Flock uniformity of broiler

Flock uniformity is a measure of the variability of bird size in a flock.

To determine the average weight and uniformity of a flock, divide the house into three sections. A random sample of approximately 100 birds from each section or 1% of the total population should be weighed and the individual weights recorded. It is important to weigh all birds within the catch pen, excluding culls. Of the 100 birds sampled, count the number of birds 10% either side of the average body weight. Calculate the percentage of the sample that the number represents. This is the uniformity percent.

The variability of a population (the flock) is described by the coefficient of variation (CV %).

CV% = [Standard deviation (g) ÷ average live weight (g)] x 100

Standard Deviation (SD): The standard deviation is a measure of how widely values are dispersed around the average value (the mean).

SD=**σ (sigma)= it is the square root of the Variance**

Variance: The average of the squared differences from the Mean

Mean

The average value of a population.

The live weights (LW) of 10 broilers are: 1350, 1300, 1200, 1100, 1450, 1150, 1250, 1370, 1500, 1400gm;

Calculate its mean.

Answer:

$$\text{Mean} = \frac{1350+1300+1200+1100+1450+1150+1250+1370+1500+1400}{10} = \frac{13070}{10} = 1307$$

So the mean (average) LW is 1307 gm.

Find out the difference values from the mean for each data:

1350-1307= 43
1300-1307 = -7
1200 -1307= -107
1100 -1307= -207
1450-1307= 143
1150-1307= -157
1250-1307= -57
1370-1307= 63
1500-1307= 193
1400 -1307 = 93

Find out average of the **squared** differences from the Mean

$$\text{Variance} = \frac{43^2 + (-7)^2 + (-107)^2 + (-207)^2 + 143^2 + (-157)^2 + (-57)^2 + 63^2 + 193^2 + 93^2}{10}$$

=1849+49+11449+42849+20449+24649+3249+3969+37249+8649/10
= 15441

So, the Variance is **15441**

And the Standard Deviation is just the square root of Variance, so:

Standard Deviation: $\sigma = \sqrt{15441}$ = 124.26= **124**(to the nearest gm)

CV% = [Standard deviation (g) ÷ average live weight (g)] x 100
= (124 /1307) x 100
= 9.48

The following table gives an approximation of flock uniformity

% Uniformity	CV (%)
95.4	5
90.4	6
84.7	7
78.8	8
73.3	9
68.3	10
63.7	11
58.2	12
55.8	13
52.0	14
49.5	15
46.8	16

So, Flock uniformity is below 73.3

Uniformity Indication

CV%	Uniformity%	Evaluation
8	80	Uniform
10	70	Average
12	60	Poor

We Know

- A low CV% indicates a uniform flock.
- A high CV% indicates an uneven flock.

Conclusion: It was an average uniformity flock

Standard Deviation

The standard deviation is a measure of how widely values are dispersed around the average value (the mean).

Its symbol is **σ** (sigma)

The formula is easy: it is the **square root** of the **Variance**

Variance

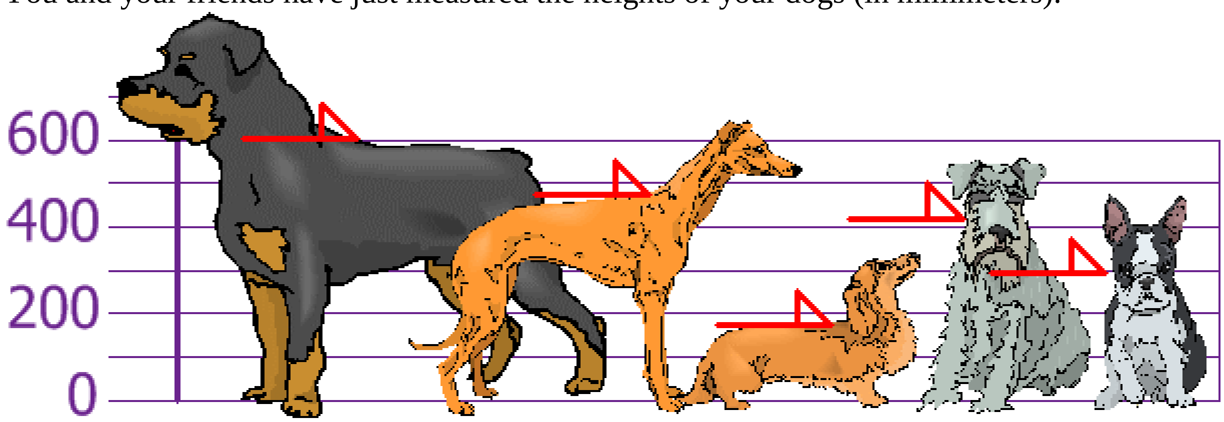
The Variance is defined as: The average of the **squared** differences from the Mean

