MODERN COLLEGE OF ARTS, SCIENCE & COMMERCE

# A PROJECT REPORT ON

## A STATISTICAL ANALYSIS OF POULTRY FARMING

**Submitted To**
SAVITRIBAI PHULE PUNE UNIVERSITY

**UNDER THE GUIDANCE OF**

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MODERN COLLEGE PUNE-05

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# CERTIFICATE

This is to certify that the project work entitled "A STATISTICAL ANALYSIS OF POULTRY FARMING" is a bonafide project work carried out by MISS. SHEWALE VAIBHAVI, MISS. MUSALE MOHINI, MR. RAMOSHI MANGESH, MR. BORGE AKSHAY, MR. SHENDAGE SANDIP Students of T.Y.BSC. (Statistics), MODERN COLLEGE PUNE-05. This original work is submitted for the partial fulfillment of B.Sc. degree of Savitribai Phule Pune University, Pune.

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Date:

Place: Modern college pune-05.

# ACKNOWLEDGEMENTS

We are very glad to present the project report on “STATISTICAL ANALYSIS OF POULTRY FARMING” which is prepared as a part of final year of graduation in science.

With the belief guidance of Dr. P.G. DIXIT sir, Head of department of Statistics, MODERN COLLEGE OF ARTS COMMERCE AND SCIENCE, PUNE-05. He has enacted important role in our project.

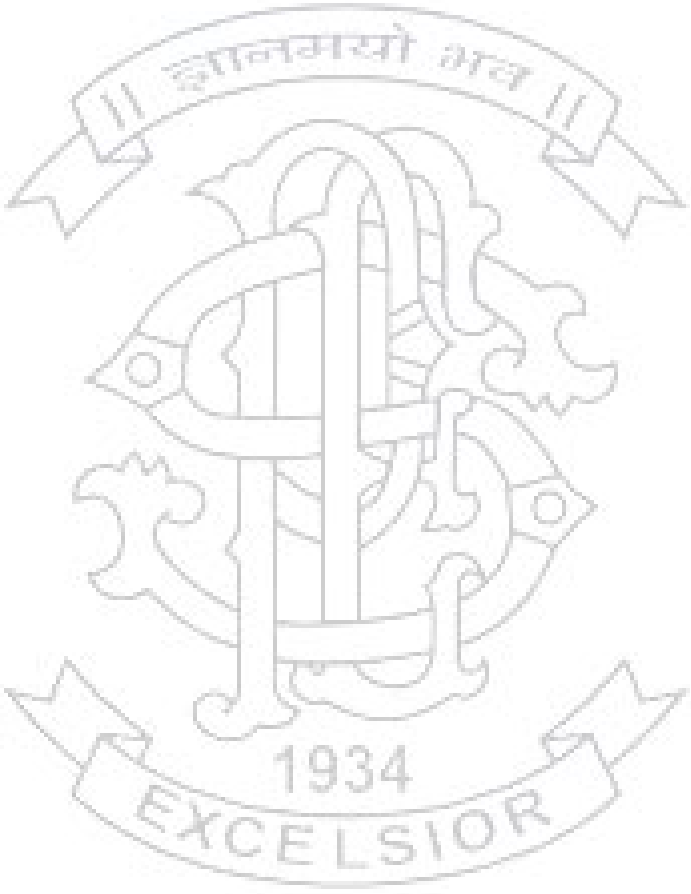
A project of such thinking could not happen without the systematic guidance of our guide and other teachers. Also we would like to thank all teachers of our department for all possible help.

We would also like to thank all the people who has help us to collect the raw data. Last but not the least we would like to thank our family, friends and all others who were directly or indirectly related for giving suggestions and all possible help.

Thank you Everyone!!!

# Abstract:

In our project “STATISTICAL ANALYSIS OF POULTRY FARMING”. We have collected primary data from a poultry farm. The data is of three seasons on chick deaths and their feeding over a period of 42 days for each batch. The statistical analysis is carried out to study variations in chick death rates, body weight gains of chicks in different seasons



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# INTRODUCTION

Poultry is one of fast growing segment of agriculture sector and contributes major share in term of protein supplementation from egg and meat. It has originated from the agricultural era. Chickens nurtured for eggs are known as layers, while chickens nurtured for meat are called broilers.

Poultry farm is farm that feed the chicks for business. There are approximately 4500 chicks in per batch of farm for period of 42-45 days.

In poultry there are different causes for deaths of chicks, like excess heat, lack of facilities, unhealthy atmosphere etc. We analysed poultry farming data in various seasons.

# IDENTIFICATION OF PROBLEM

- **IN SIMPLE LANGUAGE:**

1) To check mortality rate of chicks in different seasons?
2) To check is there any effect of seasons on survival rate of chicks?
3) To find relation between food consumed on body weight gain?
4) To check the effect of different type of feed on weight gain by chicks?
5) To check the effect of different seasons on weight gain by chicks?
6) To check data is randomly occurs?

- **IN STATISTICAL LANGUAGE:**

1) To check whether mortality rate of chicks is within statistical control or not using “Statistical Quality Control”?
2) To estimate survival rate of chicks using “Survival Function”?
3) To fit “Regression Line” of food consumption on body weight gain?
4) To check the effect of different type of feed on weight gain by chicks using “Analysis of variance”
5) To check the effect of different seasons on weight gain by chicks using “Analysis of variance”
6) To check randomness using run test.

# OBJECTIVES

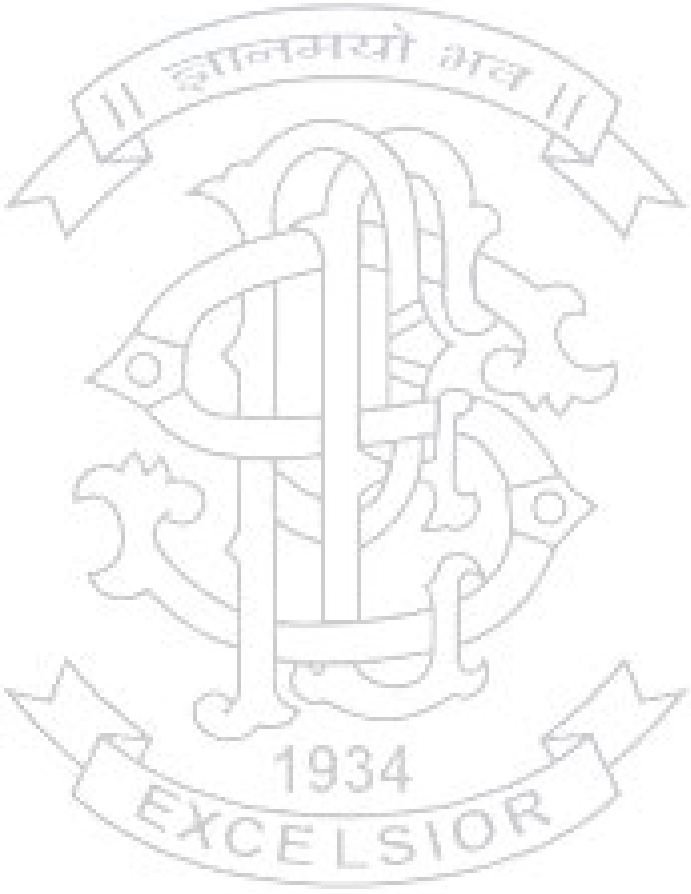
1.To study if chick death rates change according to seasons.

2.To find the effect of feeding on chick body weight gain in different seasons.

3.To estimate parameters of survival function.

4. To study the assignable causes of variation in death rates.

5. To study occurrence of death is random.



# METHODOLOGY

We used control chart to check whether the deaths are in statistical control. We used survival function to estimate survival rate. We used analysis of variance technique to check the impact of season and feed on body weight gain. We used regression analysis technique to check effect of feed on body weight gain. We used testing of hypothesis technique to test randomness of data.

