http://dx.doi.org/10.22161/ijeab/4.3.4 *ISSN: 2456-1878*

Re-Engineering on the Production of Surrogate Feeds for Broiler Chickens (Gallus–Gallus Domesticus): its Effects on Broilers' Live and Carcass Weights and Consumption Cost

Gener S. Subia, Jennilyn C. Mina, Rowell A. Diaz, Romeo B. Campos, Jr. and Gerald Quijano

***Abstract*—** *This experimental study focused on the production of alternative feeds for broilers chickens using golden apple snail shell as the main ingredient. Three groups were compared and the characteristics of them are as follows: The commercial group was given pure commercial feeds, treatment one group (T_1) was given 25% pomaceacanaliculata's shell that was mixed with 37.5% of rice bran and 37.5% of corn, and the third group which was treatment (T_2) was given 50% pomaceacanaliculata's shell that was mixed with 25% of rice bran and 25% of corn as feed mix.The study found out that golden apple snail shell can be mixed with feeds for broiler production without negative effect on the carcass recovery. It can replace commercial feeds as food for broilers especially if the farm area or area near it were infested by golden apple snail. Although the consumption cost among the treatments and the commercial feed do not differ, it is practical to use T_2 as a substitute for commercial feeds since it is less than P3.00 to P5.00 per consumption cost.*

The findings of this study have valuable financial implications, particularly to the farmers and poultry owners.

***Keywords*— Broiler chickens, consumption cost, feeds, re-engineering.**

I. INTRODUCTION

Rice is life, for most people living in Asia and has shaped the cultures, diets, and economies of thousands of millions of people [1]. One of the countries in Asia that rice is their most significant food crop in the Philippines. It is the 9th largest rice producer in the world, accounting for 2.8% of global rice production [2].

However, because of pests and insects, rice produces low income for many farmers in the country. In the study of [3], their respondent farmers rated pesticide application was perceived to be effective (73%) but not efficient in controlling rice insects. Moreover, farmers recognized the negative effects of pesticide applications in the environment (76%). Thus, efficient, safe, low-cost pest control strategies are needed to reduce the reliance of farmers to pesticides and to improve agricultural production and food security of smallholder farmers in the Philippines[3], thus, increasing their production and income.

One of the rice pests that needed to be controlled efficiently and safely is the "Golden Apple Snail" also known as "Golden Kuhol". The golden apple snail, (Pomacea Canaliculata) (Mesogastropoda Palidae) has been introduced to several Asian countries where it has unexpectedly developed into a pest of rice [4].According to several researchers as cited by [5], this species has invaded several European, American, and Asian countries and damages rice and aquatic organisms.

Maria Lizbeth Severa J. Baro of the Bureau of Agricultural Research (BAR), stated that "golden kuhol may be considered a threat in rice production, but many farmers are (again) looking at the golden kuhol at a different perspective" [6]. Since golden kuhol is nutritious and easy to digest and snail meat provides protein and energy-giving fat while the shell contains calcium, phosphorous, vitamins, and minerals, farmers used it as supplementary feed for their livestock and Chickens [6].

The chicken (Gallus gallusdomesticus), is a type of domesticated fowl, a subspecies of the red jungle fowl that is one of the most common and more in any other bird and in any domestic animals, with a total population of more than 19 billion as of 2011[7]. Since the number of chicken increases significantly, the need to feed them with food that could stimulate their fast growth and reproduction is necessary.

According to [8], "one of the common issues with regard to backyard flocks relates to poor or inadequate

http://dx.doi.org/10.22161/ijeab/4.3.4 *ISSN: 2456-1878*

feeding programs that can lead to vitamin and mineral deficiencies for the birds. Vitamins and minerals are very important components of a chicken's diet and unless a formulated ration is feed, it is likely that deficiencies will occur."

As researchers and teacherswho have the knowledge and the sense of purpose that allows them to rise above casual or conventional approaches and to dothings others cannot [9] as cited in [10]and persons who are engaged in business enterprise particularly in farming and livestock production, the researchers borrowed the idea of using golden kuhol shellas an alternative feeds for chicken, especially broiler chickens. This study would help not only them but the farmers in their province to reduce the said pest in their farm and turn it into resources. This could also providethe researchers' additional savings since they will be using free alternative feeds for their broilers instead of buying commercial feeds.

