AND NATURAL RESOURCES AND DEVELOPMENT (PCARRD). 2003. The Philippines Recommends for Livestock Feed Formulation. Los Banos, Laguna. Pp.11- 88.

PHILIPPINE COUNCIL FOR AGRICUTURE, FORESTRY AND NATURAL RESOURCES AND DEVELOPMENT (PCARRD). 2000. The Philippines Recommends for Feed Formulation. Los Banos, Laguna. Pp. 30- 33.

REGIONAL AGRICULTURE AND FISHERIES INFORMATION DIVISION, DEPARTMENT OF AGRICULTURE. (RAFID – DA). 2000. San Agustin, PiliCamarines Sur. Retrieve 03 May 2012 from http://www.bicol.da.gov.ph/news/technoguide/sasso_chicken.html.