# KEYWORD & TOOLS USED

- Keywords:
    1. F.C.R.- Feed Conversion Ratio.
    2. Mortality rate=$\frac{number\ of\ deaths}{number\ of\ chicks}$
    3. C.L.- Control Limit
    4. L.C.L.- Lower Control Limit
    5. U.C.L.- Upper Control Limit

- Tools Used:
    1. Microsoft Excel
    2. Microsoft Word
    3. R Software

# QUESTIONNAIRE

- **Poultry Information:**

| |
|---|
| **Name of owner:** Suryawanshi Dinesh |
| **Address of poultry:** At. Post karjgavan, tal. Malegaon, Dist. Nashik. |
| **Date of establishment of poultry:** Oct. 2014 |
| **Capacity of poultry:** 5200 |
| **Breed:** cock 300 |
| **Distributor:** Ananda Agro |

| Sr. No. | title | prices |
|---|---|---|
| 1. | Price of per chick | Rs. 20-25 |
| 2. | Total feeding bags | 400-450 bags |
| 3. | Cost per feeding bag | Rs. 31 per Kg. |
| 4. | Expenditure on Medicine | Rs. 2.5 per chick |

| Sr. No. | Rating (1-strongly bad, 5-strongly good) | Rating |
|---|---|---|
| 1. | Poultry litter | 4.0 |
| 2. | Water supply | 5.0 |
| 3. | Temperature maintain | 3.0 |
| 4. | Cleanliness | 4.0 |
| 5. | Storage capacity and place | 4.0 |
| | **Overall performance** | **4.0** |

| Sr. No. | | How Much Time | Timing | |
|---|---|---|---|---|
| | | | morning | evening |
| 1. | Feeding | 2 | 1 | 1 |
| 2. | Water | 2 | 1 | 1 |
| 3. | Medicine | 1 vaccine Per week | - | - |

- **Broiler Record:**

  - **This data collected from 17/April/2020 to 28/May/2020. (Summer data)**

| | Count | | Cumulative feed in grams | | Body weight in gram | | F.C.R. | |
|---|---|---|---|---|---|---|---|---|
| Interval (days) | No. of chicks | Total deaths | Stand. | Actual | Stand. | Actual | Stand. | Actual |
| 1-3 | 4931 | 14 | 53 | 34 | 104 | 90 | 0.51 | 0.38 |
| 4-6 | 4917 | 24 | 143 | 123 | 169 | 150 | 0.85 | 0.82 |
| 7-9 | 4893 | 48 | 254 | 229 | 264 | 210 | 0.96 | 1.09 |
| 10-12 | 4845 | 16 | 407 | 406 | 376 | 300 | 1.08 | 1.35 |
| 13-15 | 4829 | 22 | 591 | 514 | 507 | 400 | 1.17 | 1.29 |
| 16-18 | 4807 | 40 | 821 | 585 | 679 | 500 | 1.21 | 1.17 |
| 19-21 | 4767 | 21 | 1095 | 798 | 850 | 750 | 1.29 | 1.06 |
| 22-24 | 4746 | 28 | 1418 | 976 | 1086 | 900 | 1.31 | 1.08 |
| 25-27 | 4718 | 29 | 1787 | 1474 | 1321 | 1150 | 1.35 | 1.28 |
| 28-30 | 4689 | 76 | 2200 | 1598 | 1540 | 1250 | 1.43 | 1.28 |
| 31-33 | 4613 | 69 | 2630 | 1975 | 1814 | 1380 | 1.45 | 1.43 |
| 34-36 | 4544 | 27 | 3087 | 2412 | 2060 | 1500 | 1.50 | 1.61 |
| 37-39 | 4517 | 33 | 3574 | 2887 | 2350 | 1850 | 1.52 | 1.56 |
| 40-42 | 4484 | 42 | 4088 | 3328 | 2575 | 2200 | 1.59 | 1.51 |

  - **This data collected from 28/June/2020 to 8/august/2020. (rainy data)**

| | Count | | cumulative feed grams | | Body weight in gram | | F.C.R. | |
|---|---|---|---|---|---|---|---|---|
| Interval Days | No. of chicks | total deaths | Stand. | Actual | Stand. | Actual | Stand. | Actual |
| 1-3 | 4585 | 27 | 53 | 87 | 104 | 100 | 0.51 | 0.87 |
| 4-6 | 4558 | 17 | 143 | 140 | 169 | 155 | 0.85 | 0.90 |
| 7-9 | 4541 | 10 | 254 | 264 | 264 | 240 | 0.96 | 1.10 |
| 10-12 | 4531 | 7 | 407 | 406 | 376 | 310 | 1.08 | 1.31 |
| 13-15 | 4524 | 2 | 591 | 566 | 507 | 410 | 1.17 | 1.38 |
| 16-18 | 4522 | 8 | 821 | 797 | 679 | 480 | 1.21 | 1.66 |
| 19-21 | 4514 | 6 | 1095 | 1011 | 850 | 520 | 1.29 | 1.94 |
| 22-24 | 4508 | 15 | 1418 | 1317 | 1086 | 680 | 1.31 | 1.94 |
| 25-27 | 4493 | 20 | 1787 | 1591 | 1321 | 820 | 1.35 | 1.94 |
| 28-30 | 4473 | 26 | 2200 | 1924 | 1540 | 1300 | 1.43 | 1.48 |
| 31-33 | 4447 | 37 | 2630 | 2303 | 1814 | 1567 | 1.45 | 1.47 |
| 34-36 | 4410 | 29 | 3087 | 2593 | 2060 | 1758 | 1.50 | 1.47 |
| 37-39 | 4381 | 90 | 3574 | 3094 | 2350 | 1940 | 1.52 | 1.59 |
| 40-42 | 4291 | 73 | 4088 | 3195 | 2575 | 2500 | 1.59 | 1.28 |

- **This data is collected from 23/December/2020 to 2/February/2021. (winter data)**

| | Count | | Cumulative feed in grams | | Body weight in gram | | F.C.R. | |
|---|---|---|---|---|---|---|---|---|
| Interval (days) | No. of chicks | Total deaths | Stand. | Actual | Stand. | Actual | Stand. | Actual |
| 1-3 | 4491 | 19 | 53 | 70 | 104 | 100 | 0.51 | 0.70 |
| 4-6 | 4472 | 20 | 143 | 178 | 169 | 150 | 0.85 | 1.19 |
| 7-9 | 4452 | 13 | 254 | 289 | 264 | 240 | 0.96 | 1.20 |
| 10-12 | 4439 | 7 | 407 | 469 | 376 | 310 | 1.08 | 1.51 |
| 13-15 | 4432 | 7 | 591 | 563 | 507 | 390 | 1.17 | 1.44 |
| 16-18 | 4425 | 6 | 821 | 690 | 679 | 520 | 1.21 | 1.33 |
| 19-21 | 4419 | 2 | 1095 | 1094 | 850 | 640 | 1.29 | 1.71 |
| 22-24 | 4417 | 10 | 1418 | 1332 | 1086 | 800 | 1.31 | 1.67 |
| 25-27 | 4407 | 11 | 1787 | 1792 | 1321 | 1200 | 1.35 | 1.49 |
| 28-30 | 4396 | 1 | 2200 | 2177 | 1540 | 1300 | 1.43 | 1.67 |
| 31-33 | 4395 | 5 | 2630 | 2620 | 1814 | 1610 | 1.45 | 1.63 |
| 34-36 | 4390 | 10 | 3087 | 2952 | 2060 | 1850 | 1.50 | 1.60 |
| 37-39 | 4380 | 15 | 3574 | 3457 | 2350 | 2180 | 1.52 | 1.59 |
| 40-42 | 4365 | 20 | 4088 | 4196 | 2575 | 2335 | 1.59 | 1.80 |

# Statistical Analysis

## 1. Statistical quality control.

For all three seasons we analysed the data in quality control charts (p-chart) to find out whether the death rates are within control or not.

