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Animal feeding stuffs — Sampling

Aliments des animaux — Échantillonnage

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.ch
Web www.iso.ch

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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 preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 6497 was prepared by Technical Committee ISO/TC 34, *Food products*, Subcommittee SC 10, *Animal feeding stuffs*.

Annex A of this International Standard is for information only.

Animal feeding stuffs — Sampling

1 Scope

This International Standard specifies methods of sampling animal feeding stuffs, including fish feed, for quality control for commercial, technical and legal purposes.

It is not applicable to pet foods. Nor are the methods intended for sampling for the purpose of microbiological examination. Conditions of, and requirements for, sampling are specified separately for feeding stuffs of different physical natures.

For certain categories of animal feeding stuff, specific methods of sampling are specified in other International Standards. A list of these can be found in the bibliography. When sampling the products specified, it is these methods which shall be used.

Methods of sampling for the determination of substances likely to be non-uniformly distributed are described in Annex A.

2 Terms and definitions

For the purposes of this International Standard, the following terms and definitions apply.

2.1
consignment
a specified quantity of feeding stuff on offer, dispatched or received at one time

NOTE It may consist of one or more lots (see 2.2).

2.2
lot
an identified quantity of a consignment having characteristics presumed to be uniform

NOTE The uniformity of the characteristics may be due, for example, to the fact that the products are supplied by a single producer always using the same production process, where production is stable and the individual characteristics follow a normal distribution or a close approximation to a normal distribution (note that special circumstances can give rise to subdivisions in the distribution). Consequently, the term “lot” means an “inspection lot” in sampling, i.e. a quantity of material or a collection of items (a population) from which a sample is to be drawn and inspected. It may therefore differ from a collection of items referred to as a lot in the shipment context, for example.

2.3
increment
a quantity of material taken at one time from a single point in a lot

2.4
bulk sample
a quantity of material obtained by combining and mixing all the increments taken from the same lot

NOTE A collection of distinct and identifiable increments intended for separate investigation may be denoted the “gross sample”.

2.5
reduced sample
a representative part of the bulk sample, obtained by a process of successive division or reduction in such a manner that the mass or volume approximates to that of the laboratory samples

2.6
laboratory sample
a sample representative of the quality and condition of the lot, obtained by division of the reduced sample and intended for analysis or other examination

NOTE For each sample taken, three or four laboratory samples are normally produced. One of these should be submitted for testing and at least one stored for reference purposes. If more than four laboratory samples are required, the quantity of the reduced sample will have to be increased so that the minimum quantity requirement for all laboratory samples can be met.

3 General principles

3.1 Representative sampling

The purpose of representative sampling is to obtain a small fraction from a lot in such a way that a determination of any particular characteristic of this fraction will represent the mean value of the characteristic of the lot.

The lot shall be sampled by repeatedly taking increments at various single positions in the lot. These increments shall be combined by mixing to form a bulk sample from which representative laboratory samples shall be prepared by dividing.

3.2 Selective sampling

If portions of the material to be sampled show a noticeable difference in quality from the rest of the material, such portions shall be separated from the material and treated as a separate lot. In such cases, mention shall be made of this fact in the sampling report.

If it is not possible to divide the material into separate lots, the material shall be sampled as one lot, and the sampling report shall indicate this fact. The proportion of the product suspected to be different shall be given, if possible.

3.3 Statistical considerations

Acceptance sampling is the usual method of sampling for animal feeding stuffs. For sampling by attributes, there is a theoretical sampling plan based on a binomial distribution, but, for practical purposes, this plan has been simplified to a square-root relationship between the lot size and the number of increments.

NOTE 1 With bulk products, sample variances can be expected to be acceptably uniform if, for lots up to 2,5 tonnes, at least seven increments are taken and, for lots between 2,5 tonnes and 80 tonnes, the number of increments taken is at least equal to $\sqrt{20m}$, where m is the mass, in tonnes, of the lot. If the lot exceeds 80 tonnes, the square-root relationship is still applicable, but the risk of making incorrect decisions on the basis of the samples increases. However, this can be the subject of agreement between the interested parties.

NOTE 2 The application of the square-root relationship is somewhat different for the sampling of packaged animal feeding stuffs, for liquids and semi-liquids, for blocks and licks and for roughages, because the sample size may vary.

4 Sampling personnel

Sampling shall be carried out by persons suitably trained and experienced in the sampling of animal feeding stuffs and who are particularly aware of the hazards and dangers the product and the sampling process may involve.

5 Identification and general inspection of the lot prior to sampling

Positively identify the lot in question before any samples are taken, and, for this purpose, compare, as appropriate, the number of items in the lot, the mass of the lot or the volume of the lot, and the markings on containers and labels, with the entries on the relevant documents.

Note for inclusion in the sampling report any features, relevant to the taking of representative samples, concerning the condition of the lot and of the surroundings.

