A Profile Analysis on the Effectiveness of Two kinds of Feeds on Poultry Birds.

Onuoha, Desmond O+. and Opara Pius N*.

+Department of Mathematics and Statistics, Federal Polytechnic Nekede, Owerri, Imo State.
E-mail: desonuoha@yahoo.com
*Department of Statistics,Imo State University Owerri

Abstract:

This study was carried out to find the effect of two types of poultry feeds on the weight of poultry birds using chicken from Michika Farm in Igwuruta in Port Harcourt, Rivers State as a case study. The data was collected for a period of eight weeks, where a sample size of sixty chickens was divided into two equal populations. The data for the analysis was collected as a primary data through the method of direct observation and measurement. The data were analyzed using hostelling T^2 distribution, F-distribution to Test for parallel profile. At the end of the analysis, it was found that the profile was not parallel. This shows that the levels of the treatment on feeds are not the same.

***Key words**:* poultry feeds, poultry birds, primary data, direct observation, hostelling T^2 distribution, F-distribution

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1.0 Introduction

Poultry farming is one of most lucrative business ventures one can embark upon if properly managed. The management of poultry could be attributed to the production of healthy and weighty birds in order to maximize profit. To actualize this, one has to adopt the best poultry feed on the birds. This work is aimed at using Profile analysis to select the best feeds needed for the poultry birds. In this case, profile analysis could be described as a situation where a number of treatments are administered to two or more populations. [22] ,[15] stated that the responses must be expressed in similar unit and are assumed to be independent of one another, for different populations.

Furthermore, in comparing two or more populations, we might be faced with questions such as; Is the population's mean-vector the same? That is $\mu_1 = \mu_2$.

By applying profile analysis to test for the effectiveness of two different types of feeds on poultry birds, the questions are formulated in a stage-wise approach:

1. Are the profiles parallel?

Or Equivalent: H_{01}: $\mu_{1i} - \mu_{1(i-1)} = \mu_{2i} - \mu_{2(i-1)} = \mu_{3i} - \mu_{3(i-1)} \ldots = \mu_{gi} - \mu_{g(i-1)}$; $i = 1, 2, \ldots, p$

2. Assuming the profiles are parallel, are they coincident?

Or Equivalent: H_{02}: $\mu_{1i} = \mu_{2i} = \mu_{3i} = \ldots = \mu_{gi}$; $i = 1, 2, \ldots, p$

3. Assuming the profiles are coincident, are they level? That is, are all means equal to the same constant?

Or Equivalent: H_{03}: $\mu_{11} = \mu_{12} \ldots = \mu_{1p} = \mu_{21} = \mu_{22} \ldots = \mu_{2p} \ldots = \mu_{2p} = \ldots = \mu_{g1} = \mu_{g2} \ldots = \mu_{gp}$

If the two profiles are parallel it shows that the mean of the feeds are the same considering all the treatments applied together.

Sources and Method of Data Collection

The data for the analysis is a primary data collected through the method of direct observation. The method of direct observation entails observing and recording events as it is happening. The data was collected from an experiment conducted for a period of eight (8) weeks and two days, with sixty (60) chickens divided into two (2) equal parts. The first two days of the measurements were not used to get the real effect of feed. It has been observed by Johnson et al [23] that when a new diet formulation is introduced or a new type of feed is presented, birds will often refuse to eat for a period of time or intake is reduced. Group A made up of thirty (30) chickens, were subjected to FEED A (vital grower) while group B comprising of thirty (30) chickens that were also subjected to FEED B (top grower). Their weights were measured in kg at the end of each week.

Scope and Limitations of the Study

This study is aimed at establishing the effects of two types of poultry feeds on the weight of poultry birds, using chicken as a case study. It involves an experiment conducted for a period of eight weeks where a sample size of sixty chickens was divided into two equal populations, each subjected to a particular feed. Their responses were measured in kilogram (kg) using weighing balance. The variables x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8 stands for the weights of chickens at the end of each week.

Review of Some Related Literature

There are several different multivariate test statistics available for the test of parallel profile, all of which will generally yield equivalent results. Amongst the four commonly test statistics – namely Wilks Lambda, Pillai's Trace, Hotelling-Lawley Trace and Roy's Greatest Root; Wilks Lambda (λ) is the most desirable because it can be converted exactly to an F-statistics [18],[8] Johnson and Wichern [23] presented in their text a detailed approach of this conversion and the exact distribution of λ.