Statistical quality control (SQC) involves the application of statistical techniques in controlling the process to prevent excessive defects.

a) Graphs showing if sample results are within statistical control limits.
b) Control limits are the upper and lower boundaries of a control chart.
c) A process is " **in control** " if
    1. No sample point lies outside the control limits.
    2. Most points fall near the process average. Few of them are close to the control limits.
    3. Approximately equal numbers of points occur above and below the process average.
    4. The points are randomly distributed around the process average.

Formulae for calculation to draw p chart:

Mortality rate ($p_i$) = $\frac{number\ of\ deaths}{number\ of\ chicks}$

$\hat{p} = \frac{\sum_{i=1}^{k} \boldsymbol{d_i}}{\sum_{i=1}^{k} \boldsymbol{n_i}}$ ------- where k=14

C.L = $\hat{p}$

LCL= $\hat{p} - 3\sqrt{\frac{\hat{p} * \hat{q}}{\boldsymbol{n_i}}}$

UCL= $\hat{p} + 3\sqrt{\frac{\hat{p} * \hat{q}}{\boldsymbol{n_i}}}$

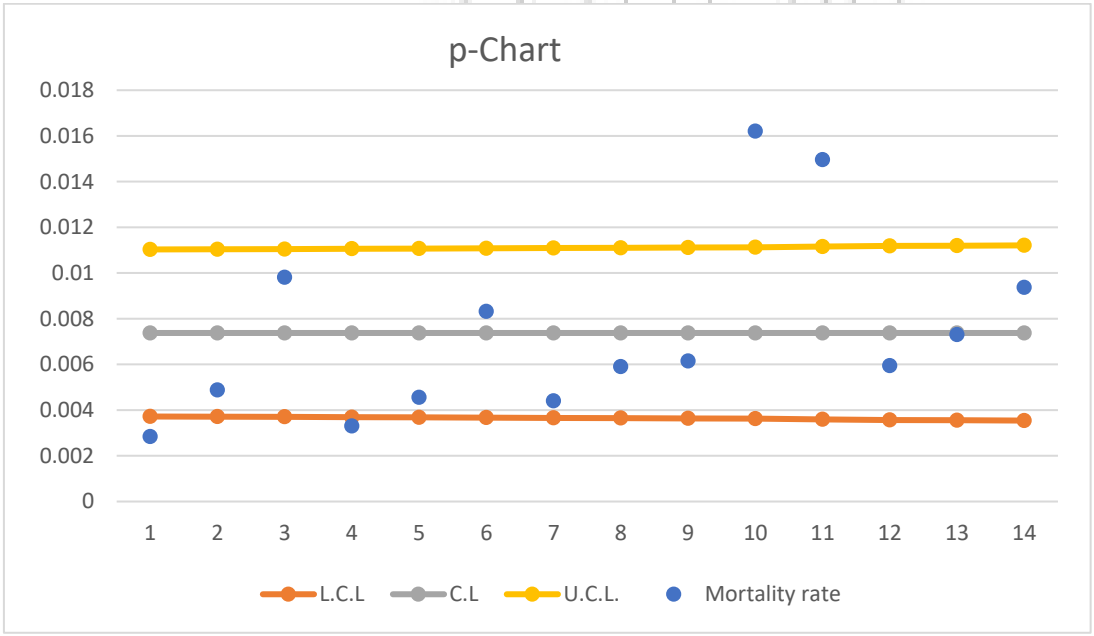
Data for Summer Season:

| Interval (days) | Number of chicks ($n_i$) | No. of deaths ($d_i$) | Mortality rate ($p_i$) | L.C.L. | C.L. | U.C.L. |
|---|---|---|---|---|---|---|
| 1-3 | 4931 | 14 | 0.002839 | 0.00372 | 0.007376 | 0.01103 |
| 4-6 | 4917 | 24 | 0.004881 | 0.00372 | 0.007376 | 0.01104 |
| 7-9 | 4893 | 48 | 0.00981 | 0.00371 | 0.007376 | 0.01105 |
| 10-12 | 4845 | 16 | 0.003302 | 0.00369 | 0.007376 | 0.01106 |
| 13-15 | 4829 | 22 | 0.004556 | 0.00368 | 0.007376 | 0.01107 |
| 16-18 | 4807 | 40 | 0.008321 | 0.00367 | 0.007376 | 0.01108 |
| 19-21 | 4767 | 21 | 0.004405 | 0.00366 | 0.007376 | 0.01109 |
| 22-24 | 4746 | 28 | 0.0059 | 0.00365 | 0.007376 | 0.0111 |
| 25-27 | 4718 | 29 | 0.006147 | 0.00364 | 0.007376 | 0.01111 |
| 28-30 | 4689 | 76 | 0.016208 | 0.00363 | 0.007376 | 0.01112 |
| 31-33 | 4613 | 69 | 0.014958 | 0.0036 | 0.007376 | 0.01116 |
| 34-36 | 4544 | 27 | 0.005942 | 0.00357 | 0.007376 | 0.01118 |
| 37-39 | 4517 | 33 | 0.007306 | 0.00356 | 0.007376 | 0.0112 |
| 40-42 | 4484 | 42 | 0.009367 | 0.00354 | 0.007376 | 0.01121 |
| **Total** | **66300** | **489** | **0.103941** | | | |

$\hat{p}$= 0.007376 and $\hat{q} = 0.992624$

From these table values we plot p chart

**Chart 1:**




In this p chart, point no 10 and 11 lies above the UCL so the process is not under statistical control. That is death rates are not in control. Assignable cause is excess heat.

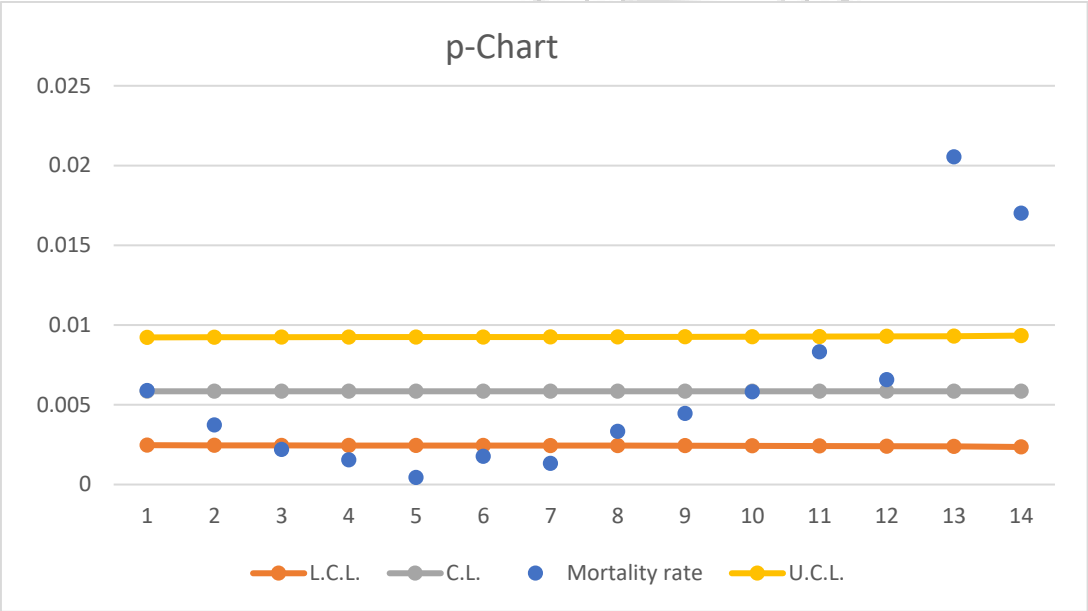
Data for rainy season:

