Agricultural Statistics in Practice

Analysis of Variance (ANOVA)

Effect of change of origin and scale in ANOVA

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A problem

- Suppose a farmer wants to compare the crop yields of different fields on their farm. However, the yield data is measured in **_different units_** (e.g., kilograms for one field, pounds for another field).

- Before conducting the ANOVA, the farmer needs to consider the effect of changing the origin and scale of the measurements to ensure accurate and meaningful comparisons.


Source:
agronicfood.com

General Terms

(handwritten annotations)
15 kg 0   5 ml – 0
10 kg – 5   3 ml – 2
3 kg – 12   1 ml – 4

- **<u>Origin:</u>** The reference point or baseline for measurement. Changing the origin involves shifting the data values by a constant amount, such as subtracting a mean or adding a constant value to align the measurements.

- **<u>Scale:</u>** The range or magnitude of the data. Changing the scale involves multiplying or dividing the data by a constant factor to adjust the measurements to a common range or unit of measurement.

- **<u>Transformation:</u>** The process of applying mathematical operations to the data to change the origin or scale. Common transformations include logarithmic, square root, or reciprocal transformations to achieve desired properties in the data.
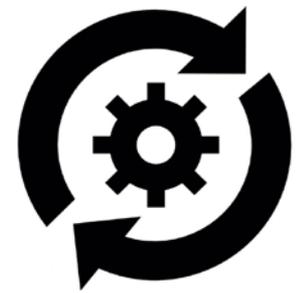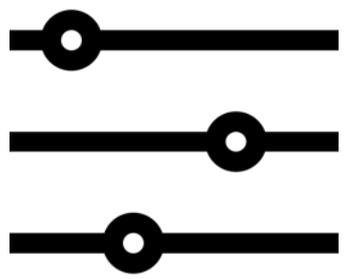
(handwritten annotations)
$gm \propto \dfrac{1}{1000}$

$gm \rightarrow kg$

Meaning

- The effect of change of origin and scale in ANOVA refers to the impact of altering the measurement units or scale of the data on the results of the analysis.

- It involves transforming or converting the data to a common scale or origin to enable valid comparisons and interpretations within the ANOVA framework.

- ***Variance remain unchanged by change of origin.***
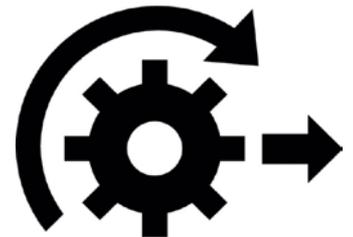
Utility in agri field

- By considering the effect of changing the origin and scale, farmers can account for any differences in measurement units or scales and ensure fair comparisons among different variables or treatments.

- It helps farmers **avoid misleading interpretations** or incorrect conclusions that may arise from comparing data measured in different units or scales without appropriate transformations.

Advantages
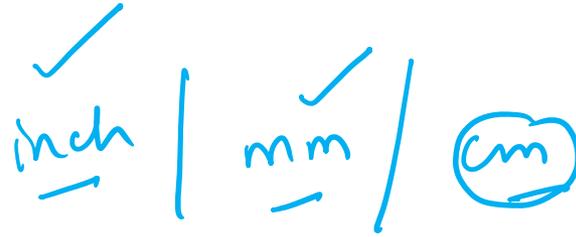
- Changing the origin and scale in ANOVA ensures meaningful comparisons of data measured in different units.

- Transforming data to a common scale allows farmers to make accurate conclusions and avoid misleading interpretations.

- Consideration of the effect of origin and scale helps align measurements and account for differences in measurement units.

- Shifting the origin or adjusting the scale in ANOVA enables fair comparisons and valid statistical analysis.

- Appropriate transformations address the effect of change of origin and scale, improving the reliability of ANOVA results.

Thank You