Bartlett [2] in his work presented a modification of λ for cases where the number of groups is more than three ($g > 3$), as well as when large sample sizes are involved. It is worthy to note that $(p - 1)$ would replace p.

Leboeur [15] noted in his work – "Profile analysis", that experiment is conducted in a way of observing two responses for a given population; the same population is exposed to p-treatment at successive times. And that we can formulate successive times to enable us develop the question of equality of means in a step wise procedure.

Hence, H_{01}, $\mu_1 = \mu_2 = \dots \mu_n$ implies treatments which have the same effect on the population; hence, we test for coincident profile.

Profile analysis, according to Ott [18], is a specific style of Multivariate Analysis of Variance. Tabacknick and Fidell had stated that Profile Analysis is equivalent to repeated measures, because of its multiple responses taken into sequence on the same subject(s).

Ohaegbulen E.U and Nwobi F.N [17] stated that in poultry farming, the production of high quality birds is always desired as this boosts the revenue of the poultry farmer and showed how profile analysis can be used to determine the feed with better nutritive value to the poultry birds.

Croyle [4] conducted a profile analysis on self-harm experience among Hispanic and white young adults. He compared the self-reported rates of self-harm in 255 Non - Hispanic white (NHW) and 187 Hispanic (predominantly Mexican American). He observed that self-harm is relatively common with about 31 % of the sample reporting some history of self-harm. Rates and specific types of self-harm did not significantly differ between the Non-Hispanic and Hispanic groups.

Abdu, P.A., Mera, U.M. and Saidu, L. [1] had a study on chicken mortality in Zaria and observed that the use of profile analysis to conduct a chicken mortality research is recommended.

Jensen and Dolberg [13],[6],[7] advocated for using poultry as a tool in poverty alleviation. An enabling environment must be established by providing access to feed, vaccine, vaccinations services, micro-finance, marketing and other inputs and services. A village group, composed of members of socially equal status, is an excellent entity to disseminate improved technology, a cost-effective entity to disseminate extension messages, and a secure entity for disbursement of loans.

Rahman and Hossain, [19] showed that an intervention with poultry production created a relatively small decline in the overall poverty with the proportion of extreme poor declining from 31 to 23% and the moderate poor stagnating around 29%.

Todd, [21] and Dolberg,[6] opined that poultry activity is to be considered as a learning process for the beneficiaries, but it has to be realised that one activity alone is not sufficient to lift a family out of poverty. The opportunities called as the enabling environment must be available for the beneficiaries to establish a small poultry enterprise, to minimize the risks and to take up other income generating activities.

Jensen [13] observed that about 70 % of the rural landless women are directly or indirectly involved in poultry rearing activities. He found that homestead poultry rearing is economically viable.

Mack et al [16] opined that in order to increase egg and poultry meat production there is a need for increased investment guided by policies and institutions that promote equitable, sustainable, and environmentally friendly long-term outcomes as backyard poultry make an important contribution to poverty mitigation, it should be considered as any strategy to improve rural livelihoods. Right policies and investment, well designed and participative development programmers can overcome the constraints faced by the smallholder poultry producers.

Karlan [14] opined that an enabling environment would give all the villagers access to poultry farm input supplies and services; pave the way for disbursement of micro-credits in a cost-effective way; facilitate easier formation of associations through formalized village livestock groups; help people acquire the skills that are required for a business set-up.

Dolberg [7] reviewed poultry as a tool in poverty alleviation focusing on experiences from Bangladesh but survey and project work that has been undertaken in India. Animal husbandry and agricultural departments' extension programmes are hardly known or used by most poor people for whom the poultry work is relevant.

Gondwe et al [9] found that rural poultry is raised and utilized by about 80 percent of the human population, primarily situated in rural areas and occupied by subsistence agriculture.

Bujarbaruah and Gupta [3] reported that a flock size ranging from 25-250 birds are reared across the country under the village poultry system. They have low production potential with only 40-80 eggs per year but are less susceptible to most of the common diseases requiring less veterinary care. In order to meet the deficiency gap in poultry meat and egg sectors, adequate and sustained efforts will have to be made to improve the production efficiency of the rural poultry which has been responsible to produce 40% of meat and 44% of egg requirement in the country.

