International Standard 6496

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Animal feeding stuffs — Determination of moisture content

Aliments des animaux — Détermination de la teneur en eau

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 6496 was developed by Technical Committee ISO/TC 34, *Agricultural food products*, and was circulated to the member bodies in June 1981.

It has been approved by the member bodies of the following countries :

Australia	Italy	Portugal
Austria	Korea, Dem. P. Rep. of	Romania
Brazil	Korea, Rep. of	South Africa, Rep. of
Canada	Malaysia	Spain
Egypt, Arab Rep. of	Mexico	Sri Lanka
Hungary	Netherlands	Thailand
India	New Zealand	Turkey
Iran	Peru	United Kingdom
Israel	Poland	Yugoslavia

No member body expressed disapproval of the document.

This International Standard has also been approved by the International Union of Pure and Applied Chemistry (IUPAC).

Animal feeding stuffs — Determination of moisture content

1 Scope and field of application

This International Standard specifies a method for the determination of the moisture (water and other volatile substances) content of animal feeding stuffs.

The method is applicable to animal feeding stuffs with the exception of

— milk products;

— mineral substances;

— mixtures containing a considerable amount of milk products or mineral substances;

— the following simple animal feeding stuffs :

— animal and vegetable fats and oils (for which method A specified in ISO 662 is applicable),

— oilseeds (for which a method is specified in ISO 665),

— oilseed residues (for which a method is specified in ISO 771),

— cereals, except maize, and cereal products (for which a method is specified in ISO 712),

— maize (for which the reference method specified in ISO 6540 is applicable).

2 References

ISO 662, *Animal and vegetable fats and oils — Determination of moisture and volatile matter content.*

ISO 665, *Oilseeds — Determination of moisture and volatile matter content.*

ISO 712, *Cereals and cereal products — Determination of moisture content (Routine reference method).*

ISO 771, *Oilseed residues — Determination of moisture and volatile matter content.*

ISO 6498, *Animal feeding stuffs — Preparation of test samples.*[1)]

ISO 6540, *Maize — Determination of moisture content (on milled grains and on whole grains).*

3 Definition

moisture content of animal feeding stuffs : The loss in mass on drying determined according to the procedure specified in this International Standard, and expressed as a percentage by mass of the product as received.

4 Principle

Determination of the loss in mass on drying under specified conditions depending on the nature of the sample.

5 Apparatus and material

Usual laboratory apparatus, and in particular :

5.1 Analytical balance.

5.2 Container, of non-corrodible metal or glass, provided with a sufficiently tight-fitting lid, and having a surface allowing the test portion to be spread to about 0,3 g/cm^2.

5.3 Electrically heated oven, well ventilated, capable of being controlled at 103 ± 1 °C.

5.4 Electrically heated vacuum oven, capable of producing pressures below 13 kPa, provided with a thermostat and vacuum pump, and either a device for the introduction of dried air, or containing calcium oxide (CaO) as desiccant (300 g of CaO for 20 samples).

5.5 Desiccator, provided with an efficient desiccant.

5.6 Sand, acid-washed.

1) At present at the stage of draft.

6 Sampling

Methods of sampling animal feeding stuffs will form the subject of a future International Standard. (Until this is published, the method of sampling shall be agreed between the parties concerned.)

Store the sample in such a way that deterioration and change in composition are minimized.

7 Procedure

7.1 Preparation of test sample

Prepare the test sample according to ISO 6498.

7.2 Test portion

7.2.1 Feeding stuffs in liquid or paste form, and feeding stuffs predominantly composed of oils and fats

Into the container (5.2), which has been previously dried with its lid at 103 °C for 30 min and weighed to the nearest 1 mg, containing sand (5.6) and a glass rod, weigh, to the nearest 1 mg, about 10 g of the prepared test sample (7.1). Using the glass rod, mix thoroughly with the sand. Leave the glass rod in the container.

7.2.2 Other feeding stuffs

Into the container (5.2), which has been previously dried with its lid at 103 °C for 30 min and weighed to the nearest 1 mg, weigh, to the nearest 1 mg, about 5 g of the prepared test sample (7.1) and spread it evenly.

7.3 Determination

Place the container, with its lid beneath or beside it, in the oven (5.3), controlled at 103 ± 1 °C. (It is recommended that not more than one container per litre of oven volume be placed in the oven.)

Leave to dry for 4 h after the oven temperature has returned to 103 °C. Place the lid on the container, remove from the oven, allow to cool to ambient temperature in the desiccator (5.5) and weigh to the nearest 1 mg.