| Interval (days) | Number of chicks | Number of deaths ($d_i$) | Mortality rate ($p_i$) | L.C.L. | C.L. | U.C.L. |
|---|---|---|---|---|---|---|
| 1-3 | 4585 | 27 | 0.005889 | 0.00247 | 0.005846 | 0.00922 |
| 4-6 | 4558 | 17 | 0.003730 | 0.00246 | 0.005846 | 0.00923 |
| 7-9 | 4541 | 10 | 0.002202 | 0.00245 | 0.005846 | 0.00924 |
| 10-12 | 4531 | 7 | 0.001545 | 0.00245 | 0.005846 | 0.00924 |
| 13-15 | 4524 | 2 | 0.000442 | 0.00245 | 0.005846 | 0.00925 |
| 16-18 | 4522 | 8 | 0.001769 | 0.00244 | 0.005846 | 0.00925 |
| 19-21 | 4514 | 6 | 0.001329 | 0.00244 | 0.005846 | 0.00925 |
| 22-24 | 4508 | 15 | 0.003327 | 0.00244 | 0.005846 | 0.00925 |
| 25-27 | 4493 | 20 | 0.004451 | 0.00243 | 0.005846 | 0.00926 |
| 28-30 | 4473 | 26 | 0.005813 | 0.00243 | 0.005846 | 0.00927 |
| 31-33 | 4447 | 37 | 0.008320 | 0.00242 | 0.005846 | 0.00928 |
| 34-36 | 4410 | 29 | 0.006576 | 0.0024 | 0.005846 | 0.00929 |
| 37-39 | 4381 | 90 | 0.020543 | 0.00239 | 0.005846 | 0.0093 |
| 40-42 | 4291 | 73 | 0.017012 | 0.00235 | 0.005846 | 0.00934 |
| **Total** | **62778** | **367** | | | | |

$\hat{p}$= 0.005846 and $\hat{q} = 0.99415$

From above table we plot this p chart

**Chart 2:**




In this p chart, points 13 and 14 lie above UCL, so the process is not under statistical control. Assignable cause is cloudy atmosphere.

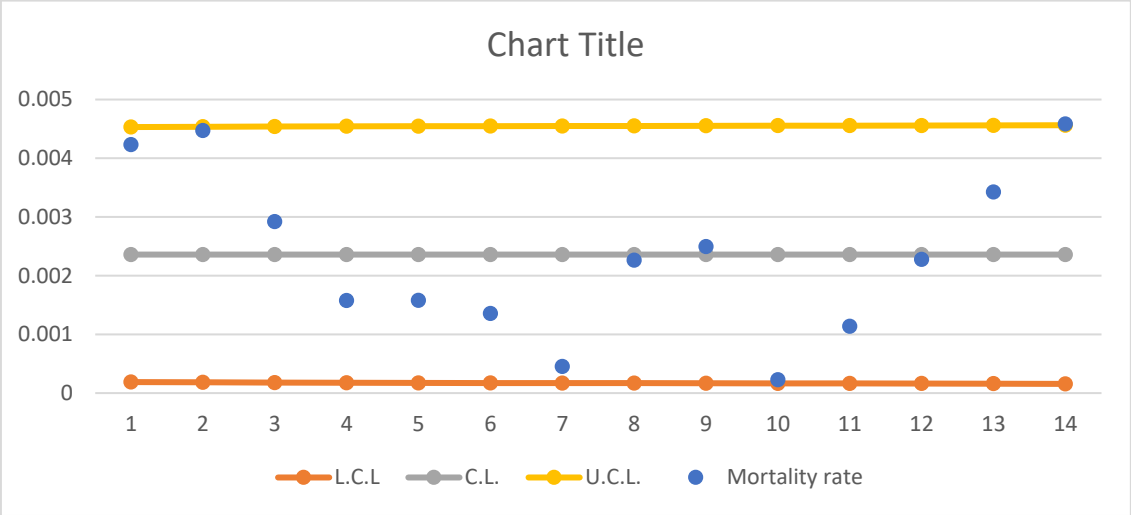
Data for winter season:

| Interval (days) | Number of chicks | Number of deaths ($d_i$) | Mortality rate ($p_i$) | L.C.L. | C.L. | U.C.L. |
|---|---|---|---|---|---|---|
| 1-3 | 4491 | 19 | 0.004231 | 0.000190 | 0.002359 | 0.004530 |
| 4-6 | 4472 | 20 | 0.004472 | 0.000180 | 0.002359 | 0.004540 |
| 7-9 | 4452 | 13 | 0.002920 | 0.000180 | 0.002359 | 0.004540 |
| 10-12 | 4439 | 7 | 0.001577 | 0.000170 | 0.002359 | 0.004540 |
| 13-15 | 4432 | 7 | 0.001579 | 0.000170 | 0.002359 | 0.004550 |
| 16-18 | 4425 | 6 | 0.001356 | 0.000170 | 0.002359 | 0.004550 |
| 19-21 | 4419 | 2 | 0.000453 | 0.000170 | 0.002359 | 0.004550 |
| 22-24 | 4417 | 10 | 0.002264 | 0.000170 | 0.002359 | 0.004550 |
| 25-27 | 4407 | 11 | 0.002496 | 0.000170 | 0.002359 | 0.004550 |
| 28-30 | 4396 | 1 | 0.000228 | 0.000160 | 0.002359 | 0.004550 |
| 31-33 | 4395 | 5 | 0.001138 | 0.000160 | 0.002359 | 0.004550 |
| 34-36 | 4390 | 10 | 0.002278 | 0.000160 | 0.002359 | 0.004560 |
| 37-39 | 4380 | 15 | 0.003425 | 0.000160 | 0.002359 | 0.004560 |
| 40-42 | 4365 | 20 | 0.004582 | 0.000160 | 0.002359 | 0.004560 |
| total | **61880** | **146** | 0.0023594 | | | |

$\hat{p}$= 0.002359 and $\hat{q}$= 0.997641

From these table values we plot p chart

**Chart 3:**




In this p chart, nearly all points are in control limits so we can say that the process is under statistical control.

**Interpretation:**

| Seasons | $\hat{p}$ | $\hat{q}$ |
|---|---|---|
| **Summer** | 0.007376 | 0.992624 |
| **Rainy** | 0.005846 | 0.99415 |
| **Winter** | 0.002359 | 0.997641 |

The average proportion of deaths ($\hat{p}$) is highest in summer season and lowest in winter season.

**Conclusion:**

From above three p-charts we concluded that the winter season is best for the chicks in the poultry as compare to summer and rainy season. And we can also say that only last 2 or 3 interval shows deaths rates are not in control.

# 2. Survival function.

We used survival analysis to estimate life-span of population understudy. We used non-parametric method to estimate survival function called "Actuarial estimator of survival function" with its standard error.

$x_i$: $i^{th}$ interval of days.

$d_i$: deaths of chickens in $i^{th}$ interval of days.

$n_i$: chickens alive at beginning of $i^{th}$ interval.

Pi=$\left(1-\frac{d_i}{n_i}\right)$ ------ probability of surviving through $i^{th}$ interval.

S(x)=$\prod_{i=1}^{k}\left(1-\frac{d_i}{n_i}\right)$ ------- survival function.

SE(S(x)) =S(x)*$\sqrt{\sum_{i=1}^{k}\frac{d_i}{n_i(n_{i-d_i})}}$ ------- Standard error of estimator.