The context of the problem gave the idea to the researchers to conduct a study onthe production of surrogate feeds for Broiler Chickens (Gallus–Gallus Domesticus) and looked on its effects on broilers' live and carcass weights and consumption cost in Barangay, San Roque, San Isidro, Nueva Ecija.

II. METHODOLOGY

This study utilized an experimental research design.The commercial group was given pure commercial feeds, treatment one (T_1) was given 25% *pomaceacanaliculata's* shell that was mixed with 37.5% of rice bran and 37.5% of corn, and the third group which was treatment (T_2) was given 50% *pomaceacanaliculata's* shell that was mixed with 25% of rice bran and 25% of corn as feed mix. There were two sampling procedures used in the broiler chickens. The first procedure was the complete enumeration sampling, a type of purposive sampling technique where all the live weight broiler chicken got their weight and measures. The second procedure is random sampling. The random sampling procedure was used in the carcass recovery of the broiler chicken. The researchers used Microsoft Excel and statistical package for social sciences (SPSS) in analyzing the gathered numerical data. The study was conducted from January 2018 to July 2018.

III. RESULTS AND DISCUSSION

1. Live Weight of Broiler Chicken

Table 1.1.Live Weight of Broiler Chicken

LIVE WEIGHT in Grams *(g)*			
	Treatment 1	***Treatment 2***	***Control Group***
Week 0	77.21	77.21	77.21
Week 1	153.85	168.85	154.75
Week 2	242.55	270.05	232.75
Week 3	587.55	625.05	680.05
Week 4	1169.05	1169.05	1227.05
Week 5	1419.05	1519.05	1553.05
Week 6*	1600.05	1669.05	1713.05
Sum	***5,172.10***	***5,421.10***	***5,560.70***
Average	***862.02***	***903.52***	***926.78***
Variance	***381,963.95***	***410,797.87***	***447,836.07***

** last five (5) days of observation to complete 40 days.*

Table 1.1 presents the sum, average, and variance of live weight of the broiler chicken from week 1 to week 6 after subjected to the feeding ofthe three different treatments. The weekly sum, average, and variance of the Treatment 1 ***(T1)***were 5,172.10; 862.02; and 381,963.95 respectively. For Treatment 2 ***(T2),*** the weekly total sum in grams was 5,421.10; 903.52 for the average; and 410,797.87 for a variance. For control (commercial) group the weekly total sum in grams was 5,560.70; 926.78 for the average; and 447,836.07 for variance.

The data revealed that the control group fed with commercialized feeds was heavier than other groups of chickens in terms of their live weight. Further testing to show if the commercial feeds are superior to the other treatments as to its effects on the live weight of the broilers chickens, Table 1.2 shows that it is not.

http://dx.doi.org/10.22161/ijeab/4.3.4 *ISSN: 2456-1878*

Table 1.2.Comparison of the Three Treatments as to their Effect to the Live Weights of Broiler Chickens

Source of Variation	***SS***	***Df***	***MS***	***F***	***p–value***	***Decision***
Between Groups	12916.62	2	6458.31	0.01562	0.9845	Ho Accepted
Within Groups	6202989.42	15	413532.63			
Total	6215906.04	17				

There is no significant difference on the live weight of the broilers that were subjected to T_1 (25% *pomaceacanaliculata's* shell that was mixed with 37.5% of rice bran and 37.5% of corn), T_2(50% *pomaceacanaliculata's* shell that was mixed with 25% of rice bran and 25% of corn as feed mix)and the control group (which were fed with commercial feeds), respectively. The computed p–value of 0.9845 using Analysis of Variance (ANOVA)was greater than 5% level of significance which means the Ho (Null hypothesis) is accepted implying that there is no significant difference in the live weights of the broiler chickens subjected in the three different treatments.

This result suggests that the broiler chickens have similar live weights regardless if they have eatenT_1, T_2orcommercial feeds.This implies that the commercial feeds can be replaced by the two treatments in feeding broiler chickens if the commercial feeds are not available.

