## BIBLIOGRAPHY

ALAMAN, ROGER D. APRIL 2011. Reproductive Performance of Native Chicken Raised in the Backyard. Benguet State University, La Trinidad, Benguet.

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## ABSTRACT

The study was conducted at Remedios, Cervantes, Ilocos Sur from April to September 2010 to determine the average number of eggs that can be laid by native chicken pullets, the average hatchability of native chicken eggs, the growth rate of the chicks up to three months of age, and the mortality rate of native chicken raised in the backyard.

Three pullets from three strains of native chicken particularly *"Puraw"*, *"Dalusapi"* and "*Itim*" were bred to three roosters which were all "*Puraw*".

It was found that the average clutch size that can be laid by native pullets is 7 with a hatchability rate of 61 to 69%. The total body weight increment of the chicks at 90 days of age range from 461g to 473g.

The mortality rate was notably high (50 to 75%) and incurred from May to September when there were adverse weather changes.

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## INTRODUCTION

The Philippine native chicken is the common fowl found in the backyards of most rural households. It is a mixture of different breeds and believed to have descended from the domesticated red jungle fowl (Tolentino, 2009). The blood of the imported breeds varied the colors and other characteristics of our original native chicken.

Native chickens are raised for household consumption, for barters, and for religious rituals. Native chickens are not good feed converters. They are raised in backyards provided with simple nest, simple housing and simple feed supplements. Native chickens are capable of self-supporting. They do not require wide knowledge and extra time for them. Native chicken are resistant to different diseases and they could tribe in adverse environment. Native chickens are known for their good mothering ability and desirable products.

This research attempts to put in proper perspective some of the characteristics of native chicken, particularly those related to reproduction. Information generated in this study will serve as standard information for future researches. It will allow students to have working knowledge on the performance of native chicken. The information can be use in designing better management practice that will improve the performance of native chicken.

There are many raisers of native chicken in rural areas but most of them do not know the basic parameters of native chicken. Native chicken raisers must know the basic parameters of native chicken to have a higher income. It provides them knowledge on how they will manage their stock properly in order to have a higher production level. It

provides basis for the raisers in making feasibility studies. This study invites job seekers to engage their selves in native chicken rather than wasting their time.

The general objective of the study was to observe the reproductive performance of native chicken.

Specifically it aimed to:

1. To determine the mortality rate of chicks of the native chicken.

2. To determine the growth rate of the chicks of native chicken up to three month of age.

3. To determine the average number of that can be laid by pullets at first laying.

4. To determine the average hatchability of a native chicken eggs.

The study was conducted at Remedios Cervantes, Ilocos Sur from March 2010 to June 2010.

## REVIEW OF LITERATURE

The Red Junglefowl (*Gallus gallus*) is a tropical member of the Pheasant family, and is often believed to be a direct ancestor of the domestic chicken. It was first raised in captivity at least several thousand years ago in the Indian subcontinent, and the domesticated form has been used all around the world as a very productive food source for both meat and eggs. Some breeds have been specifically developed to produce these (Capanzana, 2001).

The early-domesticated chickens still resemble their wild ancestor in many characteristics. The wild adult male has shiny red plumage with light hackle and black tail are of single type, and the color of their shanks ranges from yellow to gray. The combined effects of mutation, natural selection, natural selection for cockfighting, and the indiscriminate crossing with the exotic resulted to our domesticated native chicken. The chicken inventory numbers for sub categories (native, layer, broiler) during 1991 to 2005 shares 54% native, 30% broiler, and 16% layer. Peak production of native chicken was in 1998 then slowly it accelerates down while the layer continues going up. Native chicken production is more widespread but most prominent in Western Visayas (14.1%), Central Visayas (9.4%), Cagayan Valley (7.9%), Southern Mindanao (7.9), and Ilocos Region (7.5%). In 2005, the share of commercial broilers in total chicken meat production in the Philippines was estimated 67%, with native chicken accounting for only 13%. Similarly, commercial layers accounted for 74% the total table egg production while native chicken accounted for the remaining 24% (Chang, 2005).

In 2007, PCARRD reported that under traditional management system native chicken only produce 40 to 60 eggs per year. However, with improve management and

better nutrition egg production can be increased to 130 to 200 per year. Traditionally raised native chickens weigh one kilogram when they are 18 to 20 weeks old but under improved management and nutrition native chicken weighs 1 kilogram as early as 12 weeks old.

