

## **Determination of Moisture in feedstuffs**

Moisture is defined as the free amount of water present in any feedstuff. Moisture can be avoided in any feedstuffs sample by putting such sampling in oven. The remaining quantity which remains after this process is called "Dry Matter".

### **The most important causes for determination of moisture:**

1. For preparation of feed sample for different chemical analysis in case of green or plant feeds.
2. To record the result according or on basis of total dry matter.
3. To preserve the feedstuff because high moisture lead to growth of fungi and rapid deterioration of the feed, also, high amount of moisture causes rapid chemical reaction and autolysis of feedstuffs.

### **Procedure of the experiment:**

1. Empty, labeled, clean moisture can is placed in oven ( $100\text{C}^\circ$ ) for an hour. The aim of this process is for cleaning and sterilization.
2. the can is transferred from drying oven into desiccator for cooling.
3. the can is weighed by digital electrical scale with recording the weight.
4. one- two gm. Of feed sample intended for moisture estimation is weighed and is put in the moisture can of previously weighed and recorded.

**Notebook: there is Two types followed with weighing of sample with the can in the digital electrical scale.**

- a. At the beginning, the empty can weighed (e.g. 12gm.). If a sample weight is about (1.5gm.) wanted, then the sample weight will be added into can weight with the sample to be (13.5gm.).
- b. Empty can is weighed and recorded (12gm). Then, the scale is tarred and the sample will be added (1.5gm).

the second type of weighing is preferable in the laboratory in sample weighing.

5. moisture can containing the sample is put in the drying oven on ( $130\text{-}150\text{C}^\circ$ ) for half an hour.
6. At the end of drying period, the can is transferred into desiccator for cooling.

Then, the can is weighed by digital scale with recording the can weight.

### **Calculations:-**

1. Moisture can is weighed when it's empty.
2. Weight of moisture can containing the sample (the weight before drying ).
3. Weight of the sample =  
(weight before drying – weight of empty moisture can).
4. Weight of moisture can with the sample (the weight after drying).
5. Weight of moisture =  
(the weight before drying – weight after drying) .
6. The percentage of moisture in the sample=

$$\frac{\text{weight of moisture}}{\text{weight of sample}} * 100$$

7. The percentage of dry matter of the sample =  
= 100- moisture percentage.

### **Determination of moisture in green feedstuffs samples**

Determination of moisture in green feedstuffs samples should be dried in two stages. In the first stage, 100- 200 gm of feedstuff is dried after it's chopping. Drying of feedstuffs should be at (60-70C°) for 16 hours (overnight). Then, the sample should be cooled, weighed and determined the primary moisture. In the second stage, the dried sample is ground finely and (1-2) gm. of the sample is taken. The secondary moisture is estimated following the fore mentioned previous procedures. The purpose of drying of green feedstuffs following two stages is to prevent the occurrence (**the case of hardness**). Case of hardness by formation of outer solid layer to prevent oozing and leakage of moisture from the lower layers of the sample. Hence, little fraction of the moisture may remain in the sample leading to false and improper results. Total moisture of the green feedstuffs is estimated following the equation:-

**Total percentage% =**

$$\text{primary moisture (\%)} + \frac{\text{secondary moisture (\%)} * (100 - \text{primary moisture\%})}{100}$$

Dry matter (%)= 100- total moisture.

### Example No. ( 1 )

Two hundred grams of green alfalfa feed sample was dried primarily on (60-70C°) for 16 hours. After drying the weight becomes (40gm). Two gm. of the primarily dried sample was taken and was further dried on (150C°) for half an hour to be (1.6gm).

Estimate primary, secondary and total percentage of moisture in sample.

Solution:-

$$\text{Primary moisture \%} = \frac{\text{weight of moisture}}{\text{weight of sample}} * 100$$

$$= \frac{\text{w.t.of sample before drying} - \text{w.t.of sample after drying}}{\text{weight of sample before drying}} * 100$$

$$= \frac{200-40}{200} * 100$$

$$= 80\%$$

Secondary moisture%=

$$\frac{\text{weight of sample before drying} - \text{weight of sample after drying}}{\text{weight of sample before drying}} * 100$$

$$= \frac{2-1.6}{2} * 100$$

$$= 20\%$$

Total moisture percentage(%)=

$$\text{primary moisture (\%)} + \frac{\text{secondary moisture (\%)} * (100 - \text{primary moisture (\%)})}{100}$$

$$= 80 + \frac{20 * (100 - 80)}{100}$$

$$= 80 + \frac{400}{100}$$

$$= 84\%$$

### Example No. ( 2 )

Estimate the percentage of dry matter in a feed sample containing (70%) primary moisture and 5% secondary moisture.

### Example No.( 3 )

The weight of empty moisture can is (13.5gm). fifteen gram is the weight the can and the concentrate sample added to the first sample. The sample is put in oven (130C°) for half an hour. The sample was transferred from the oven and was weight. The weight is became (14.9 gm.). Estimate dry matter percentage of the sample.

## Determination of moisture in milks, meats, and eggs samples

The handling of these sample differs from those of ordinary and concentrate feedstuff because they adhere with the can at drying process. So, some substances are added with these samples such as filter paper with the milk, sand with the meat, asbestos with the eggs. The purpose of using these substances are due to:-

1. Increase the surface area for more evaporation.
2. To avoid the adhesion of the sample with the can.

Procedure of the experiment:-

1. Weigh the moisture can with the substances (filter paper, sand, asbestos).
2. Weigh the can with the substances + meat sample

**(weight before drying).**

3. weight of sample = weight before drying – weight of can with substances.

It is preferable that the weight of the original sample of meat, eggs and milk is (5 gm.).

4. The can containing the substances and the sample should be put in water bath for half an hour.
5. The can containing the substances and the sample should be inserted in drying oven on (150C°) for half an hour. Then, the sample is taken and is weighed which is considered as

**" weight after drying".**

6. Weight of moisture = weight before drying – weight after drying.

7. percentage of moisture =  $\frac{\text{weight of moisture}}{\text{weight of sample}} * 100$

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**Example :-** The weight of empty moisture can is (11.6gm) .(5gm.)of dry sand add to this can, then the weight became (16.6gm.).add meat sample ,then the weight became (21.45gm.).the can inserted with substances in oven ,then put out and weight becomes (18.76gm.).Estimate the moisture percentage in this sample.

**solution:-** percentage of moisture =  $\frac{\text{weight of moisture}}{\text{weight of sample}} * 100$

w.t of moisture =w.t before drying(can+meat+sand)\_w.t after drying

$$= 21.45 - 18.76$$

= 2.69gm.

w.t of sample(meat)=w.t before drying (can+meat+sand)- w.t of can with sand

$$= 21.45 - 16.60 = 4.85$$

$$\text{moisture}(\%) = \frac{2.69}{4.85} \times 100 = 55.46\%$$

4.85