Data for summer season:

| Days (x) | No. of chicks at beginning of interval ($n_i$) | No. of death during interval ($d_i$) | $p_i$ | Survival function s(x) | S.E. (s(x)) |
|---|---|---|---|---|---|
| 1-3 | 4931 | 14 | 0.997161 | 0.997161 | 0.001000 |
| 4-6 | 4917 | 24 | 0.995119 | 0.992294 | 0.001414 |
| 7-9 | 4893 | 48 | 0.990190 | 0.982559 | 0.001732 |
| 10-12 | 4845 | 16 | 0.996698 | 0.979315 | 0.002000 |
| 13-15 | 4829 | 22 | 0.995444 | 0.974853 | 0.002236 |
| 16-18 | 4807 | 40 | 0.991679 | 0.966741 | 0.002646 |
| 19-21 | 4767 | 21 | 0.995595 | 0.962482 | 0.002646 |
| 22-24 | 4746 | 28 | 0.994100 | 0.956804 | 0.002828 |
| 25-27 | 4718 | 29 | 0.993853 | 0.950923 | 0.003000 |
| 28-30 | 4689 | 76 | 0.983792 | 0.935510 | 0.003464 |
| 31-33 | 4613 | 69 | 0.985042 | 0.921517 | 0.003873 |
| 34-36 | 4544 | 27 | 0.994058 | 0.916041 | 0.004000 |
| 37-39 | 4517 | 33 | 0.992694 | 0.909349 | 0.004123 |
| 40-42 | 4484 | 42 | 0.990633 | 0.900831 | 0.004243 |

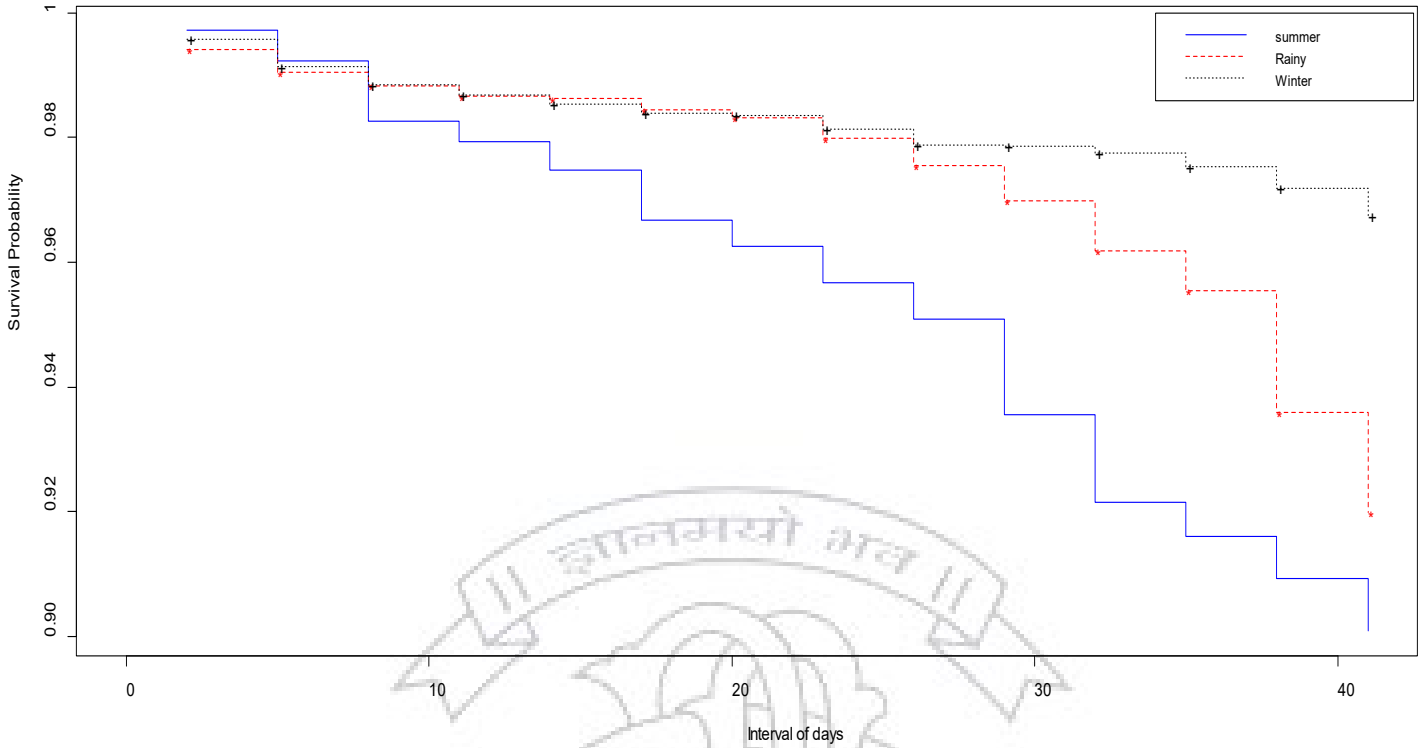
Data for Rainy season:

| Days (x) | No. of chicks at beginning of interval ($n_i$) | No. of death during interval ($d_i$) | $p_i$ | Survival function s(x) | SE (s(x)) |
|---|---|---|---|---|---|
| 1-3 | 4585 | 27 | 0.994111 | 0.994111 | 0.001000 |
| 4-6 | 4558 | 17 | 0.996270 | 0.990403 | 0.001414 |
| 7-9 | 4541 | 10 | 0.997798 | 0.988222 | 0.001732 |
| 10-12 | 4531 | 7 | 0.998455 | 0.986696 | 0.001732 |
| 13-15 | 4524 | 2 | 0.999558 | 0.986260 | 0.001732 |
| 16-18 | 4522 | 8 | 0.998231 | 0.984515 | 0.001732 |
| 19-21 | 4514 | 6 | 0.998671 | 0.983206 | 0.002000 |
| 22-24 | 4508 | 15 | 0.996673 | 0.979935 | 0.002000 |
| 25-27 | 4493 | 20 | 0.995549 | 0.975573 | 0.002236 |
| 28-30 | 4473 | 26 | 0.994187 | 0.969902 | 0.002449 |
| 31-33 | 4447 | 37 | 0.991680 | 0.961832 | 0.002828 |
| 34-36 | 4410 | 29 | 0.993424 | 0.955507 | 0.003000 |
| 37-39 | 4381 | 90 | 0.979457 | 0.935878 | 0.003606 |
| 40-42 | 4291 | 73 | 0.982988 | 0.919956 | 0.004000 |

Data for Winter season:

| Days (x) | No. of chicks at beginning of interval ($n_i$) | No. of death during interval ($d_i$) | $p_i$ | Survival function s(x) | SE (s(x)) |
|---|---|---|---|---|---|
| 1-3 | 4491 | 19 | 0.995769 | 0.995769 | 0.001000 |
| 4-6 | 4472 | 20 | 0.995528 | 0.991316 | 0.001414 |
| 7-9 | 4452 | 13 | 0.997080 | 0.988421 | 0.001732 |
| 10-12 | 4439 | 7 | 0.998423 | 0.986863 | 0.001732 |
| 13-15 | 4432 | 7 | 0.998421 | 0.985304 | 0.001732 |
| 16-18 | 4425 | 6 | 0.998644 | 0.983968 | 0.002000 |
| 19-21 | 4419 | 2 | 0.999547 | 0.983523 | 0.002000 |
| 22-24 | 4417 | 10 | 0.997736 | 0.981296 | 0.002000 |
| 25-27 | 4407 | 11 | 0.997504 | 0.978847 | 0.002236 |
| 28-30 | 4396 | 1 | 0.999773 | 0.978624 | 0.002236 |
| 31-33 | 4395 | 5 | 0.998862 | 0.977511 | 0.002236 |
| 34-36 | 4390 | 10 | 0.997722 | 0.975284 | 0.002236 |
| 37-39 | 4380 | 15 | 0.996575 | 0.971944 | 0.002449 |
| 40-42 | 4365 | 20 | 0.995418 | 0.967491 | 0.002646 |

## Graph:




## Conclusion:

1. survival rate of chicks is highest in Winter as compared to summer and rainy season

2.survival rate of chicks is lowest in summer season.