There are few farms of native chicken found in the Philippines. Almost all-native chickens are raised in backyards just for household use only. Only few farmers sold their native chicken in the market. Farmer prefers native chicken because it does not require special care and feeds but they have nutritious products that are free from toxins compared to commercial broilers. Native chickens does not require high cost of production and capitals and they could tribe under rugged conditions (Tolentino, 2009).

Native chicken has the great potential of becoming big industry according to Dr. Provido as cited by Capanzana, 2001, a successful agricultural entrepreneur and the president chairman of the Regional Agricultural and Fisheries Council (RAFC) Region VI. He further stated that “its about time that the Darag native chicken should be projected to the public market as one of the region’s flagship commodities. City residents who lead more sedentary life prefer foods that are low in cholesterol. Their preference is now shifting to the eggs coming from native chicken which, being small, are also believed to supply a small amount of cholesterol. Aside from that, native birds and egg are tastier and savory than the improved breeds.

## MATERIALS AND METHODS

### Materials

A total of nine pullets that were more or less of the same weight and age and three "*puraw*" strain roosters were used as breeders during the study. The nine pullets belong to three strains of native chicken namely "*puraw*", "*dalusapi*" and "*itim*". The three strains were used as the treatments with each treatment replicated three times. An isolated old piggery house was used as the housing of the chickens (Figure 1). A total of ten small baskets for the nest (Figure 2) and ten bigger baskets (improvised scratch pen) to confine the hen for the first month old of the chicks were provided (Figure 3). Rice hull was provided in the brooding pen. Improvised drinking troughs and feeding troughs made up of bamboo and plastic covers were made. Woven bamboo was used as a divider while cogon grass (dried) was used to cover the sides of the housing (Figure 4). Corn, rice middlings, palay, rice bran, and kitchen leftovers were fed to the birds.

This materials include the record book, weighing scale, ball pen, multi square, and others.

### Methodology

Housing preparation. An old piggery pen was used in the study. It was divided into two, half for the nest and perch and half for the brooding pen. It is important to divide the housing to prevent fighting among the hens with little chicks. One more reason is to prevent stealing of feed of little chicks by older birds. Open sides of the housing were covered with cogon grass to minimize the entrance of moist and strong wind. The nests and perches are placed 5 to 6 feet above the ground. The feeding trough and

drinking trough were provided in the housing. Rice hull was also provided in the brooding pen.

Figure 1. A piggery pen improved into the study area

Figure 2. Nest for the hens

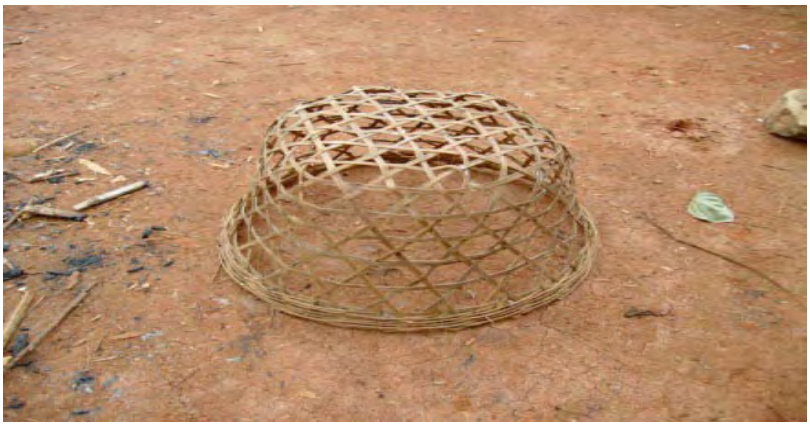

Figure 3. Improvised scratch pen

Figure 4. Cogon grass (dried) used to cover the sides of the housing

Figure 5. Multi-square used to measure egg length and diameter

Experimental animals. A total of nine pullets were used in the study. They are raised in backyard from Cervantes, Ilocos Sur. The pullets were eight months old. The pullets belong to three strains (Figure 5). Three pullets belong to "*puraw*", three pullets belong to "*dalusapi*" and three pullets belong to "*itim*". The "*puraw*" was the treatment one, "*dalusapi*" was the treatment two, and the third treatment was the *itim*. Three roosters that belong to "*puraw*" strain were used as breeders in the study (Figure 6).

Feeding and management. The animals were fed in the morning and in the afternoon. The birds were first confined in the housing for three days before they were released for mating. The rooster stayed together with the pullets until all of them laid eggs. The pullets who laid eggs were identified and checked every day because they might interchange their nest. During incubation, the nests were partially covered so that the other pullets would not disturb them.