In the case of feeding stuffs consisting mainly of oils or fats, dry for another 30 min at 103 °C. The loss in mass between the two weighings shall not exceed 0,1 % of the mass of the test portion.

7.4 Check test

In order to check that during drying of the test portion an unacceptable loss of mass does not occur as a result of chemical reactions (for example Maillard reactions), proceed as follows.

Dry the container and test portion again at 103 °C for 2 h, allow to cool to ambient temperature in the desiccator and weigh to the nearest 1 mg. If the loss in mass during this second drying period is more than 0,2 % of the mass of the test portion, chemical reactions may have occurred. In this case, use the method specified in 7.5.

NOTE — This criterion of 0,2 % is not in conflict with the repeatability of 0,2 % defined in 8.2. The latter is the difference between two duplicate determinations on the same sample. The former is based on the difference between two weighings of the same test portion before and after an extra period of heating in order to check whether an unacceptable loss in mass has occurred.

7.5 Samples giving unacceptable losses in mass

Prepare the test sample according to 7.1 and take the test portion according to 7.2.

Place the container, with its lid beneath or beside it, in the vacuum oven (5.4), controlled at 80 °C. Reduce the pressure to about 13 kPa and dry the sample at this pressure, either while admitting dried air, or in the presence of the desiccant. In the latter case, disconnect the vacuum pump after reaching the specified pressure and ensure that this pressure is maintained throughout the drying period. Heat the sample for 4 h after the oven temperature returns to 80 °C. Return the oven pressure carefully to atmospheric pressure. Open the oven, immediately place the lid on the container, remove from the oven, allow to cool to ambient temperature in the desiccator (5.5) and weigh to the nearest 1 mg.

Dry for additional periods of 30 min in the vacuum oven at 80 °C and weigh, until the loss in mass between two consecutive weighings does not exceed 0,2 % of the mass of the test portion.

7.6 Number of determinations

Carry out two determinations on test portions taken from the same test sample.

8 Expression of results

8.1 Method of calculation and formulae

8.1.1 Determination without preliminary conditioning

The moisture content, expressed as a percentage by mass of the product as received, is equal to

$$[m_3 - (m_5 - m_4)] \times \frac{100}{m_3}$$

NOTE — For explanation of the symbols, see 8.1.2.2.

8.1.2 Determination with preliminary conditioning (for samples which are difficult to crush, see ISO 6498)

8.1.2.1 For samples having high moisture contents [more than 17 % (m/m)] and low fat contents, which need only preliminary drying, the moisture content, expressed as a percentage by mass of the product as received, is equal to

$$\left[\frac{m_0 - m_1}{m_0} + \frac{m_3 - (m_5 - m_4)}{m_3} \times \frac{m_1}{m_0}\right] \times 100$$

NOTE — For explanation of the symbols, see 8.1.2.2.

8.1.2.2 For samples having high fat contents and low moisture contents, which need only preliminary defatting, and for samples having high fat contents and high moisture contents which need preliminary drying followed by preliminary defatting, the moisture content, expressed as a percentage by mass of the product as received, is equal to

$$\left[\frac{m_0 - m_1 - m_2}{m_0} + \frac{m_3 - (m_5 - m_4)}{m_3} \times \frac{m_1}{m_0}\right] \times 100$$

where

m_0 is the mass, in grams, of the test sample;

m_1 is the mass, in grams, of the test sample after extraction and/or drying and conditioning in ambient air;

m_2 is the mass, in grams, of the fat extracted from the test sample (see ISO 6498);

m_3 is the mass, in grams, of the test portion;

m_4 is the mass, in grams, of the container and lid and, if appropriate, sand and glass rod;

m_5 is the mass, in grams, of the container, lid and dried test portion and, if appropriate, sand and glass rod.

8.1.3 Result

Take as the result the arithmetic mean of the values obtained in the two determinations (7.6), provided that the requirement for repeatability (see 8.2) is satisfied. If it is not, repeat the determinations.

Express the result to the nearest 0,1 % (m/m).

8.2 Repeatability

The difference between the values obtained in the two determinations (7.6), carried out simultaneously or in rapid succession by the same analyst, shall not exceed 0,2 % (m/m).

9 Test report

The test report shall show the method used and the result obtained. It shall also mention any operating conditions not specified in this International Standard, or regarded as optional, as well as any circumstances that may have influenced the result.

The test report shall include all the information necessary for the complete identification of the sample.

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