# 3.Regression Analysis.

We used regression analysis to find the relation between the amount of feeding and weight gain of chicks in different seasons.

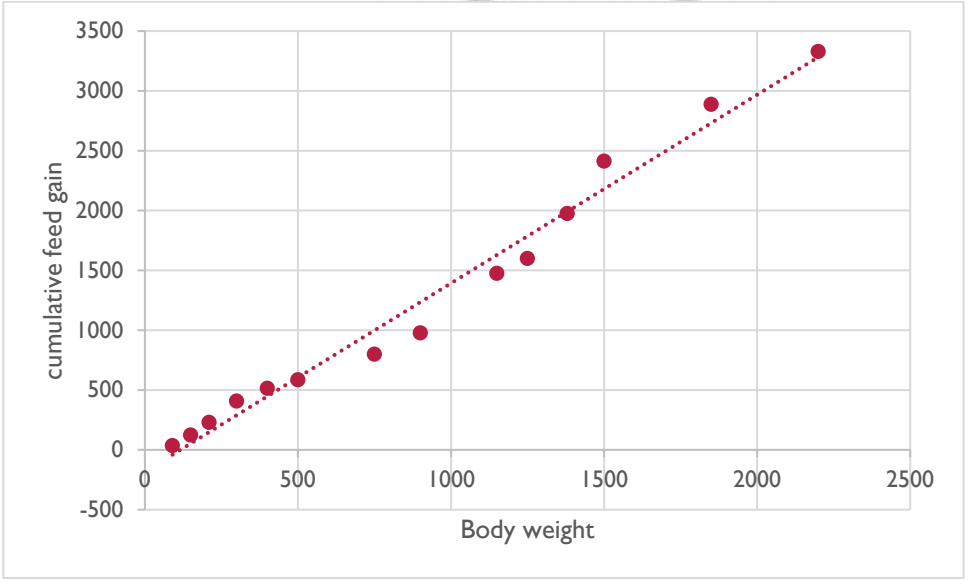
Y= Body weight gain by chicks in grams.

X= Cumulative feed consumed by chicks in grams.

Data for summer season:

| Interval (days) | In grams | |
|---|---|---|
| | body weight (y) | cumulative feed (x) |
| 1-3 | 90 | 34 |
| 4-6 | 150 | 123 |
| 7-9 | 210 | 229 |
| 10-12 | 300 | 406 |
| 13-15 | 400 | 514 |
| 16-18 | 500 | 585 |
| 19-21 | 750 | 798 |
| 22-24 | 900 | 976 |
| 25-27 | 1150 | 1474 |
| 28-30 | 1250 | 1598 |
| 31-33 | 1380 | 1975 |
| 34-36 | 1500 | 2412 |
| 37-39 | 1850 | 2887 |
| 40-42 | 2200 | 3328 |

Graph:



**Summary:**

| Regression Statistics | |
|---|---|
| Multiple R | 0.990421 |
| R Square | 0.980934 |
| Adjusted R Square | 0.979345 |
| Standard Error | 96.448551 |
| Observations | 14 |

| | Coefficients | Standard Error | t Stat | P-value |
|---|---|---|---|---|
| Intercept | 130.878765 | 40.34723 | 3.243810 | 0.007037 |
| X Variable 1 | 0.622740 | 0.025062 | 24.847867 | 1.09E-11 |

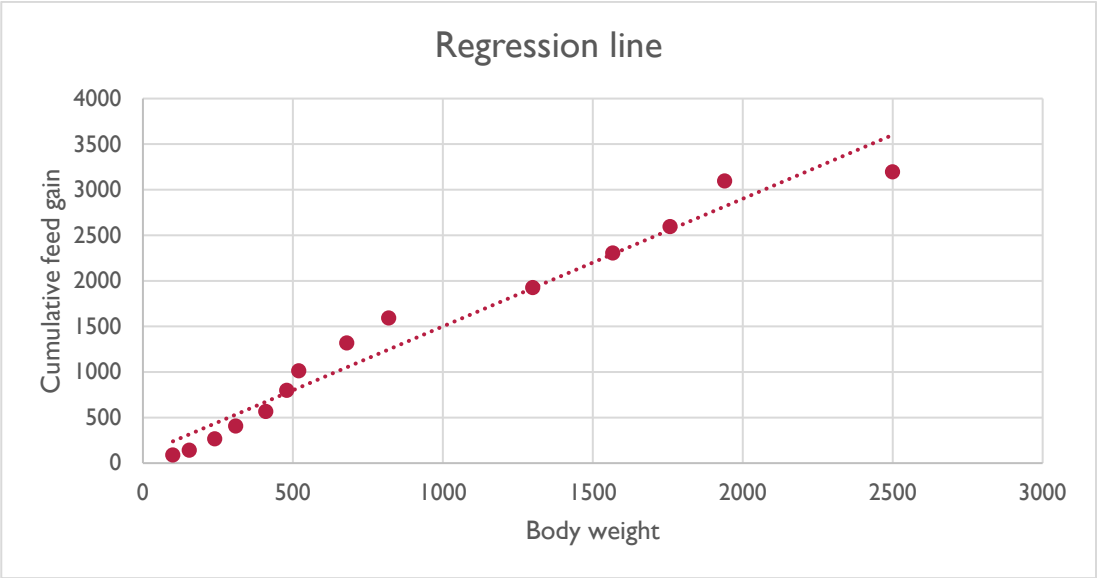
Regression equation: y= 130.878765+(0.622740*x)

1gram feed help to increase approximately 0.6 gram of weight. Because in summer chicks eat less. Weight gain is high compared to feeding.

Data for Rainy season:

| **Interval (days)** | **In grams** | |
|---|---|---|
| | **body weight (y)** | **cumulative feed (x)** |
| 1-3 | 100 | 87 |
| 4-6 | 155 | 140 |
| 7-9 | 240 | 264 |
| 10-12 | 310 | 406 |
| 13-15 | 410 | 566 |
| 16-18 | 480 | 797 |
| 19-21 | 520 | 1011 |
| 22-24 | 680 | 1317 |
| 25-27 | 820 | 1591 |
| 28-30 | 1300 | 1924 |
| 31-33 | 1567 | 2303 |
| 34-36 | 1758 | 2593 |
| 37-39 | 1940 | 3094 |
| 40-42 | 2500 | 3195 |

**Graph:**




**Summary:**

| Regression Statistics | |
|---|---|
| Multiple R | 0.981147 |
| R Square | 0.962649 |
| Adjusted R Square | 0.959536 |
| Standard Error | 153.548517 |
| Observations | 14 |

| | Coefficients | Standard Error | t Stat | P-value |
|---|---|---|---|---|
| Intercept | -33.875418 | 67.691594 | -0.500437 | 0.6258184 |
| X Variable 1 | 0.687176 | 0.039074 | 17.586235 | 6.2259E-10 |