Figure 6. Sample pullets from each treatment

Figure 7. The roosters used in the study

The chicks and the hen were confined in the brooding pen with the improvised scratch pen at day old up to one month of age. The chicks were feed with kitchen leftovers and rice bran. All the birds were provided with water *adlibitum*. The chicks were released at one month of age. The chicks were checked every day.

Data gathering. The weights of the birds were taken before breeding. The eggs were checked every feeding schedule. The laying intervals of the pullets were recorded. The weight, width and length of the eggs were taken and recorded. The eggs were marked according to the date they were laid. The total number of eggs laid per hen was recorded. The intervals of the eggs were recorded. Hatched and unhatched eggs were counted and recorded. The chicks were weighed at day old up to three months with one month interval. The causes of death and sickness were identified and recorded.

The data gathered were the following:

1. Weight of the pullets. The weight of the rooster and pullets at the start of the study.

2. Color of the pullets and rooster. The different colors of the pullets and rooster at the start of the study.

3. Number of eggs. The number of eggs laid by the pullets during the study.

4. Laying period . The number of days that the hen laid eggs in one laying period.

5. Sizes of the eggs

    a. Weight. The weight of the egg laid.

    b. Length. The longitudinal diameter of the egg.

    c. Width. The transversal diameter of the egg.

6. Number of hatched and unhatched eggs

7. Weight of the chicks

    a. Day old. The weight of the chicks at day old.

    b. Thirty days. The weight of the chicks at one month old.

    c. Sixty days. The weight of the chicks at two months old.

    d. Ninety days. The weight of the chicks at three months old.

8. Chick mortality. The mortality rate of the chicks from day old up to three months old.

9. Hatchability(%). This was determined using the formula:

$$\text{Hatchability} = \frac{\text{Number of eggs hatched}}{\text{Number of eggs incubated}} \times 100$$

10. Mortality rate. This was determined using the formula:

$$\text{Mortality rate} = \frac{\text{Number of chicks at third month}}{\text{Number of chicks hatched}} \times 100$$

11. Monthly weight increment (MWI). This was determined using the formula:

$$\text{MWI} = \frac{\text{Weight at current month} - \text{Weight at previous month}}{\text{Weight at previous month}} \times 100$$

Analysis of Data

Data were subjected to the analysis of variance for CRD experiment. Treatment means were compared using the Duncan's Multiple Range Test (DMRT).

## RESULTS AND DISCUSSION

### Weight of Pullets

Table 1 shows the mean initial weight of the pullet of different strains. Statistical analysis shows that there were no significant differences among the weight of the pullets. The pullets used had been calculated that they were ranging from 7 to 8 months old. They have a mean initial weight of 1.3 kilograms. The pullets used were heavier compared to the "*gulaya*" strain used by Tabino (2003) having a mean initial weight of 1.15 at an average of 5.63 months old. This indicates that the pullets the pullets used had have already reached their maturity age at the start of the study.

### Color of the Pullets, Rooster and Chicks Produced

The color of the chicks produced reveals the color of the ancestor of the pullets and roosters. Most of the colors of the chicks were combination of black or brown with white spots. Treatment one produced a white plumage inherited from their parents (Figure 7a). The other colors produced in this treatment such as brown and black have white spots all over the body. Treatment two produced dark brown plumage with bright

Table 1. Weight of the Pullets

| TREATMENT | WEIGHT (kg) |
|---|---|
| *Puraw* | 1.30 |
| *Dalusapi* | 1.40 |
| *Itim* | 1.20 |

*means with no letter superscripts are not significantly different at .05 DMRT

yellow at the neck and some has a color of "*lasak*". "*Lasak*" was defined by Balesteros (2004) which is reddish brown with white spots. It appears that some "*lasak*" was from the cross of "*dalusapi*" and "*puraw*" (Figure 7b). Most of the chicks produced in treatment three inherited the color of the parent hen (Figure 7c). They have a dominant black color but they have white spots at the neck and other parts of body. There were other colors produced at downy stage in each treatment but were not traced because of high mortality at first month.

8a

8b

8c

Figure 8. Chicks produced from the different treatments; (a) from white pullet and white rooster; (b) from brown pullet and white rooster and (c) from black pullet and white rooster

Clutch Size

Table 2 shows the average clutch size of each treatment. Statistical analysis shows that there were no significant differences in the clutch size among the three strains. "*Puraw*" and "*Dalusapi*" pullets have a clutch size of 7.67 and "*Itim*" pullets have slightly lower clutch size of 7.33. The clutch sizes of chickens were affected by the body condition of the pullets as seen in the third treatment which are the black pullets having slightly lower body weights.

