

Hand out of practical Lectures in Animal Nutrition

Directions and instructions about working in nutrition laboratory

Nutrition Laboratory is similar to chemistry laboratory. It contains chemical and glass wares, food analysis equipment's.

Notebook: Students should work their experiment under supervision of their in charge lectures directly in the nutrition lab.

Tools, equipment's, and glass wares used in nutrition lab:-

1. Digital electrical scale:

Electrical scale is used for correct and proper device for accurate weights. Hence, the following steps should be carried out:-

- a. Put the scale on fixed , stable and unmovable table to prevent any agitation.
- b. Clean all parts of the scale before measurement using special small brush to remove debris, waste and dust specially those present on the scale.
- c. To open the instrument, press on the button "power", to tare the instrument press on the button "tar".
- d. Never handle the sample intended for weighing by hands because it negatively effects on their weights. So, special handlers are used for this purpose.
- e. Scaling process is carried out quickly with care to prevent the acquirement of the sample to climatic moisture weight is immediately recorded.
- f. Re-cleans the instrument after use from remains of the sample attached to the scale using special brush.
- g. The accuracy of the scale is (0.00) after the point.



2. The desiccator:

The relative humidity of food samples vary from time to other due to the climate. The moisture differs from time to another which causes large mistakes so such food samples should be placed in the desiccator to prevent these cases. The desiccator is a glass bowl having a strict closed- cover. The desiccator contains CaCl_2 , Which acts as moisture absorption.

The desiccator is widely used in nutrition lab. For various purpose e.g. cooling of the samples, keeping the tools before carrying out scaling. When food samples taken out from drying or burning ovens should be put in the desiccator.

The cover of the desiccator should not strictly closed because these hot samples cause extension of air inside the desiccator leading to push the cover with

consequence of partial loss of the sample. The cover may be strictly closed after partial cooling of the sample. The sample should be preserved until being weighed.



Instruments used for volume measurement:

1. The Burette:

It is a thin glass cylinder with various capacities viz., 50 ml, 25 ml. the burette is closed from the bottom by a valve. Each one ml. is further subdivided in to (10) portions. Measurement followed by burette is up to 0.04–0.05 ml and this amount is equal to one drop. (two drops in the burette equals one line).

The burette should be thoroughly washed before it's use by tap water and then by distilled water and finally by the solution intended for use in the test. The burette is quietly filled from the top using small glass funnel avoiding air bubbles formation inside the burette. The valve located at it's bottom is opened to ensure that it's full of solution when transparent solution is used in titration process, the reading is recorded when the solution is in lower surface (the concave surface of solution).

When coloured solution are used in titration process, the reading is recorded at the upper surface of the solution (the convex surface of the solution).

It is better to use white paper behind the reading area of the burette to prevent the leakage of light and to clarify the reading. Eye sight level should be horizontal at the area of reading.



2. pipette:

It is a standard slender graduate glass cylinder having narrow opening. It is used for measurement of fluids in tests and experiments. The thumb is used for regulating the evacuation of the intended volume.

There are two types of pipettes i.e standard pipette and graduate pipette. When the fluids are holding using pipette, the end of the pipette should be placed in the inner surface of the flask intended for conveying. It is advised not to blow the pipette in order to evacuate it. It is not necessary to evacuate the last drop of the pipette because the pipette is designed to hold the last drop.

Some pipettes have a swelling calling safety bubble which prevent the arrival of the solution to the mouth of the handler during the working.



3. Measuring flasks:-

It is a rounded glass flask having slender narrow neck. The volume of the flask is indicated by special mark. Measuring flasks are used to prepare certain standard solution or for their dilution. These flasks are not intended for heating or boiling solutions.

Also, hot solutions should not be put in these flasks because these operations may change their standard volumes. These changes are due to the fact that these flask are not manufactured from pyrex glass which is heat resistant and heat stable. There are many volumes of these flasks e.g. 100ml and 250 ml.



4. Conical flasks:

These are conical flask made from glass having broad bottom and slender opening. Usually, these flasks are used for dilution of stock and standard solutions. Also, it can be used as a receiving flask located bottom the burette or under the distiller.



5. Graduate cylinders:

It is a graduate glass cylinder and different volumes (10-1000ml). These cylinders are used in lab usually for preparing stock and standard solutions or for their dilutions.



The repeat in Lab. Analysis

Feed and chemical samples are analyzed following two samples of each (Duplicate).

but it may be triplicate (three samples) of the species in the sometime. Results are calculated of feed samples with no more than 3-5% of the experimental error is accepted. The percentage of the experimental error can be estimated following these steps:

1. The difference between two results = maximum result – minimum result.
2. mean of the result = *first result + second result* / 2
3. percentage of experimental error: = *difference between two results / mean of the result * 100*

Notebook: in case of triplicate, the result of any experiment which doesn't conform with other results should be excluded.

Example:

Determination of fat percentage of concentrates sample was: 5.6% fat percentage of the first result, 6.3% of the second result and 5.8% of the third result.

Calculate the experimental error.

Solution:

Since the 2nd result does not conform with 1st and 3rd results, so it should be excluded.

The difference between two results = 5.8- 5.6=0.2

Mean of result= $5.6+5.82=5.7$

Percentage of error = *difference between two results / mean of result*

= $0.2 / 5.7 * 100 = 3.5\%$

Feed stuffs and methods of sampling:

Firstly, Feed stuffs: they are considered that any feed can be used for animal feeding. These materials may include any material that farm animal can digest, absorbed, assimilated either for maintenance or for production. Generally, animal feedstuffs can be divided into two main parts which are:-

1. Concentrates:

These types of feed contain high percentage of protein and soluble carbohydrates and low ratio of crude fiber (less than 18%).

Concentrates include cereals, grains of different origins such as wheat, barley, corn (maize) as well as meals. Meals are the residues of oily crops after the extraction of oil from these crops such as sesame meal, cotton seed meal, sun flower meal, soy bean meal, and safflower meal. Concentrates may contain protein of animal origin as well as animal by products such as blood and bone meal, feather meal. Of plants and vegetative sources it may include date palm residues, sugar beet residues, wheat bran, molasses, rice husks and rice residues.

2. Roughages:

It refers to those feed which contain high percentage of crude fibers (more than 18%). Its nutritional value is low and is given to the ruminants rations as bulky material. There are two types of roughages:

A. Green roughages:

It includes grasses of various kinds and the clover, alfalfa as well as the silage which are fermented grass preserved away from air in special siloes. Silage is considered as a palatable feed for animals. Yellow corn silage is the most famous silage.

B. Dry roughages:

Straw and plant stems are examples of dry roughages which are produced after the harvest of field crops. Also, hay is dry roughages, these materials are dry feed substance. The purpose of drying is to prolong time of preservation, so it is stored at summer and being given to the animals at winter. Examples of hay is alfalfa hay and oat hay.

Secondly: approximate analysis of feedstuffs:

It is regarded as a series of chemical analysis carried out on feedstuff to determine ratio and percentages of essential feed compounds such as protein and fat and carbohydrates. The purpose of feedstuff analysis as follows:

1. To determine the real nutritional value of the ration or feedstuff.
2. To detect adulteration (cheat) of the feedstuff.
3. To determine the suitable price of the feedstuff.