2. Dressed (Carcass) Weight of Broiler Chickens

Table 2.1.Dressed (Carcass) Weight of Broiler Chicken

Dressed (Carcass) in Grams *(g)*			
Replication	***Treatment 1***	***Treatment 2***	***Control Group***
I	1,250	1,350	1,400
II	1,200	1,350	1,250
III	1,250	1,250	1,350
Sum	***3,700***	***3,950***	***4,000***
Average	***1,233.33***	***1,316.67***	***1,333.33***
Variance	833.33	3,333.33	5,833.33
** last five (5) days of observation to complete 40 days.*			

Table 2.1 presents the dressed (carcass) weight of the broiler chickens classified into varying levels of Treatments. The data divulged that the control group fed with commercialized feeds was heavier in their weight in grams than the other groups. The sum of carcass weight, average, and variance of the Treatment 1 ***(T1)*** were3,700; 1,233.33; and 833.33 respectively. For Treatment 2 ***(T2),*** the sum in carcass weight for each replication was 3,950; 1,316.67 for the average; and 3,333.33 for a variance. Lastly, for the control (commercial) group the sum of each replication for carcass weight in grams was 4,000; 1,333.33 for the average; and 5,833.33 for variance. Testing if the difference was significant, Table 2.2 shows the result.

Table 2.2.Comparison of the Three Treatments as to Dressed (Carcass) Weight of Broiler Chickens

Source of Variation	***SS***	***Df***	***MS***	***F***	***P–value***	***Decision***
Between Groups	17222.22	2	8611.11	2.5833	0.1551	Ho Rejected
Within Groups	20000	6	3333.33			
Total	37222.22	8				

The computed p–value of 0.1551 using Analysis of Variance (ANOVA)was greater than 5% level of significance which means that the Ho is accepted implying that there is no significant difference in the dressed (carcass) weights of the broiler chickens exposed in the three different treatments.

The data suggests that the broiler chickens have the same dressed (carcass) weights irrespective if they have eaten25% *pomaceacanaliculata's* shell that was mixed with 37.5% of rice bran and 37.5% of corn,50% *pomaceacanaliculata's* shell that was mixed with 25% of rice bran and 25% of cornor which were fed with commercial feeds.

This means that the two treatments can substitute the commercial feeds especially if golden apple snails are prominent in the area.

3. Feed consumption weight

Table 3.1.Feed Consumption Weight of Broiler Chicken

Feed Consumption Weight in Grams (g)			
	Treatment 1	***Treatment 2***	***Control Group***
Week 1	1,436.50	1,436.50	2,693.27
Week 2	1,915.33	1,915.33	3,591.02
Week 3	2,872.98	2,872.98	5,386.52
Week 4	4,309.47	4,309.47	8,079.77
Week 5	5,027.71	5,027.71	9,426.40
Week 6*	3,589.86	3,589.86	6,733.15
Sum	**19,151.85**	**19,151.85**	**35,910.13**
Average	***3,191.98***	***3,191.98***	***5,985.02***
Variance	1452083.897	1452083.897	5104382.062
** last five (5) days of observation to complete 40 days.*			

Table 3.1 presents the feed consumption weight of broiler chickens classified into varying levels of Treatments.The weekly sum feed consumed weight, average and variance of the Treatment 1 ***(T1)*** with 25% level of shell were 19,151.85; 3,191.98 and 1,452,083.897 respectively. For Treatment 2 ***(T2),*** the weekly total sum feed consumed in grams was 19,151.85; 3,191.98 for the average; and 1,452,083.897 for a variance. For Control (commercial) group the weekly total sum of feed consumed weight in grams were35,910.13; 5,985.02 for the average; and 5,104,382.062 for variance.

The data presented revealed that the control group fed with commercialized feeds consumed more weightin grams of feeds. When compared to see if the difference of feeds consumed is significant, Table 3.2 shows the result.

Table 3.2.Comparison of the Three Treatments as to Feed Consumption Weight

Source of Variation	*SS*	*df*	*MS*	*F*	*P–value*	*F crit*
Between Groups	14078692.85	2	7039346.43	2.64	0.1507	Ho Accepted
Within Groups	16017099.71	6	2669516.62			
Total	30095792.56	8				

Table 3.2 shows the significant difference on the feed consumption weight of broiler chickenssubjected to the three treatments. The p–value of 0.1507is greater than 0.05 which means that the Ho is accepted. This means that there is no significant difference in the feed consumption weight regardless of the treatments.

4. Cost Analysis

Table 4.1 shows the cost analysis ofT_1 (25% *pomaceacanaliculata's* shell that was mixed with 37.5% of rice bran and 37.5% of corn), T_2(50% *pomaceacanaliculata's* shell that was mixed with 25% of rice bran and 25% of corn as feed mix)and the control group (which were fed with commercial feeds), respectively.

T_2shows that the cost in every broiler chicken is much lesser than T_1 and in the control group.