In earlier study, Tabino (2003) reported that "*gulaya*" strain of native chicken has an average clutch size of 8.53. In 2004, Ballesteros reported that "*itim*" and "*dalusapi*" have an average clutch size of 10.2 and 9.8 respectively. The "*itim*" and "*dalusapi*" used by Ballesteros had a higher clutch size than the "*itim*" and "*dalusapi*" used in the study. Maybe this was affected by some factors such as place of origin of the pullets and time of conduct. The pullets used by Ballesteros was taken from Itogon, Benguet while the pullets used in this study was taken from Cervantes, Ilocos Sur. The study was conducted during the month of May to September while Ballesteros conducted her research during the month of October to April.

Table 2. Average clutch size of pullets

| TREATMENT | CLUTCH SIZE |
|---|---|
| *Puraw* | 7.67 |
| *Dalusapi* | 7.67 |
| *Itim* | 7.33 |

*means with no letter superscripts are not significantly different at .05 DMRT

Egg Measurements

Table 3 shows the average weight, diameter and length of the egg produced in each treatment which was measured using a multi-square. Statistical analysis shows that there were no significant differences in the egg measurements among the three strains of native pullets used in the study.

The "*puraw*", "*dalusapi*" and "*itim*" pullets have an average egg weight of 38.15 grams, 37.96 grams and 36.88 grams respectively. The general average of egg diameter of the three strains of native pullets was 3.74 cm and egg length of 4.88.

In 2003, Tabino reported that "*gulaya*" strain has an egg diameter of 3.85 cm and egg length of 5 cm. In 2004, Ballesteros reported that native chicken has egg diameter of 2.6 cm and egg length of 3.8 cm. It could be noted that the "*gulaya*" strain has slight larger eggs. It would appear that egg diameter of native chicken range from 2.6 to 3.85 cm and egg diameter from 3.8 to 5 cm.

Laying Period

Table 4 shows the average laying period of the pullets. Statistical analysis shows that there was no significant difference in the laying period of the three strains. "*Puraw*" pullets have an average laying period of 11.67 days, "*dalusapi*" pullets have 12 days and "*itim*" pullets have 12.33 days.

In 2004, Ballesteros reported that native chickens have an average laying period of 11.5 days. It could be noticed that the mean laying period of the three strain used in this study is higher than those the same strain used by Ballesteros. It is further noticed that the average laying period of native chicken at their first laying period is ranging from 11.5 days to 12 days long.

Table 3. Average egg measurements

| TREATMENT | EGG WEIGHT (g) | EGG DIAMETER (cm) | EGG LENGTH (cm) |
|---|---|---|---|
| *Puraw* | 38.15 | 3.72 | 4.90 |
| *Dalusapi* | 37.96 | 3.82 | 4.95 |
| *Itim* | 36.88 | 3.69 | 4.79 |

*means with no letter superscripts are not significantly different at .05 DMRT

Table 4. Average laying period of native chicken

| TREATMENT | AVERAGE LAYING INTERVAL (days) |
|---|---|
| *Puraw* | 11.67 |
| *Dalusapi* | 12.00 |
| *Itim* | 12.33 |

*means with no letter superscripts are not significantly different at .05 DMRT

Hatchability

Statistical analysis shows that there was no significant difference in the hatchability rate of the three strains used. Table 5 shows the average hatchability of the pullets. White pullets have 69%, brown pullets have 61.31%, and black pullets have 67.47%. The data obtained in this study is slight lower than that reported by Ballesteros which was 69.29%. Furthermore, Apolonio (2002), on his Survey on the performance of native chicken in Buguias, reported that on average different strains of native chicken hatch 5 to 14 chicks per laying period. The result of earlier study confirms the data

Table 5. Hatchability rate of native chicken eggs

| TREATMENT | HATCHABILITY RATE (%) |
|---|---|
| *Puraw* | 69.00 |
| *Dalusapi* | 61.31 |
| *Itim* | 67.86 |

*means with no letter superscripts are not significantly different at .05 DMRT

obtained in this study which was five to six chicks at their first laying period.