Krishna Rao [20] recorded that poultry are inseparable from mankind and in the rural scenario they do not need any land, are easy to manage, regularly lay eggs, disease resistant and well adapted to the harsh environment.

Research Methodology

Profile Analysis pertains to situations where a number of treatments are administered to two or more populations where all the responses must be expressed in similar units and the responses for the different populations are assumed to be independent of one another. Suppose birds ; on diet one are observed weekly for eight weeks, we can calculate the mean using the formula below:

$$\overline{X_1} = \begin{pmatrix} \overline{X}_{11} \\ \overline{X}_{12} \\ . \\ . \\ . \\ \overline{X}_{18} \end{pmatrix}$$

Where the first subscript represents feed and the second subscript represents weeks. We plot the mean $\overline{X}_1$ weights against the number of weeks.

Parallel Profile:

We assume that $x_{11}, x_{12}, ..., x_{1n}$ is a random sample from $N_p(\mu_1, \Sigma)$ and $x_{21}, x_{22}, ..., x_{2n}$ is also a random sample from $N_p(\mu_2, \Sigma)$.

$$C_{(P-1)xP} = \begin{pmatrix} -1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -1 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -1 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -1 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -1 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -1 & 1 \end{pmatrix}$$

$$C\mu_1 = \begin{pmatrix} \mu_{12} - \mu_{11} \\ \mu_{13} - \mu_{12} \\ . \\ . \\ . \\ \mu_{1p} - \mu_{1p-1} \end{pmatrix}, \text{ where } C\mu_1 = (p-1) * 1$$

We can write Ho_1 as
Ho_1: $C\mu_1 = C\mu_2$ Vs Ha_1: $C\mu_1 \neq C\mu_2$.
Instead of basing our test on the observations $x_{11}, x_{12}, ..., x_{1n}$, $x_{21}, x_{22}, ..., x_{2n}$ we should use CX_{ij}; i = 1, 2 while j = 1, . . ., n.
To test Ho_1; we calculate the Hotelling's T^2 [11].[12] as

$$T^2 = \left(\overline{X_A} - \overline{X_B}\right)' C' \left\{ \left[\frac{1}{n_1} + \frac{1}{n_2}\right] C S_{pooled} C' \right\}^{-1} C\left(\overline{X_A} - \overline{X_B}\right)$$

with critical region $T^2 > t = \frac{n_1 + n_2 - 2(p-1)}{n_1 + n_2 - p} F_{P-1[n_1+n_2-p]\alpha}$, $\alpha = 0.05$,
if we reject Ho_1, we stop and conclude that the profile are not parallel and $\mu_1 \neq \mu_2$, but if Ho_1 is not rejected, we test for coincident profiles given that the profiles are parallel.

3.2 Coincident profiles.

If the profiles are parallel, they can only be coincident if the total of element in μ_1 is equal to the total element in μ_2.

The test statistic

$$T^2 = 1'\left(\overline{X_A} - \overline{X_B}\right)'\left\{\left[\frac{1}{n_1} + \frac{1}{n_2}\right] 1'\left(S_{pooled}\right)I\right\}^{-1} 1\left(\overline{X_A} - \overline{X_B}\right)$$

with critical region $T^2 > F_1, n_1 + n_2 - 2, \alpha$

If we reject Ho_2, stop

3.3 Level Profiles

If the profiles are coincident the X_{ij}, j = 1, 2, …,n_1 and X_{2j}, j = 1, 2, …,n_2 are sample space of size $n_1 + n_2$ from $N_p(\mu_1, \Sigma)$ where $\mu = \mu_1 = \mu_2$.

The test statistic is given as $T^2 = \left(n_1 + n_2\right)\overline{X}'C'\left(C\,S_{pooled}\,C\right)^{-1} C\overline{X}$ with critical region

$$T^2 > \frac{(n_1 + n_2 - 2)(p-1)}{(n_1 + n_2 - p)} F_{P-1}, n_1 + n_2 - p, \alpha$$

3.4 Mean and Pooled Covariance Matrix

The mean $\bar{x} = \dfrac{\sum_{i=1}^{n} x_i}{n}$

Then for the respective group,

$$\overline{x_A} = \frac{\sum_{i=1}^{n} x_{Ai}}{n}, \quad \overline{x_B} = \frac{\sum_{i=1}^{n} x_{Bi}}{n}$$

The pooled venue is given by

4.2 Calculations For The Analysis.

N = 30, $n_1 = n_2$

Mean of Means for feed A and B is given as;

Pooled $= \dfrac{A + B}{N_1 + N_2 - 2}$

Analysis

A sample size of sixty chickens is involved in this study. The chickens were divided into two equal parts of thirty chickens each. The chickens were labelled 1 to 30 for each of the groups. The weights of each of the groups classified as A and B are taken using a weighting balance for a period of eight weeks labelled x_1 x_2, x_3, x_4, x_5, x_6, x_7 and x_8. The weights over the weeks are shown in appendix A.