To calculate the variance follow these steps:

- Work out the Mean (the simple average of the numbers)
- Then for each number: subtract the Mean and square the result (the *squared difference*).
- Then work out the average of those squared differences. (Why Square?)

Example

You and your friends have just measured the heights of your dogs (in millimeters):



The heights (at the shoulders) are: 600mm, 470mm, 170mm, 430mm and 300mm.

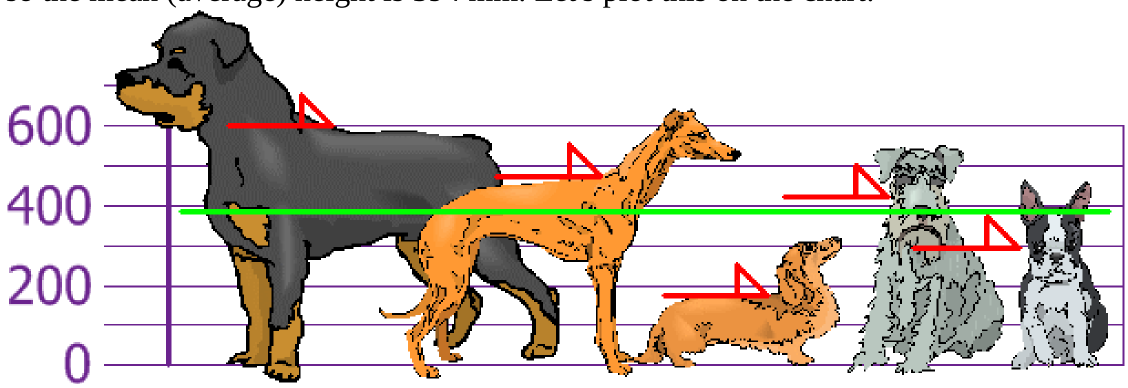
Find out the Mean, the Variance, and the Standard Deviation.

Your first step is to find the Mean:

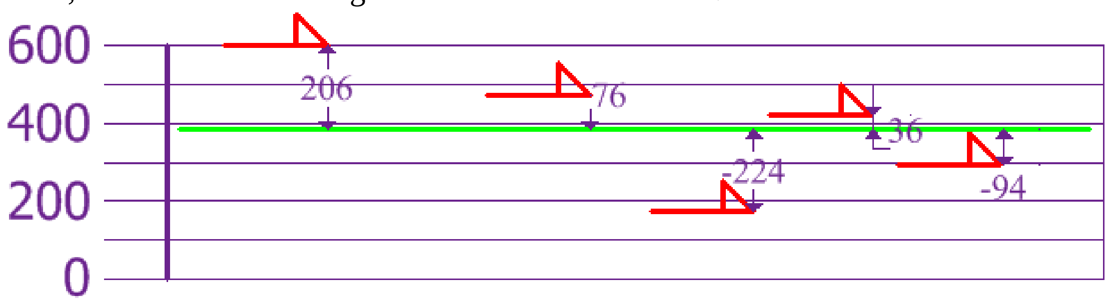
Answer:

$$\text{Mean} = \frac{600 + 470 + 170 + 430 + 300}{5} = \frac{1970}{5} = 394$$

so the mean (average) height is 394 mm. Let's plot this on the chart:



Now, we calculate each dogs difference from the Mean:



To calculate the Variance, take each difference, square it, and then average the result:

$$\begin{aligned} \text{Variance: } \sigma^2 &= \frac{206^2 + 76^2 + (-224)^2 + 36^2 + (-94)^2}{5} \\ &= \frac{42,436 + 5,776 + 50,176 + 1,296 + 8,836}{5} \\ &= \frac{108,520}{5} = 21,704 \end{aligned}$$

So, the Variance is **21,704.**

And the Standard Deviation is just the square root of Variance, so:

Standard Deviation: σ = √21,704 = 147.32... = **147** (to the nearest mm)