Hatchability rate is greatly affected by the fertility of the pullets. There were always unfertile eggs in the first clutch laid by pullets, thus the lower hatchability rate of pullets than the hens. This was also affected by the body condition of the hen to sit over the eggs for twenty one days. The hen sacrifices a lot of meals just to incubate the eggs thus; she uses her body reserves for that time. The hen having little body reserves the hen would always moved out to look for food. This action of the hen would lead to the disturbance to the development of the eggs and sometimes may cause total damage of the egg.

Monthly Weight Increment of the Chicks

Table 6 shows the average weight of the chicks starting from day old up to three months of age. Statistical analysis shows that there was no significant difference in the weight increment of the chicks of the three strains. The chicks have an average initial weight of 23.94 grams, slightly higher than 23.67 grams which were reported by Ballesteros in 2004. The chicks increased their weight to an average of 44.4 grams at the end of thirty days, 155.56 grams at the end of sixty days and 468.67 at the end of ninety days. In earlier research conducted, Tabino (2003) stated that "*gulaya*" strain wean their

Table 6. Monthly weight increment of the chicks

| TREATMENT | DAY OLD(g) | THIRTY DAYS (g) | SIXTY DAYS (g) | NINETY DAYS (g) |
|---|---|---|---|---|
| *Puraw* | 24.77 | 45.39 | 156.33 | 473.17 |
| *Dalusapi* | 21.78 | 44.80 | 152.56 | 461.22 |
| *Itim* | 25.27 | 43.00 | 157.78 | 471.63 |

*means with no letter superscripts are not significantly different at .05DMRT

chicks at their sixty days old with a weaning weight of 271.58 grams in traditional feeding condition and 334.55 grams to the treatment supplemented with commercial feeds. It appeared that the weaning weight of the strains used is lower than "*gulaya*" strain. The lower weaning weight of the strains used maybe because bad weather condition during the time this study was conducted. Other factors such as the total number of chicks raised by the parent hen, the mothering ability of the hen and the feed supplied to the chicks may have a great effect in the weight increment of the chicks.

Mortality Rate

Statistical analysis shows that there was no significant difference in the mortality of the chicks used in the study. Table 7 show the average mortality of the three strains used at the end of third months of age. The three strains had a mean mortality rate of 59.66%. In earlier research conducted by Tabino (2003) and Ballesteros (2004) from the month ranging September to February, they reported a higher Survival rate of native chicken. In 2003, Tabino reported that under traditional feeding condition of "*gulaya*" had a Survival rate of 77. 5% after brooding. In 2004, Ballesteros reported a higher mean

Table 7. Average mortality rate of native chicks

| TREATMENT | MORTALITY RATE (%) |
|---|---|
| *Puraw* | 75.67 |
| *Dalusapi* | 50.00 |
| *Itim* | 53.33 |

*means with no letter superscripts are not significantly different at .05DMRT

survival rate of 83.21% by "*itim*", "*lasak*" and "*dalusapi*". It could be noted that the weather is the greatest factor that contributes to the mortality rate of the chicks during the study was conducted. According to farmers, starting from the month of May to September was the part of the year that has the highest mortality rate because these were the times of strong typhoons, wind, and very high humidity. This observation of the farmers also conform the result of the study conducted during month of May to September.

One more factor that affect death rate was the food they ate. Chicks bellow one month of age who had eaten pure hard grain like corn and rice at two consecutive meal would die because it they could hardly digest the food. Their digestive system were not developed enough to digest the food that would cause their death. Tabino (2004) noted in his study that chicks at downy stage should be feed with easily digested feeds.

It is the nature of native chicken to fight stranger in the flock. Newly hatched hens were considered stranger among the group and the fight cannot be avoided. If hen with chicks would fight, it is possible that they would injure their chicks that may lead to their death. Other cases would be the hen would intentionally hit the chicks of other hens.

The presence also of predator like the birds, dogs, big rats, snakes and wild cat in the raising area would contribute mortality rates.

Figure 9. Chick mortality

## SUMMARY, CONCLUSION AND RECOMMENDATION

### Summary

The study on the reproductive performance of native chicken was conducted at Cervantes, Ilocos Sur from April to September 2010. This study aims to determine some of the parameters of native chicken such as the mortality rate, growth rate, clutch size and hatchability.

A total of nine pullets were used in the study. They were distributed in three treatments according to their color. Each treatment was replicated three times. The treatment were *puraw* , *dalusapi* and *itim*.

The average clutch size of the native pullets is 7.56 and they could hatch an average of 66.07 percent of their eggs at their first laying period. The average mortality of chicks during these months reaches 59.66 percent. The chicks of native chicken weigh an average of 468.67 grams at the end of three months.