The term profile is said to have been observed by Hotelling (1936) to come from the practice in applied works in which score on a test battery are plotted in terms of graph or profile. Profile analysis provides three types of information, level, dispersion and the shape

Figure 1: A graph of sample means of Responses per week

Sample profile for two types of poultry feeds on the weights of poultry birds

Let A stand for feed A and B for feed B such that the means $\overline{X_A}$ and $\overline{X_B}$ are the respective means for the eight weeks under study.

$$\bar{x} = \begin{pmatrix} 0.635 \\ 0.8147 \\ 0.9583 \\ 1.1083 \\ 1.2317 \\ 1.3453 \\ 2.0653 \\ 2.5653 \end{pmatrix} + \begin{pmatrix} 0.6917 \\ 0.8747 \\ 1.141 \\ 1.4043 \\ 1.5923 \\ 1.7473 \\ 2.2697 \\ 2.6767 \end{pmatrix} = \begin{pmatrix} 1.3267 \\ 1.6894 \\ 2.0993 \\ 2.5126 \\ 2.824 \\ 3.0926 \\ 4.335 \\ 5.242 \end{pmatrix} /2 \;=\; \begin{pmatrix} 0.66335 \\ 0.8447 \\ 1.04965 \\ 1.2563 \\ 1.412 \\ 1.5463 \\ 2.1675 \\ 2.621 \end{pmatrix}$$

The mean deviation of the two sample means are given by

$$\left(\overline{X}_A - \overline{X}_B\right) = \begin{pmatrix} 0.64 \\ 0.82 \\ 0.96 \\ 1.11 \\ 1.23 \\ 1.35 \\ 2.07 \\ 2.57 \end{pmatrix} - \begin{pmatrix} 0.69 \\ 0.87 \\ 1.14 \\ 1.4 \\ 1.59 \\ 1.75 \\ 2.27 \\ 2.68 \end{pmatrix} = \begin{pmatrix} -0.05 \\ -0.05 \\ -0.18 \\ -0.29 \\ -0.36 \\ -0.4 \\ -0.2 \\ -0.11 \end{pmatrix}$$

While the sum of squares and cross products of each of groups are given by the symmetric matrix below

For feed A

$$A = \begin{pmatrix} 0.148 & 0.05 & 0.072 & 0.032 & 0.027 & 0.034 & 0.034 & 0.034 \\ 0.05 & 0.256 & 0.188 & 0.177 & 0.184 & 0.235 & 0.235 & 0.235 \\ 0.072 & 0.188 & 0.43 & 0.24 & 0.25 & 0.248 & 0.248 & 0.248 \\ 0.032 & 0.177 & 0.24 & 0.34 & 0.342 & 0.258 & 0.258 & 0.258 \\ 0.027 & 0.184 & 0.25 & 0.342 & 0.862 & 0.345 & 0.345 & 0.345 \\ 0.034 & 0.235 & 0.248 & 0.258 & 0.345 & 0.409 & 0.409 & 0.409 \\ 0.034 & 0.235 & 0.248 & 0.258 & 0.345 & 0.409 & 0.409 & 0.409 \\ 0.034 & 0.235 & 0.248 & 0.258 & 0.345 & 0.409 & 0.409 & 0.409 \end{pmatrix}$$

