Tikrit University
College of Veterinary Medicine

Lecture Title:
Determination of the percentage of Soluble carbohydrates in feedstuffs.

Subject name: Animal Nutrition

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Determination of the percentage of Soluble carbohydrates in feedstuffs.

Soluble carbohydrates or nitrogen-free extract (N.F.E) are regarded as important energy sources of the animal body. Soluble carbohydrates are characterized by high solubility and digestibility. The animal body can easily utilize those compounds as a source of energy.

Methods of determination of soluble carbohydrates:

• First: The chemical method:

 • This method is regarded as an accurate method, but it is rather expensive.

In this method, multiple chemical compounds are used, or the application of an enzyme, " amylase". This method is principally based on the conversion of soluble carbohydrates into their simplest form, "Glucose".

Later, the percent of glucose in the solution can be determined according to the concentration of the colors. The variation of color can be compared with a standard solution containing a known quantity of glucose. This measurement is reflected by a technique called chromatography.

Second: The calculation method:

• This method depends on determining and finding the percentages of the rest of the feed compounds of the sample and then subtraction from 100. It can be calculated in the following method:

• The percent of soluble carbohydrates= 100- (% moisture + % crude protein + % ash+ % crude fibers + % crude fat).

The drawbacks of applying this method are that it chiefly depends on the determination of the percent of other feedstuffs compounds, so if there is any error in the determination of any feedstuff compound, there will be an error in the estimation of the calculated soluble carbohydrates.

The expression of results on the basis of dry matter.

• After the completion of the determination of all nutritional compounds, we have obtained results. (as fed basis). It means that the results of chemical analysis depend on the natural conditions of the type of matter. However, customs followed in local and international nutrition tables are to include the results on a dry matter basis after disposal of moisture and omission.

Method of " on dry matter basis" determination:

If it is supposed that the percentage of nutritional compounds of a certain feedstuff sample as fed basis is as follows:

Nutritional compounds	Percentage (%)
Moisture	5
Crude protein	20
Ash	15
Crude fiber	10
Crude fat	5
Soluble carbohydrates	45
Total	100 %

Nutritional compounds Moisture Crude protein Ash Crude fiber Crude fat Percentage (%) 5 20 15 10 5 Soluble carbohydrates Total 45 100%

• At first: dry matter percentage is estimated = 100 - %

moisture =

100- 5= 95%

In this case, on a dry matter basis, the percentage of moisture = zero

So on dry matter basis = 100- moisture%

= 100 – zero = 100%.

The percentage of the rest or remaining nutritional compounds is estimated as follows:

$$\frac{crude\ protein\ (\%)}{20} \qquad \frac{dry\ matter}{95}$$

$$X \qquad\qquad 100 \qquad\qquad x = \frac{20*100}{95} = 21.05\ \%$$

$$\frac{ash\ (\%)}{15} \qquad \frac{dry\ matter}{95}$$

$$X \qquad\qquad 100 \qquad\qquad x = \frac{15*100}{95} = 15.78\ \%$$

$$\frac{crude\ fiber\ (\%)}{10} \qquad \frac{dry\ matter}{95}$$

$$X \qquad\qquad 100 \qquad\qquad x = \frac{10*100}{95} = 10.52\ \%$$

$$\frac{crude\ fat\ (\%)}{5} \qquad \frac{dry\ matter}{95}$$

$$X \qquad\qquad 100 \qquad\qquad x = \frac{5*100}{95} = 5.26\ \%$$

$$\frac{soluble\ carbohydrates\ (\%)}{45} \qquad \frac{dry\ matter}{95}$$

$$X \qquad\qquad 100 \qquad\qquad x = \frac{45*100}{95} = 47.36\ \%$$

• Also, the percentage of carbohydrates can be estimated by another method:

• = 100- (zero + 12.05 + 15.78 + 10.52 + 5.26)

 • = 100- 52.61 = 47.39

 • The organic matter (As fed basis)

• = dry matter (%) – ash (%)

• = 95- 15

 • = 80%

$$\frac{organic\ matter\ (\%)}{80} \qquad \frac{dry\ matter}{95}$$

    X   100 $x = \dfrac{80*100}{95}$ = 84.21 %

Or the organic matter (on a dry matter basis)

= 100 - ash%

= 100 – 15.78

= 84.22 %