### Conclusion

The researcher concludes that the native chicken could only lay seven to eight eggs at their first laying period and could only hatch five heads of chicks. The researcher concludes that the chick mortality is during the month of May to September is very high. At the end of ninety days, the approximate weight of the chicks is 468.67 grams.

### Recommendation

It is recommended to provide better housing and other facilities for the native chickens during May to September to reduce the mortality of the chicks. The chicks must be assisted with little amount of feeds during adverse weather condition.

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**APPENDICES**

Appendix Table 1. Initial weight (kg)

| TREATMENT | REPLICATION | | | TOTAL | MEAN |
|---|---|---|---|---|---|
| | I | II | III | | |
| $T_1$ | 1.3 | 1.4 | 1.2 | 3.9 | 1.3 |
| $T_2$ | 1.4 | 1.3 | 1.5 | 4.2 | 1.4 |
| $T_3$ | 1.3 | 1.2 | 1.1 | 3.6 | 1.2 |
| GRAND TOTAL | | | | 11.7 | |
| GRAND MEAN | | | | | 1.3 |

ANALYSIS OF VARIANCE

| SOURCE OF VARIANCE | DEGREE OF FREEDOM | SUM OF SQUARES | COMPUTED F | TABULAR F | |
|---|---|---|---|---|---|
| | | | | .05 | .01 |
| Treatment | 2 | 0.06 | 1.2 | $5.14^{ns}$ | $10.92^{ns}$ |
| Error | 6 | 0.15 | | | |
| TOTAL | | | | | |

ns = not significant CV. = 12%

Appendix Table 2. Width of eggs (cm)

| TREATMENT | REPLICATION | | | TOTAL | MEAN |
|---|---|---|---|---|---|
| | I | II | III | | |
| $T_1$ | 3.77 | 3.66 | 3.73 | 11.16 | 3.72 |
| $T_2$ | 3.70 | 3.78 | 3.99 | 11.46 | 3.82 |
| $T_3$ | 3.69 | 3.84 | 3.53 | 11.07 | 3.69 |
| GRAND TOTAL | | | | 33.69 | 11.23 |
| GRAND MEAN | | | | | 3.74 |

ANALYSIS OF VARIANCE

| SOURCE OF VARIANCE | DEGREE OF FREEDOM | SUM OF SQUARES | COMPUTED F | TABULAR F | |
|---|---|---|---|---|---|
| | | | | .05 | .01 |
| Treatment | 2 | 0.03 | 0.14 | 5.14 $^{ns}$ | 10.92 $^{ns}$ |
| Error | 6 | 0.11 | | | |
| TOTAL | | | | | |

= not significant CV. = 3.78%

Appendix Table 3. Length of eggs (cm)

| TREATMENT | REPLICATION | | | TOTAL | MEAN |
|---|---|---|---|---|---|
| | I | II | III | | |
| $T_1$ | 5.16 | 4.81 | 4.75 | 14.72 | 4.90 |
| $T_2$ | 4.94 | 4.81 | 5.11 | 14.86 | 4.95 |
| $T_3$ | 4.69 | 4.99 | 4.69 | 14.37 | 4.79 |
| GRAND TOTAL | | | | 43.95 | |
| GRAND MEAN | | | | | 4.88 |

ANALYSIS OF VARIANCE

| SOURCE OF VARIANCE | DEGREE OF FREEDOM | SUM OF SQUARES | COMPUTED F | TABULAR F | |
|---|---|---|---|---|---|
| | | | | .05 | .01 |
| Treatment | 2 | 0.05 | 1.25 | 5.14 $^{ns}$ | 10.92 $^{ns}$ |
| Error | 6 | 0.13 | | | |
| TOTAL | | | | | |

= not significant CV. = 2.9%

Appendix Table 4. Weight of the eggs (g)

| TREATMENT | REPLICATION | | | TOTAL | MEAN |
|---|---|---|---|---|---|
| | I | II | III | | |
| $T_1$ | 39.57 | 37.25 | 37.63 | 114.45 | 38.15 |
| $T_2$ | 38.14 | 37.00 | 38.75 | 113.89 | 37.96 |
| $T_3$ | 36.00 | 39.50 | 35.14 | 110.64 | 36.88 |
| GRAND TOTAL | | | | 338.98 | |
| GRAND MEAN | | | | | 37.66 |