For feed B

$$B = \begin{pmatrix} 0.846 & 0.238 & 0.057 & 0.225 & 0.057 & 0.01 & 0.035 & 0.08 \\ 0.238 & 0.168 & 0.054 & 0.072 & 0.033 & -0.004 & -0.037 & 0.008 \\ 0.057 & 0.054 & 0.508 & 0.19 & 0.302 & 0.307 & 0.411 & 0.258 \\ 0.225 & 0.072 & 0.19 & 0.723 & 0.421 & 0.351 & 0.338 & 0.164 \\ 0.057 & 0.033 & 0.302 & 0.421 & 0.951 & 0.88 & 0.892 & 0.587 \\ 0.01 & -0.004 & 0.307 & 0.351 & 0.88 & 0.997 & 0.884 & 0.484 \\ 0.035 & -0.037 & 0.411 & 0.338 & 0.892 & 0.884 & 1.424 & 0.995 \\ 0.08 & 0.008 & 0.258 & 0.164 & 0.587 & 0.484 & 0.995 & 1.361 \end{pmatrix}$$

The Spooled (pooled covariance) matrices is given by

$S_{pooled} = \dfrac{A+B}{n_1+n_2-2}$ where $n_1 = n_2 = 30$ such that $n_1 + n_2 - 2 = 58$

S_{pooled} approximated to 3 decimal places

$$\begin{pmatrix} 0.017 & 0.005 & 0.002 & 0.004 & 0.001 & 0.001 & 0.001 & 0.002 \\ 0.005 & 0.007 & 0.004 & 0.004 & 0.003 & 0.004 & 0.003 & 0.004 \\ 0.002 & 0.004 & 0.016 & 0.007 & 0.01 & 0.01 & 0.011 & 0.009 \\ 0.004 & 0.004 & 0.007 & 0.018 & 0.013 & 0.011 & 0.01 & 0.007 \\ 0.002 & 0.004 & 0.01 & 0.013 & 0.031 & 0.021 & 0.021 & 0.016 \\ 0.001 & 0.004 & 0.01 & 0.011 & 0.021 & 0.024 & 0.022 & 0.015 \\ 0.001 & 0.003 & 0.011 & 0.01 & 0.021 & 0.022 & 0.031 & 0.024 \\ 0.002 & 0.004 & 0.009 & 0.007 & 0.016 & 0.015 & 0.024 & 0.031 \end{pmatrix}$$

$I^1 S_{pooled} I$ = [Sum of elements in S_{pooled}] = 0.667

$I^1\left(\overline{X}_A - \overline{X}_B\right)$ = [Sum of elements in $\left(\overline{X}_A - \overline{X}_B\right)$] = -1.64

$$C\left(\overline{X}_A - \overline{X}_B\right) = \begin{pmatrix} -1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -1 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -1 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -1 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -1 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -1 & 1 \end{pmatrix} \begin{pmatrix} -0.05 \\ -0.05 \\ -0.18 \\ -0.29 \\ -0.39 \\ -0.4 \\ -0.2 \\ -0.11 \end{pmatrix} = \begin{pmatrix} 0 \\ -0.13 \\ -0.11 \\ -0.1 \\ -0.01 \\ 0.2 \\ 0.09 \end{pmatrix}$$

Where c is a contrast matrix.

$\left(\overline{X}_A - \overline{X}_B\right)^1 C^1 = (0 \quad -0.13 \quad -0.11 \quad -0.1 \quad -0.01 \quad 0.2 \quad 0.09)$

$\overline{X}^1$

$$C^1 = (0.66 \quad 0.85 \quad 1.05 \quad 1.27 \quad 1.41 \quad 1.55 \quad 2.17 \quad 2.26)\begin{pmatrix} -1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & -1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & -1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & -1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & -1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & -1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & -1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix}$$

Therefore; $\overline{X}^1 C^1 = (0.19 \quad 0.2 \quad 0.22 \quad 0.14 \quad 0.14 \quad 0.62 \quad 0.45)$

$CS_{pooled}C^1 =$

$$= \begin{pmatrix} 0.014 & 0 & -0.002 & 0.002 & 0.001 & -0.001 & 0 \\ 0 & 0.015 & -0.009 & 0.004 & -0.001 & 0.002 & -0.003 \\ -0.002 & -0.009 & 0.02 & -0.008 & -0.002 & -0.002 & -0.001 \\ 0.002 & 0.003 & -0.008 & 0.023 & -0.008 & 0.001 & -0.002 \\ 0.001 & 0 & -0.002 & -0.008 & 0.013 & -0.002 & -0.002 \\ -0.001 & 0.002 & -0.002 & 0.001 & -0.002 & 0.011 & 0 \\ 0 & -0.003 & -0.001 & -0.002 & -0.002 & 0 & 0.014 \end{pmatrix}$$

