ANIMAL GENETICS & BREEDING

UNIT – I
BIO-STATISTICS AND COMPUTER APPLICATION
Theory

MEASURES OF CENTRAL TENDENCY
or Average

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Introduction

- The primary aim of statistical methods is to condense the raw data in way that it is able to convey some meaningful conclusion at first sight.

- In order to reduce the complexity of data obtained from different sources and to make them comparable, it is essential data should be reduced to single figure.

- It is obvious that the single figure which is used to represent whole series should neither have the lowest value or highest value in the series but a somewhere between two limits, possibly in the center, where most of the items of the series cluster.

- Such figures are called the measure of central tendency or measure of the averages.

Need of an average

- A statistical average condenses a frequency distribution or raw data and presents it in one single representative number.

- It is a single value which is considered as the most representative or typical value for a set of values.

- Such a value can neither be the smallest one nor the largest one but is one which usually lies somewhere near the centre of the group. That is why an average is usually referred to as a measure of central tendency.

- It is located at a point around which most of the other values tend to cluster and therefore it is also termed as a measure of location.
- It is considered as a measure of description because it describes the main characteristics of the data.

Definition

- Central tendency is defined as "the statistical measure that identifies a single value as representative of an entire distribution."It aims to provide an accurate description of the entire data. It is the single value that is most typical/representative of the collected data.

Or

- A measure of central tendency is a summary measure that attempts to describe a whole set of data with a single value that represents the middle or centre of its distribution.

Objective

- To determine a single value for the whole set of data.
- To describe the characteristics of the entire group of data.
- To help in comparison of different data with in one group or between groups of data.

Characteristics of ideal measures of central tendency

Since an average is a single value representing a group of values, it is expected that such a value should satisfied the following properties.

- It should be rigidly defined.
- It should be based on all the observations.
- It should be least affected by the extreme values.

- It should be easy to understand or comprehensible, otherwise its use will be limited
- It should be easy to calculate.
- It should be amenable to further mathematical treatment.
- It should be least affected by fluctuation of sampling.

Different Symbols used for parameter and statistics

Characteristics	Parameter (Population)	Statistics (Sample)
Number of Individuals	N	N
Mean	μ	$\overline{X}$
Variance	σ^2	S^2
Standard deviation	σ	S
Proportion	p	P
Pearson Correlation coefficient	R	R

Classification

- The different averages are broadly classified into two groups namely mathematical averages or algebraic averages and positional averages or averages of position.
- Mathematical averages are based on all observations and are calculated by algebraic formula. They are
- Arithmetic Mean (AM) or Mean
- Geometric Mean (GM)
- Harmonic Mean (HM)
- Positional averages are based on few observations and occupy certain position among the observations. They are
- Median
- Mode

Properties of AM

- The algebraic sum of the deviations of the given set of observations from their arithmetic mean is zero.

- 1f X1 and X2 for given frequency n1 & n2 the combined frequency X

- $X = \dfrac{X1\ N1 + X2\ N2}{N1 + N2}$

- The sum of the squares of deviation of the given set of observations is minimum when taken from the arithmetic mean.

Merits of AM

- It is rigidly defined
- It is easy to calculate and understand
- It is based on all the observations
- It is suitable for mathematical treatment
- Among all averages it is least of affected by fluctuating / random sampling.

Demerits of AM

- It is much affected by extreme values

- It cannot be used for open end classes

- It cannot be determined by inspection nor can it be located graphically.

- It cannot be used for qualitative types of data, for which median is used.

- Am cannot be obtained for missing values.

- Am is not measure of location for extreme skewed distribution.

THANK YOU