ANALYSIS OF VARIANCE

| SOURCE OF VARIANCE | DEGREE OF FREEDOM | SUM OF SQUARES | COMPUTED F | TABULAR F | |
|---|---|---|---|---|---|
| | | | | .05 | .01 |
| Treatment | 2 | 2.82 | 0.55 | 5.14 $^{ns}$ | 10.92 $^{ns}$ |
| Error | 6 | 15.34 | | | |
| TOTAL | | | | | |

= not significant CV. = 4.25%

Appendix Table 5. Clutch size

| TREATMENT | REPLICATION | | | TOTAL | MEAN |
|---|---|---|---|---|---|
| | I | II | III | | |
| $T_1$ | 7 | 8 | 8 | 23 | 7.67 |
| $T_2$ | 7 | 8 | 8 | 23 | 7.67 |
| $T_3$ | 7 | 8 | 7 | 22 | 7.33 |
| GRAND TOTAL | | | | 68 | |
| GRAND MEAN | | | | | 7.56 |

ANALYSIS OF VARIANCE

| SOURCE OF VARIANCE | DEGREE OF FREEDOM | SUM OF SQUARES | COMPUTED F | TABULAR F | |
|---|---|---|---|---|---|
| | | | | .05 | .01 |
| Treatment | 2 | 0.22 | 0.33 | 5.14 $^{ns}$ | 10.92 $^{ns}$ |
| Error | 6 | 2.00 | | | |
| TOTAL | | | | | |

= not significant CV. = 7.59%

Appendix Table 6. Laying period

| TREATMENT | REPLICATION | | | TOTAL | MEAN |
|---|---|---|---|---|---|
| | I | II | III | | |
| $T_1$ | 11 | 11 | 13 | 35 | 11.67 |
| $T_2$ | 13 | 12 | 12 | 37 | 12.33 |
| $T_3$ | 13 | 13 | 10 | 36 | 12.00 |
| GRAND TOTAL | | | | 108 | |
| GRAND MEAN | | | | | 12 |

ANALYSIS OF VARIANCE

| SOURCE OF VARIANCE | DEGREE OF FREEDOM | SUM OF SQUARES | COMPUTED F | TABULAR F | |
|---|---|---|---|---|---|
| | | | | .05 | .01 |
| Treatment | 2 | 0.66 | 0.2112 | 5.14 ns | 10.92 ns |
| Error | 6 | 9.34 | | | |
| TOTAL | | | | | |

= not significant CV. = 12.97%

Appendix Table 7. Hatchability (%)

| TREATMENT | REPLICATION | | | TOTAL | MEAN |
|---|---|---|---|---|---|
| | I | II | III | | |
| $T_1$ | 57.14 | 75.00 | 75.00 | 207.14 | 69.05 |
| $T_2$ | 71.43 | 62.50 | 50.00 | 183.93 | 61.31 |
| $T_3$ | 57.14 | 75.00 | 71.43 | 203.57 | 67.86 |
| GRAND TOTAL | | | | 1594.64 | |
| GRAND MEAN | | | | | 66.07 |

ANALYSIS OF VARIANCE

| SOURCE OF VARIANCE | DEGREE OF FREEDOM | SUM OF SQUARES | COMPUTED F | TABULAR F | |
|---|---|---|---|---|---|
| | | | | .05 | .01 |
| Treatment | 2 | 104.12 | 0.50 | 5.14 $^{ns}$ | 10.92 $^{ns}$ |
| Error | 6 | 623.04 | | | |
| TOTAL | | | | | |

= not significant CV. = 15.44%

Appendix Table 8 Weight of chicks at day old

| TREATMENT | REPLICATION | | | TOTAL | MEAN |
|---|---|---|---|---|---|
| | I | II | III | | |
| $T_1$ | 25.25 | 24.4 | 24.67 | 74.32 | 24.77 |
| $T_2$ | 19.00 | 24.60 | 21.75 | 65.35 | 21.78 |
| $T_3$ | 26.00 | 28.00 | 21.80 | 75.80 | 25.27 |
| GRAND TOTAL | | | | 215.47 | |
| GRAND MEAN | | | | | 23.94 |

ANALYSIS OF VARIANCE

| SOURCE OF VARIANCE | DEGREE OF FREEDOM | SUM OF SQUARES | COMPUTED F | TABULAR F | |
|---|---|---|---|---|---|
| | | | | .05 | .01 |
| Treatment | 2 | 21.32 | 1.77 | 5.14 $^{ns}$ | 10.92 $^{ns}$ |
| Error | 6 | 57.39 | | | |
| TOTAL | | | | | |