Separate damaged portions of the lot and/or, if the lot is unduly heterogeneous, divide it into portions with more similar properties. Treat each of these portions as separate lots.

6 Sampling equipment

6.1 General

Select a sampling device appropriate to the particle size of the product, the size of the sample to be taken, the size of the container, the physical state of the product, etc.

6.2 Apparatus for taking increments from solid products

6.2.1 Examples of apparatus for manual sampling

6.2.1.1 Sampling from bulk

Examples are an ordinary shovel, hand-scoop, cylindrical sampler (for example sampling spear, stick-trier or sleeve-trier) and conical sampler. The sampling spear may comprise one or more compartments.

Sampling of products in motion at relatively low flow rates can be performed manually.

6.2.1.2 Sampling from bags or other packages

Examples are a hand-scoop, sack-type sampling spear or trier, cylindrical sampler, conical sampler and riffle divider.

6.2.2 Examples of apparatus for mechanical sampling

Approved apparatus for taking increments periodically from a flow of product (for example pneumatic apparatus) may be used.

Sampling of products in motion at high flow rates can be performed by machines with manual control.

6.3 Apparatus for taking increments from liquid or semi-liquid products by manual or mechanical means

Examples are a stirrer plunger, agitator, sampling bottle, sampling tube, zone sampler and dipper, of an appropriate size.

6.4 Cleanliness

When taking, reducing, storing and handling samples, special care shall be taken to ensure that the properties of the samples and the sampled lot are not affected. The sampling equipment shall be clean, dry and free from foreign odours. The material from which the sampling apparatus is made shall not influence the quality of the sample. Apparatus shall be cleaned thoroughly between samples. This is particularly important when sampling feed with high oil content. Sampling personnel shall wear disposable gloves and dispose of them between samples so as not to contaminate the subsequent sample.

7 Sample containers

7.1 General requirements

The sample containers shall ensure that the characteristics of the sample are maintained until testing is carried out. They shall be of such size that they are almost completely filled by the sample. They shall be capable of being sealed in such a way that it will not be possible to open and reseal them without this being detected.

7.2 Cleanliness

The sample containers shall be clean, dry and free from foreign odours. The material from which the sample containers are made shall not influence the quality of the sample.

7.3 Sample containers for solid products

Sample containers for solid products and the lids of such containers shall be made of waterproof and greaseproof material (for example glass, stainless steel, tin or a suitable plastics material), shall be wide-mouthed and preferably cylindrical, and shall be of a capacity appropriate to the size of the sample they are intended to contain. Suitable plastic bags are also acceptable. The containers shall be capable of secure and waterproof closure. If the samples are to be used for the determination of photosensitive substances, like vitamins A, D3, folic acid, B2 and C and slightly sensitive substances, like vitamins K3, B6 and B12, the containers shall be opaque.

7.4 Sample containers for liquid and semi-liquid products

Such containers shall be made of a suitable material (preferably glass or plastics material), of the appropriate capacity, capable of airtight closure and preferably dark-coloured. Note the requirements in 7.3 for samples which are to be used for the determination of photosensitive substances.

8 Procedure

8.1 Sampling location

If possible, sampling shall be carried out at places protected from adventitious contamination such as damp air, dust or soot. If possible, samples shall be taken during loading or unloading. If sampling cannot be carried out whilst the material is in motion, the lot to be sampled shall be so arranged as to make each part accessible, so that representative laboratory samples are obtained.

8.2 Classification of products for the purpose of sampling

For sampling purposes, animal feeding stuffs are classified as follows:

a) solid feeding stuffs — grains, seeds, pulses and pellets;

b) solid feeding stuffs — meals and powders;

c) roughages;

d) licks and blocks;

e) liquid or semi-liquid feeding stuffs.

8.3 Sample size

It is necessary to take a sufficient number of increments in order to obtain a sample representative of the lot sampled. The number of increments and their size are determined, in accordance with the sampling plan, by the size of the lot and the practicability of taking samples. The size of any particular lot will depend on a number of factors (see 2.2). This International Standard has been drawn up for lot sizes up to a maximum of 500 tonnes.

NOTE The sampling procedure described is equally valid for quantities larger than the prescribed maximum lot size provided that the maximum number of increments given in the various tables is ignored, the number of increments being determined by the square-root formula given in the appropriate part of the procedure, and the minimum bulk sample sizes increased proportionately. This does not prevent a large consignment being divided into smaller lots and each lot sampled in accordance with this International Standard.

The size of the bulk sample is determined by the size of the increments, taken in accordance with a definite sampling plan, although minimum amounts, dependent on the lot size, are specified. The size of each laboratory sample shall not be less than three times the mass, or volume, of the test portion required. In addition, the size of each laboratory sample shall be sufficient to carry out testing.

8.4 Sampling of grains, seeds, pulses and pellets

8.4.1 Examples of products

Cereals: maize (corn), wheat, barley, oats, rice, sorghum, etc.