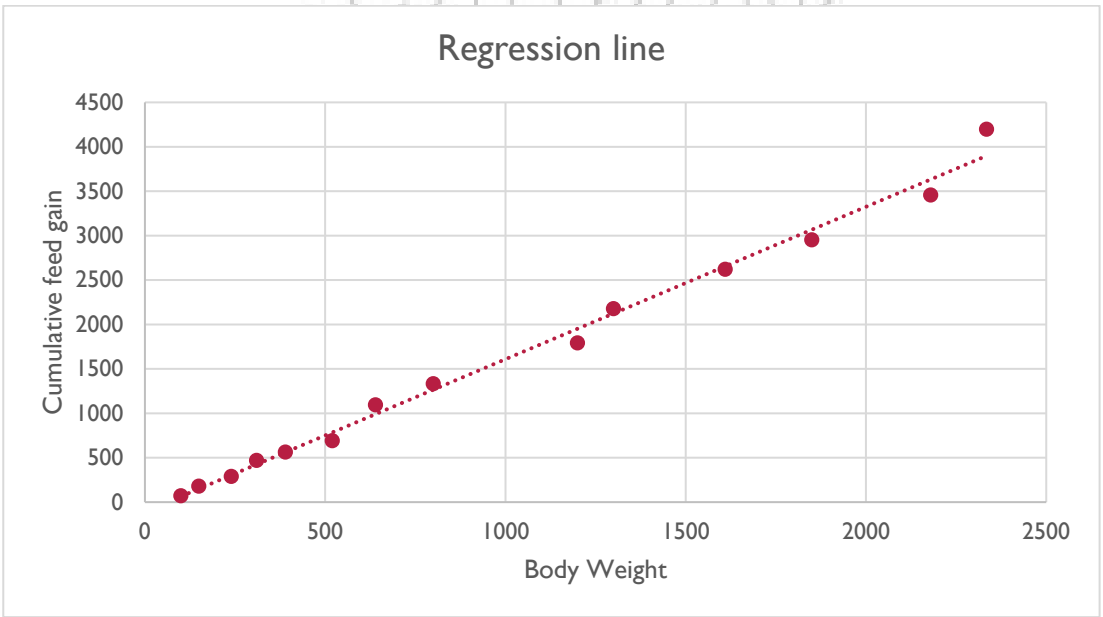
Regression equation: y= -33.875418+(0.687176*x)

1gram feed help to increase approximately 0.7 gram of weight.

Data for Winter season:

| Interval (days) | In grams | |
|---|---|---|
| | Body weight (y) | Cumulative feed (x) |
| 1-3 | 100 | 70 |
| 4-6 | 150 | 178 |
| 7-9 | 240 | 289 |
| 10-12 | 310 | 469 |
| 13-15 | 390 | 563 |
| 16-18 | 520 | 690 |
| 19-21 | 640 | 1094 |
| 22-24 | 800 | 1332 |
| 25-27 | 1200 | 1792 |
| 28-30 | 1300 | 2177 |
| 31-33 | 1610 | 2620 |
| 34-36 | 1850 | 2952 |
| 37-39 | 2180 | 3457 |
| 40-42 | 2335 | 4196 |

**Graph:**



**Summary:**

| Regression Statistics | |
|---|---|
| Multiple R | 0.995880 |
| R Square | 0.991776 |
| Adjusted R Square | 0.991091 |
| Standard Error | 72.865205 |
| Observations | 14 |

| | Coefficients | Standard Error | t Stat | P-value |
|---|---|---|---|---|
| Intercept | 69.905651 | 30.709214 | 2.276374 | 0.041952 |
| X Variable 1 | 0.578012 | 0.015194 | 38.042315 | 0.000000 |

Regression equation: y= 69.905651+(0.578012*x)

1gram feed help to increase approximately 0.6 gram of weight.

## Interpretation:

| **Season** | **Weight gain per gram** |
|---|---|
| Summer | 0.6 |
| Rainy | 0.7 |
| Winter | 0.6 |

## Conclusion:

All three season have linear relation between body weight gain and feeding

1) The rainy season has the highest body weight gain per gram of food consumed.

2) The winter and summer season has the lowest body weight gain per gram of food consumed.

# 3. Analysis of Variance (ANOVA):

We compare different type of feeds of chicks using F.C.R. Therefore we use "ANOVA" for comparison of feeds in different stages of growths with seasonal effect.

| | Summer | Rainy | Winter |
|---|---|---|---|
| **Feed 1** | 1.35 | 1.31 | 1.51 |
| **Feed 2** | 1.17 | 1.66 | 1.33 |
| **Feed 3** | 1.28 | 1.48 | 1.67 |
| **Feed 4** | 1.51 | 1.28 | 1.80 |

$H_{01}$: Different types of feeds do not have same FCR.
$H_{11}$: Different types of feeds have same FCR.

$H_{02}$: Different seasons do not have same FCR.
$H_{21}$: Different seasons have same FCR.

| SUMMARY | Count | Sum | Average | Variance |
|---|---|---|---|---|
| Feed 1 | 3 | 4.175914 | 1.391971 | 0.011445 |
| Feed 2 | 3 | 4.15734 | 1.38578 | 0.062725 |
| Feed 3 | 3 | 4.433015 | 1.477672 | 0.039251 |
| Feed 4 | 3 | 4.587729 | 1.529243 | 0.067545 |
| | | | | |
| Summer | 4 | 5.314461 | 1.328615 | 0.02073 |
| Rainy | 4 | 5.728094 | 1.432024 | 0.031052 |
| Winter | 4 | 6.311444 | 1.577861 | 0.041525 |

**ANOVA Table:**

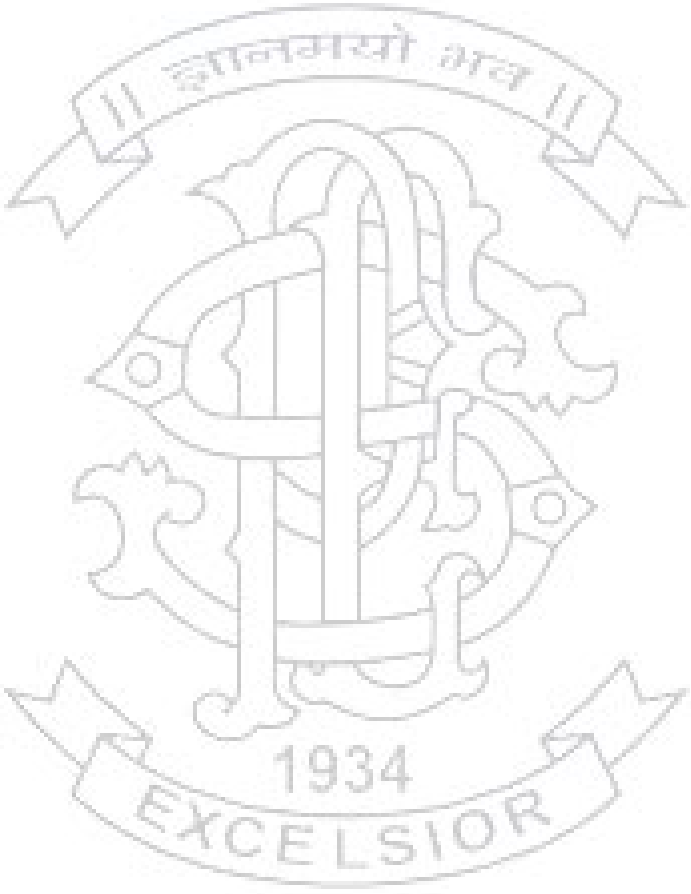
| Source of Variation | SS | df | MS | F | P-value | F tab. |
|---|---|---|---|---|---|---|
| Feeds | 0.043434 | 3 | 0.014478 | 0.367329 | 0.779625 | 4.757063 |
| seasons | 0.125447 | 2 | 0.062724 | 1.591394 | 0.278952 | 5.143253 |
| Error | 0.236485 | 6 | 0.039414 | | | |
| | | | | | | |
| Total | 0.405366 | 11 | | | | |

1.Since the p value for feed is $0.779625$ we accept $H_{01}$ at 5% Level of Significance.

2.Since the p value for season is $0.278952$ we accept $H_{01}$ at 5% Level of Significance.

**Conclusion:**

1) Different type of feeds have same FCR.
2) Different seasons have same FCR.



# TESTING OF HYPOTHESIS

## Run test for randomness.

### 1.For F.C.R.

There are ups and downs observed F.C.R as compared to standard F.C.R.

We want to check whether these ups and downs are random.

We use run test for random.