$| CS_{pooled}C^1 | =$

$$\det\left(\begin{pmatrix} 0.014 & 0 & -0.002 & 0.002 & 0.001 & -0.001 & 0 \\ 0 & 0.015 & -0.009 & 0.004 & -0.001 & 0.002 & -0.003 \\ -0.002 & -0.009 & 0.02 & -0.008 & -0.002 & -0.002 & -0.001 \\ 0.002 & 0.003 & -0.008 & 0.023 & -0.008 & 0.001 & -0.002 \\ 0.001 & 0 & -0.002 & -0.008 & 0.013 & -0.002 & -0.002 \\ -0.001 & 0.002 & -0.002 & 0.001 & -0.002 & 0.011 & 0 \\ 0 & -0.003 & -0.001 & -0.002 & -0.002 & 0 & 0.014 \end{pmatrix}\right)$$

$= 5.7253076 \cdot 10^{-14}$

$(CS_{pooled}\, C^1)^{-1} =$

$$\text{inverse}\left(\begin{pmatrix} 0.014 & 0 & -0.002 & 0.002 & 0.001 & -0.001 & 0 \\ 0 & 0.015 & -0.009 & 0.004 & -0.001 & 0.002 & -0.003 \\ -0.002 & -0.009 & 0.02 & -0.008 & -0.002 & -0.002 & -0.001 \\ 0.002 & 0.003 & -0.008 & 0.023 & -0.008 & 0.001 & -0.002 \\ 0.001 & 0 & -0.002 & -0.008 & 0.013 & -0.002 & -0.002 \\ -0.001 & 0.002 & -0.002 & 0.001 & -0.002 & 0.011 & 0 \\ 0 & -0.003 & -0.001 & -0.002 & -0.002 & 0 & 0.014 \end{pmatrix}\right)$$

$$= \begin{pmatrix} 74.57 & 3.77 & 5.11 & -9.08 & -9.53 & 6.12 & -1.49 \\ 3.66 & 105.99 & 58.64 & 15.51 & 30.97 & -4.06 & 33.54 \\ 5.04 & 58.55 & 105.37 & 48.62 & 58.00 & 15.10 & 35.30 \\ -9.02 & 17.55 & 49.76 & 84.04 & 67.35 & 9.64 & 28.94 \\ -9.82 & 23.71 & 54.00 & 65.70 & 137.72 & 23.69 & 38.00 \\ 6.07 & -5.57 & 14.26 & 9.50 & 22.97 & 98.38 & 4.46 \\ -1.55 & 32.79 & 34.92 & 28.19 & 40.08 & 4.97 & 90.70 \end{pmatrix}$$

Since N is large, it is assumed that the two sampled population are normal and the Hotelling's T^2 statistic can be used to carry out the various test, similarly note that,

A ~ $N(C\mu_1, C\Sigma_1 C^1)$ while B ~ $N(C\mu_2, C\Sigma_2 C^1)$

Where μ and Σ are the multivariate mean and variance.

Test For Parallel Profiles

Hypothesis:

Reject $Ho_1 : C\mu_1 = C\mu_2 \ if \ T^2_{cal} > T^2_{tab}$ accept if otherwise.

Where $T^2 = \left(\overline{X_A} - \overline{X_B}\right)' C' \left\{\left[\frac{1}{n_1} + \frac{1}{n_2}\right] C\, S_{pooled}\ C'\right\}^{-1} C\left(\overline{X_A} - \overline{X_B}\right)$

$T^2 = (0 \quad -0.13 \quad -0.11 \quad -0.1 \quad -0.01 \quad 0.2 \quad 0.09) *$

$$\begin{pmatrix} 74.57 & 3.77 & 5.11 & -9.08 & -9.53 & 6.12 & -1.49 \\ 3.66 & 105.99 & 58.64 & 15.51 & 30.97 & -4.06 & 33.54 \\ 5.04 & 58.55 & 105.37 & 48.62 & 58.00 & 15.10 & 35.30 \\ -9.02 & 17.55 & 49.76 & 84.04 & 67.35 & 9.64 & 28.94 \\ -9.82 & 23.71 & 54.00 & 65.70 & 137.72 & 23.69 & 38.00 \\ 6.07 & -5.57 & 14.26 & 9.50 & 22.97 & 98.38 & 4.46 \\ -1.55 & 32.79 & 34.92 & 28.19 & 40.08 & 4.97 & 90.70 \end{pmatrix} \begin{pmatrix} 0 \\ -0.13 \\ -0.11 \\ -0.1 \\ -0.01 \\ 0.2 \\ 0.09 \end{pmatrix} * (15)$$