Table 4.1.Cost Analysis of the Three Treatments

Variable Cost in Peso	Treatment 1	Treatment 2	Control Group
eeds	63.74	49.26	71.84
Power	8.08	8.08	8.08
Vitamins/Medical	16.20	16.02	28.02
Watering	5.31	5.31	5.31
Labor	14.32	10.88	14.34
Chicken	30.02	30.02	30.02
Other Cost	12.46	11.97	15.77
Total cost per broiler chicken	150.13	131.54	173.38
Average cost per treatment	21.40	18.77	24.75

Using ANOVA (Table 4.1) to determine if the cost per treatment differs with each other, the result revealed that there is no significant difference among the three groups since the computed p–value of 0.8527 was less than 0.05. This means that the Ho is accepted implying that there is no significant difference in the cost of feed per consumption of each treatment.

Table 4.2. Comparison of the Cost Analysis of the Three Treatments

Source of Variation	*SS*	*df*	*MS*	*F*	*P–value*	*F crit*
Between Groups	125.56	2	62.78	0.1608	0.8527	Ho Accepted
Within Groups	7028.81	18	390.49			
Total	7154.367981	20				

IV. CONCLUSIONS AND RECOMMENDATIONS

Golden apple snail shell can be mixed with feeds for broiler production without negative effect on its carcass recovery. It is one of the easy and efficient ways [11] of developing surrogate feeds. They can replace commercial feeds as food for broilers especially if the farm area or area near it were infested by golden apple snail. Although the consumption cost among the treatments and the commercial feed do not differ, it is practical to use T_2 as a substitute for commercial feeds since it is less than P3.00 to P5.00 per consumption cost.

Based on the findings and conclusions, the researchers offered the following: Golden apple snail shell with the range 0 to 50% can be mixed to the feeds for broiler for a better carcass recovery and consumption cost. Also, it can be a source of income of farmers for the reason that it can be converted into nutritious feeds for broilers. Likewise, it can lessen the expenses of the poultry raisers because the price of commercial feeds is slightly higher than the alternative feeds that are made from the shell of golden apple snail.Lastly, the project feasibility study is recommended to identify the potential market of the proposed alternative feeds and for further verification of the result of this study.

REFERENCES

[1] Gnanamanickam S.S. (2009) Rice and Its Importance to Human Life. In: Biological Control of Rice Diseases. Progress in Biological Control, vol 8. Springer, Dordrecht. DOI https://doi.org/10.1007/978-90-481-2465-7_1

[2] Crop Production Statistics (2009). FAO Stat. FAO Statistics. Retrieved 30 March 2011.

[3] Cabasan, M.T.N. ,Tabora , J.A.G. Cabatac, N.N. , Jumao-as, C.M. , Soberano, J.O. ,Turba, J.V. ,N.H.A. , Dagamac and Barlaan, E. (2019).Economic and ecological perspectives of farmers on rice insect pest management . Global J. Environ. Sci. Manage. 5(1): 31-42, Winter 2019. DOI: 10.22034/gjesm.2019.01.03

[4] Matthias Halwart (2008) The golden apple snail *Pomaceacanaliculata* in Asian rice farming systems: Present impact and future threat, International Journal of Pest Management, 40:2, 199-206, DOI: 10.1080/09670879409371882

[5] Buctot, F. (2018). Production performance of native chicken (gallusgallusdomesticus) supplemented with fermented golden apple snail (pomaceacanaliculatalamark) extracts. Innovative technology and management journal , volume 1, number 1

[6] Kirhat (2009).Potentials in golden kuhol.http://seeknomore.blogspot.com/2009/03/potentials-in-golden-kuhol.html

[7] UN's Food and Agriculture Organisation (July 2011). "Global Livestock Counts". *The Economist*.

[8] Cunningham, Dan. (2008).Vitamins and Minerals Important to Poultry. https://thepoultrysite.com/articles/vitamins-and-minerals-important-to-poultry

[9] D. Boiser, Strategies for teaching: amodular approach (Rex Book Store: C.M.Recto Avenue, Manila, Philippines, 2000).

[10] Subia, Gener S.(2018). Think Like My Teacher (TLMT): a New Method in Assessing Millennial Learners. International Journal of Arts Humanities and Social Sciences. Volume 3 Issue 1 ǁ January 2018.www.ijahss.com

[11] Subia, G.S. (2018).Comprehensible Technique in Solving Consecutive Number Problems in Algebra. Journal of Applied Mathematics and Physics, 6,447-457.https://doi.org/10.4236/jamp.2018.63041