If F.C.R observed less than standard replace by – sign

If F.C.R observed greater than standard replace by + sign

1) Data for summer season:

| Standard F.C.R. | Observed F.C.R. |
|---|---|
| 0.51 | 0.38 |
| 0.85 | 0.82 |
| 0.96 | 1.09 |
| 1.08 | 1.35 |
| 1.17 | 1.29 |
| 1.21 | 1.17 |
| 1.29 | 1.06 |
| 1.31 | 1.08 |
| 1.35 | 1.28 |
| 1.43 | 1.28 |
| 1.45 | 1.43 |
| 1.50 | 1.61 |
| 1.52 | 1.56 |
| 1.59 | 1.51 |

$H_O$: changes in F.C.R. are random in nature.

$H_1$: changes in F.C.R. are not random in nature.

Sequence:

- - + + +- - - - - - - + + -

Number of runs =R= 5

$n_1$: number of + sign = 5

$n_2$: number of - sign = 9

Critical value of r in the run test:

$R_o$: 3 $R_1$: 11

$R_1 \geq R \geq R_o$

## Interpretation:

Accept $H_O$ at 5% level of significance.

Therefore, changes in F.C.R. are random in nature.

2) Data for rainy season:

| Standard F.C.R. | Observed F.C.R. |
|---|---|
| 0.51 | 0.87 |
| 0.85 | 0.90 |
| 0.96 | 1.10 |
| 1.08 | 1.31 |
| 1.17 | 1.38 |
| 1.21 | 1.66 |
| 1.29 | 1.94 |
| 1.31 | 1.94 |
| 1.35 | 1.94 |
| 1.43 | 1.48 |
| 1.45 | 1.47 |
| 1.50 | 1.47 |
| 1.52 | 1.59 |
| 1.59 | 1.28 |

$H_O$: changes in F.C.R. are random in nature.

$H_1$: changes in F.C.R. are not random in nature.

Sequence:

+ + + + + + + + + + + - + -

Number of runs =R= 4

$n_1$: number of + sign = 12

$n_2$: number of - sign = 2

Critical value of r in the run test:

$R_o$: 2  $R_1$: 9

$R_1 \geq R \geq R_o$

## Interpretation:

Accept $H_O$ at 5% level of significance.

Therefore, changes in F.C.R. are random in nature.

3) Data for winter season:

| Standard F.C.R. | Observed F.C.R. |
|---|---|
| 0.51 | 0.70 |
| 0.85 | 1.19 |
| 0.96 | 1.20 |
| 1.08 | 1.51 |
| 1.17 | 1.44 |
| 1.21 | 1.33 |
| 1.29 | 1.71 |
| 1.31 | 1.67 |
| 1.35 | 1.49 |
| 1.43 | 1.67 |
| 1.45 | 1.63 |
| 1.50 | 1.60 |
| 1.52 | 1.59 |
| 1.59 | 1.80 |

$H_O$: changes are random in nature.

$H_1$: changes are not random in nature.

Sequence:

+ + + + + + + + + + + + + +

Number of runs =R= 1

$n_1$: number of + sign = 14

$n_2$: number of - sign = 0

Critical value of r in the run test:

$R_o$: 2

$R \leq R_o$

**Interpretation:**

Reject $H_O$ at 5% level of significance.

Therefore, changes in F.C.R. are not random in nature.

## 2. For Deaths of Chicks:

We would like to check number of deaths are random in nature or is there any pattern (increasing or decreasing). We used run test to test randomness.

1) Data for summer season:

| Interval of days | Total deaths |
|---|---|
| 1 | 14 |
| 2 | 24 |
| 3 | 48 |
| 4 | 16 |
| 5 | 22 |
| 6 | 40 |
| 7 | 21 |
| 8 | 28 |
| 9 | 29 |
| 10 | 76 |
| 11 | 69 |
| 12 | 27 |
| 13 | 33 |
| 14 | 42 |

$H_O$: Number of deaths are random in nature.

$H_1$: Number of deaths are not random in nature.

Ascending order:

14,16,21,22, 27,24,28,29,33,40,42,48, 69,76

Median = $\frac{7^{th}\text{ observation}+8^{th}\ observation}{2}$

$=\frac{28+29}{2}$

=28.5

Sequence is: - - + - - + - - + + + - + +

Number of runs =R= 8

$n_1$: number of + sign = 7

$n_2$: number of - sign = 7

Critical value of r in the run test:

$R_o$:3 $R_1$:13

$R_1 \geq R \geq R_o$

**Interpretation:**

Accept $H_O$ at 5% level of significance.

Therefore, Number of deaths are random in nature.

2) Data for Rainy season:

| Interval of Days | Total deaths |
|---|---|
| 1 | 27 |
| 2 | 17 |
| 3 | 10 |
| 4 | 7 |
| 5 | 2 |
| 6 | 8 |
| 7 | 6 |
| 8 | 15 |
| 9 | 20 |
| 10 | 26 |
| 11 | 37 |
| 12 | 29 |
| 13 | 90 |
| 14 | 73 |

$H_O$: Number of deaths are random in nature.

$H_1$: Number of deaths are not random in nature.

Ascending order:

2,6,7,8,10,15,17,20,26,27,29,37,73,90

Median = $\frac{7^{th}\text{ observation}+8^{th}\ observation}{2}$

$=\frac{17+20}{2}$

=18.5

Sequence is:

+ - - - - - - - + + + + + +

Number of runs =R= 3

$n_1$: number of + sign = 7

$n_2$: number of - sign = 7

Critical value of r in the run test:

$R_o$: 3 $R_1$: 13

$R_1 \geq R \geq R_o$

## Interpretation:

Accept $H_O$ at 5% level of significance.

Therefore, Number of deaths are random in nature.

3) Data for winter season:

| Interval of Days | Total deaths |
|---|---|
| 1 | 19 |
| 2 | 20 |
| 3 | 13 |
| 4 | 7 |
| 5 | 7 |
| 6 | 6 |
| 7 | 2 |
| 8 | 10 |
| 9 | 11 |
| 10 | 1 |
| 11 | 5 |
| 12 | 10 |
| 13 | 15 |
| 14 | 20 |

$H_O$: Number of deaths are random in nature.

$H_1$: Number of deaths are not random in nature.

Ascending order:

1,2,5,6,7,7,10,10,11,13,15,19,20,20

Median = $7^{th}+8^{th}$obs /2

=10+10/2

=10

Sequence is:

+ + + - - - - + + - - + + +

Number of runs =R= 5

$n_1$: number of + sign = 8

$n_2$: number of - sign = 6

Critical value of r in the run test:

$R_o$: 3 $R_1$: 12

$R_1 \geq R \geq R_o$

## Interpretation:

Accept $H_O$ at 5% level of significance.

Therefore, Number of deaths are random in nature.

**Conclusion:**

1. In summer and rainy season there is significant difference between standard values and observed values of F.C.R. & in winter season there is no significant difference between standard values and observed values of F.C.R. It is one of the main cause of increased death rates of chicks in summer and rainy season.

2. In all three seasons, number of deaths are random in nature. There is no any specific pattern (increasing or decreasing).

# Conclusions

1. In summer season, body weight gain per gram is moderate as compared to other seasons. But death rate is high in “summer season”.

2. In rainy season, body weight gain per gram is high as compared to other seasons. Death rate is moderate.

3. In winter season, death rate is low as compared to Summer and rainy season. F.C.R. is close to standard values in this season.

4. In winter, observed value of F.C.R always higher than actual value.

5. In all three seasons, number of deaths are random in nature. There is no any specific pattern (increasing or decreasing).

6. From above analysis we conclude that the “winter season” is best season for poultry framing as compared to other two season.

# Limitations

1.Inference drawn in this project report is only valid for Nashik district.

2.This project report is concerned with the breed of chickens “COCK 300” so this inference is only valid for this particular breed.

# Scope

We have done the analysis of poultry farming for which we have taken the poultry from Nasik district, Malegaon but we can do this type of analysis for any region. In this analysis we have considered the breed “COCK 300”, we can do the analysis for any breed.

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