$= (140.217177466587)$

$T^2_{cal} = 140.217$

$$T^2_{tab} = \frac{n_1 + n_2 - 2(p-1)}{n_1 + n_2 - p} T^2_{tab\,P-1[n_1+n_2-p]\alpha} \; Let\ \alpha\ be\ 0.05$$

$T^2_{tab} = 17.709$

Conclusion

Since $T^2_{cal} > T_{tab}$, we reject the hypothesis that the profile are not parallel meaning that the mean weight of chicken A is not the same with the mean weight of chickens in group B considering all the treatments applied together. This also implies that feed A and feed B have different effect on the chickens.

Tests For Coincident Profile

Hypothesis

Reject $Ho_2 : I'\mu_1 = I'\mu_2 \; if \; T^2_{cal} > T^2_{tab}$ accept if otherwise

where

$$T^2_{cal} = I'\left(\overline{X_A} - \overline{X_B}\right)'\left\{\left[\frac{1}{n_1} + \frac{1}{n_2}\right] I'\left(S_{pooled}\right) I\right\}^{-1} I\left(\overline{X_A} - \overline{X_B}\right)$$

and $T^2_{tab} = T^2_{tab\,1}, n_1 + n_2 - 2, \alpha$

Let $\alpha = 0.05$

Hence

$T^2_{cal} =$

$$(-1.64)^2\left[\left(\frac{1}{30} + \frac{1}{30}\right)0.667\right]^{-1} = 60.485757$$

$T^2_{tab.} = 4.016$

Conclusion

We reject Ho_2, since $T^2_{cal} > T^2_{tab}$ and conclude that there is no coincident profile. This means that the response of chickens on feed A is not the same with those of chickens on feed B.

4.5 Test For Level Of Profile

Hypothesis:

Reject Ho_3: $C\mu = 0$ if $T^2_{cal} > T^2_{tab}$ accept if otherwise

where

$$T^2_{cal} = (n_1 + n_2)\overline{X}'C'\left(C\,S_{pooled}\,C\right)C\overline{X}$$

and the critical region is

$$T^2_{tab} = \frac{(n_1 + n_2 - 2)(p-1)}{(n_1 + n_2 - p)} F_{P-1}, n_1 + n_2 - p, \alpha$$

$Let\ \alpha = 0.05$

Such that

$T^2 =$

$$\begin{pmatrix} 0.19 & 0.2 & 0.22 & 0.14 & 0.14 & 0.62 & 0.45 \end{pmatrix} *$$

$$\begin{pmatrix} 74.57 & 3.77 & 5.11 & -9.08 & -9.53 & 6.12 & -1.49 \\ 3.66 & 105.99 & 58.64 & 15.51 & 30.97 & -4.06 & 33.54 \\ 5.04 & 58.55 & 105.37 & 48.62 & 58.00 & 15.10 & 35.30 \\ -9.02 & 17.55 & 49.76 & 84.04 & 67.35 & 9.64 & 28.94 \\ -9.82 & 23.71 & 54.00 & 65.70 & 137.72 & 23.69 & 38.00 \\ 6.07 & -5.57 & 14.26 & 9.50 & 22.97 & 98.38 & 4.46 \\ -1.55 & 32.79 & 34.92 & 28.19 & 40.08 & 4.97 & 90.70 \end{pmatrix}$$

$$* \begin{pmatrix} 0.19 \\ 0.2 \\ 0.22 \\ 0.14 \\ 0.14 \\ 0.62 \\ 0.45 \end{pmatrix} * (60) = 7364.4291$$

Hence $T^2_{cal} = 7364.43$

while the critical region is

$$T^2{}_{tab} = \frac{(n_1 + n_2 - 2)(p-1)}{(n_1 + n_2 - p)} F_{P-1}, n_1 + n_2 - p, \alpha$$

T^2_{tab} = 17. 709

Decision: We reject the hypothesis that the profile level since the $T^2_{cal} > T^2_{tab.}$ The rejection of the level profile hypothesis means that the chicken on feed A and chicken on feed B do not have the same level of response or that the average response of the chicken to the respective feeds A and B are not leveled.