Oilseeds: sunflower seed, groundnut kernel, rapeseed, soybean, cottonseed, linseed, etc.

Pulses: beans, etc.

Pellets: feeding stuffs produced in pellet form.

8.4.2 Lot size

For products in packages, the lot shall comprise the number of packages present or the number that make up the maximum lot size.

For products in bulk containers, the lot shall consist of the number of containers present or the minimum number of containers that contain the maximum lot size. Where one container by itself exceeds the maximum lot size, the contents of that container shall comprise the lot.

For products in bulk, the lot shall comprise the amount present unless it is physically divided into a number of portions, in which case each portion shall be treated as if it were one bulk container.

8.4.3 Number of increments to be taken

For products in bulk or in bulk containers, the minimum number of randomly selected increments to be taken shall be as specified in Table 1.

Table 1

Mass m of the lot tonnes	**Minimum number of increments**
up to 2,5	7
more than 2,5	$\sqrt{20m}$ up to a maximum of 100

When products are in packages, the minimum number of randomly selected packages from which sample increments are taken shall be as follows:

a) For packages up to 1 kg: see Table 2.

Table 2

Number n of packages in the lot	Minimum number of packages to be sampled
1 to 6	Each package
7 to 24	6
more than 24	$\sqrt{2n}$ up to a maximum of 100

b) For packages of more than 1 kg: see Table 3.

Table 3

Number n of packages in the lot	Minimum number of packages to be sampled
1 to 4	each package
5 to 16	4
more than 16	$\sqrt{2n}$ up to a maximum of 100

8.4.4 Sample size

See Table 4.

Table 4

Size of lot tonnes	Minimum mass of bulk sample kg	Minimum mass of reduced sample[a] kg	Minimum mass of laboratory sample kg
1	4	2	0,5
over 1 to 5	8	2	0,5
over 5 to 50	16	2	0,5
over 50 to 100	32	2	0,5
over 100 to 500	64	2	0,5

[a] This is the minimum quantity required for up to four laboratory samples (see note to 2.6).

8.4.5 Procedure

8.4.5.1 General

Sampling shall be carried out as indicated in 9.1. Sampling of products carried in bulk containers shall, wherever possible, be carried out during loading or unloading. Similarly, if the product is to be transferred directly to a silo or warehouse, sampling shall, wherever possible, be carried out during transfer.

8.4.5.2 Sampling from bulk

When sampling from bulk, e.g. a pile or heap, determine the number of increments to be taken, taking into account the minimum number of increments specified in 8.4.3. Select the place from which each increment is to be taken randomly, choosing each place by reference to both surface area and depth so that all parts of the lot have an equal chance of selection.

When sampling from a product in motion, take the increments through the whole cross-section of the flow, either manually or mechanically, at time intervals depending on the flow rate, as follows. Use the flow rate and lot size to determine the time for the lot to pass the sampling point. Divide this time by the number of increments to be taken, giving time bands. Take an increment randomly in each of these time bands.

8.4.5.3 Sampling from packages

Select randomly from the lot the number of packages from which increments are to be taken, taking into account the minimum number of increments specified in 8.4.3. Open the packages and take the increments using equipment as described in 6.2.1.2.

If the increments are to be taken from closed packages, sack-type spears or triers can be used. Sack-type spears can be used either horizontally or vertically but shall be driven diagonally into the package. The increments taken from the packages may be taken from the whole depth or at three levels: top, middle and bottom.

After taking the increments from the package, close the hole on the package wall.

If it is not possible or convenient to use the above method (or not advisable bearing in mind the non-homogeneity of non-pelleted mixtures), empty the contents of the package on to a clean, dry surface, mix thoroughly and take one shovelful as an increment.

8.4.6 Preparation of laboratory samples

Take and prepare all samples as quickly as possible to avoid changes in the quality of the samples and to prevent them becoming contaminated. Combine the increments and mix thoroughly to form the bulk sample. The bulk sample may be placed in a container or bag that has no adverse effect on the quality of the sample.

Reduce the bulk sample either manually (for example by the random-cup method or by quartering) or mechanically (for example using a conical divider, centrifugal divider or multiple-slot divider). Repeat this process, mixing each time, to give a reduced sample of suitable size, but not less than 2 kg.

Thoroughly mix the reduced sample and divide it into three or four laboratory samples, as required, of approximately equal size (minimum 0,5 kg). Place each laboratory sample in an appropriate container. See also the note to 2.6.

8.5 Sampling of meals and powders

8.5.1 Examples of products

These products are processed (for example ground or milled, and possibly also dried) derivatives of the feeding stuffs listed below, of particle size much smaller than the unprocessed product, either alone or in mixtures:

a) meals and powders of vegetable origin, made of

   1) whole grains or some part of the kernel,

   2) unprocessed, processed or extracted oilseeds,

   3) unprocessed, processed or extracted pulses,

   4) dried alfalfa or grass,

   5) vegetable protein concentrates,