= not significant CV. = 10.24%

Appendix Table 9. Weight of chicks at the end of first month

| TREATMENT | REPLICATION | | | TOTAL | MEAN |
|---|---|---|---|---|---|
| | I | II | III | | |
| $T_1$ | 45.67 | 45.00 | 45.50 | 136.17 | 45.39 |
| $T_2$ | 43.75 | 43.67 | 41.67 | 129.09 | 43.09 |
| $T_3$ | 45.67 | 45.00 | 45.75 | 134.42 | 44.80 |
| GRAND TOTAL | | | | 399.68 | |
| GRAND MEAN | | | | | 44.4 |

ANALYSIS OF VARIANCE

| SOURCE OF VARIANCE | DEGREE OF FREEDOM | SUM OF SQUARES | COMPUTED F | TABULAR F | |
|---|---|---|---|---|---|
| | | | | .05 | .01 |
| Treatment | 2 | 9.07 | 0.15 | 5.14 $^{ns}$ | 10.91 $^{ns}$ |
| Error | 6 | 183.92 | | | |
| TOTAL | | | | | |

= not significant CV. = 12.58%

Appendix Table 10. Weight of the chicks at the end of second month

| TREATMENT | REPLICATION | | | TOTAL | MEAN |
|---|---|---|---|---|---|
| | I | II | III | | |
| $T_1$ | 155.00 | 158.00 | 156.00 | 469.00 | 156.33 |
| $T_2$ | 154.67 | 151.50 | 151.50 | 457.67 | 152.56 |
| $T_3$ | 159.00 | 156.67 | 157.67 | 473.34 | 157.78 |
| GRAND TOTAL | | | | 1400.01 | |
| GRAND MEAN | | | | | 155.6 |

ANALYSIS OF VARIANCE

| SOURCE OF VARIANCE | DEGREE OF FREEDOM | SUM OF SQUARES | COMPUTED F | TABULAR F | |
|---|---|---|---|---|---|
| | | | | .05 | .01 |
| Treatment | 2 | 43.63 | 9.29 | 5.14 $^{ns}$ | 10.92 $^{ns}$ |
| Error | 6 | 14.11 | | | |
| TOTAL | | | | | |

= not significant CV. = .99%

Appendix Table 11. Weight of chicks at the end of third month

| TREATMENT | REPLICATION | | | TOTAL | MEAN |
|---|---|---|---|---|---|
| | I | II | III | | |
| $T_1$ | 477.00 | 470.00 | 472.50 | 1419.51 | 473.17 |
| $T_2$ | 466.47 | 458.00 | 459.00 | 1383.66 | 461.22 |
| $T_3$ | 461.22 | 477.00 | 476.69 | 1414.89 | 471.63 |
| GRAND TOTAL | | | | 4218.06 | |
| GRAND MEAN | | | | | 468.67 |

ANALYSIS OF VARIANCE

| SOURCE OF VARIANCE | DEGREE OF FREEDOM | SUM OF SQUARES | COMPUTED F | TABULAR F | |
|---|---|---|---|---|---|
| | | | | .05 | .01 |
| Treatment | 2 | 253.54 | 3.00 | 5.14 $^{ns}$ | 10.92 $^{ns}$ |
| Error | 6 | 251.60 | | | |
| TOTAL | | | | | |

= not significant CV. = 1.38%

Appendix Table 12. Mortality (%)

| TREATMENT | REPLICATION | | | TOTAL | MEAN |
|---|---|---|---|---|---|
| | I | II | III | | |
| $T_1$ | 75 | 85.33 | 66.67 | 227 | 75.67 |
| $T_2$ | 40 | 60.00 | 50.00 | 150 | 50.00 |
| $T_3$ | 50 | 50.00 | 60.00 | 160 | 53.33 |
| GRAND TOTAL | | | | 537 | |
| GRAND MEAN | | | | | 59.66 |

ANALYSIS OF VARIANCE

| SOURCE OF VARIANCE | DEGREE OF FREEDOM | SUM OF SQUARES | COMPUTED F | TABULAR F | |
|---|---|---|---|---|---|
| | | | | .05 | .01 |
| Treatment | 2 | 1168.67 | 1.44 | 5.14 $^{ns}$ | 10.92 $^{ns}$ |
| Error | 6 | 2441.43 | | | |
| TOTAL | | | | | |

= not significant CV. = 33.81%