Conclusion.

The analysis showed that the profile was not paralleled and there is significant difference between the two feeds A and B performance on the weights of the chicken. The Average profile of feed A was greater than that of feed B, therefore, we select feed A as better than feed B.

Recommendation.

This method of analysis is recommended for researchers trying to compare effects of an input on the yielded results. It is also important for researcher to note that time is of essence in this form of research. This is to allow for proper measurement of the weights as the chickens are being feed with the respective feeds. This analysis should be extended to more than two independent populations.

References

[1] Adbu P. A and Mera U. M and Saidu L. (1992). A study on chicken mortality in Zaria, Nigeria. **In Proceedings. 19th World Poultry Congress,** Amsterdam, Netherlands, 2, 151.

[2] Bartlett, M. S. (2001). Further aspect of the theory of multiple regressions. Proc. Cmb. Phil. Soc., 34: 33 – 34.

[3] `Bujarbaruah K.M. and Gupta J.J. (2005). Family poultry for the development of NEH region ICAR Research Complex Umiam, Barapani, Meghalaya IPSACON-2005

[4] Croyles J. (2007). Some issues in the design of agricultural decision support systems. **Agricultural systems**, 52(2/3): 355–381.

[5] Del Ninno, C., Dorosh, P. A., Smith, L.C. and Roy, D.K (2001). The 1998 Floods in Bangladesh. Disaster Impacts, Household Coping Strategies, and Response. International Food Policy Research Institute, Washington.

[6] Dolberg, F. (2001). A livestock development approach for Rural Development: Review of Household Poultry Production with Focus on Bangladesh and India Pro- Poor Livestock Policy Initiative.

[7] Dolberg Frands (2003). The Review of Household Poultry Production as a Tool in Poverty Reduction with Focus on Bangladesh and India Pro- Poor Livestock Policy Initiative (PPLPI)Website:

[8] Everitt, B. S. and Dunn G. (2001). Applied Multivariate Data Analysis. 2nd Edn, Edward Arnold, London.

[9] Gondwe Timothy N.P., Clemens B.A. Wollny, A.C.L. Safalaoh, F.C. Chilera and Mizeck G.G. Chagunda (2003) Community-Based Promotion of Rural Poultry Diversity,

[10] Management, Utilization and Research in Malawi.

[11] Hotelling H. (1935) The Most Predictable Criterion" Journal of Educaitonal Psychology, 26, 139-142.

[12] Hotelling H. (1936) "Relations between two sets of variables" Biometrika 28, page 321- 377.

[13] Jensen, H. Askov (2000). Paradigm and Visions: Network for Poultry Production in Developing Countries.

[14] Karlan, D. S. (2002). Social Capital and Group Banking. Downloaded from
` http://web.mit.edu/spencer/www/soccappaper.pdf

[15] Leboeur, Y and Carlotte D.C., (2000). Body Weight and Low Back Pain Systematic Review of the Epidemiologic Literature.
[16] Mack, D. Hoffmann and J. Otte (2000). The contribution of poultry to rural development Organization of the United Nations, Viale delle Terme di Caracalla, 00100 Rome, Italy.
[17] Ohaegbulen E.U and Nwobi F.N (2009) Poultry Feed brands solution using profile Analysis surreal of Applied Science
[18] Ott, P., (1999). Multivariate Analysis of Variance: Profile analysis – an example using SAS, biometric information pamphlet 60
[19] Rahman, H. Z and Hossain. M (1995). Rethinking Rural Poverty: Bangladesh as a case study. UPL, Dhaka. Sage publications New Delhi. Journal Article
[20] Rao C. Krishna (2005). A rural poultry revolution for poverty alleviation in rural India Former Animal Husbandry Commissioner, Govt. of India, Jaya Nagar , New Bowenpally, Secunderabad
[21] Todd, H. (1999). Women in Agriculture and Modern Communication Technology. Proceedings of a workshop, March 30-April 3, 1998, Tune Landboskole, Denmark.
[22] Wald A. (1944) "On a Statistical Problem arising in the Classification of an Individual into One of Two Groups" Annals of Mathematical Statistics 15 page 145-162
[23] Johnson R.A. and Wichern D.W (1992) Applied Multivariate Statistical Analysis, Englewood Cliffs, New Jersey