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EXPLAINING THE COMMON AGRICULTURAL POLICY

OF THE EUROPEAN COMMUNITIES FOR

ANALYTICAL METHODS FOR DETERMINATION OF PHYSICAL QUALITIES

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INTRODUCTION

The terms for the purchase in the United Kingdom of cereals into intervention are set out in leaflet IM(C)15. This supplementary leaflet sets out the precise definitions of the cereals physical characteristics and the analytical procedures to be followed in the definitive physical testing of cereals. It contains information given in Commission Regulation (EC) No. 1272/2010.

Other analytical tests to be carried out on grains are:

- Zeleny of ground common wheat – EN ISO 5529: 2009;
- Hagberg falling number of ground common wheat - EN ISO 3093: 2009
- specific weight – EN ISO 7971/3: 2009

PART I  A. MATTER OTHER THAN BASIC CEREALS OF UNIMPAIRED QUALITY

DEFINITION OF MATTER OTHER THAN BASIC CEREALS OF UNIMPAIRED QUALITY

1. BROKEN GRAINS

All grains whose endosperm is partially uncovered shall be regarded as broken grains. Grains damaged by threshing and grains from which the germ has been removed also belong to this group.

For maize, ‘broken grains’ means pieces of grain or grains which pass through a sieve with a circular mesh 4.5mm in diameter.

For sorghum, ‘broken grains’ means pieces of grain or grains which pass through a sieve with a circular mesh 1.8mm in diameter.

2. GRAIN IMPURITIES
a. Shrivelled grains:

Grains which, after elimination from the sample of all other matter referred to in this document, pass through sieves with apertures of the following dimensions: common wheat 2.0mm, durum wheat 1.9mm, barley 2.2mm.
Notwithstanding this definition, however:

- for barley from Finland or Sweden with a specific weight of at least 64 kilograms per hectolitre offered for intervention in those Member States, or

- for barley with a moisture content of 12.5% or less,

‘shrivelled grains’ means grains which, after elimination of all other matter referred to in this document, pass through sieves with apertures of 2.0mm.

In addition, grains damaged by frost and unripe grains (green) belong to this group.

b. Other cereals:

All grains which do not belong to the species of grain sampled.

c. Grains damaged by pests:

Grains which have been nibbled. Bug-ridden grains also belong to this group.

d. Grains in which the germ is discoloured, mottled grains, grains affected with fusariosis:

Grains in which the germ is discoloured are those of which the tegument is coloured brown to brownish black and of which the germ is normal and not sprouting. For common wheat, grains in which the germ is discoloured shall be disregarded up to 8%.

For durum wheat:

- grains which show a brown to brownish black discolouration elsewhere than on the germ itself shall be considered as mottled grains,

- grains affected with fusariosis are grains whose pericarp is contaminated with fusarium mycelium; such grains look slightly shrivelled, wrinkled and have pink or white diffuse patches with an ill-defined outline.

e. ‘Grains overheated during drying’ are those which show external signs of scorching but which are not damaged grains.
3. **SPROUTED GRAINS**

Sprouted grains are those in which the radical or plumule is clearly visible to the naked eye. However, account must be taken of the general appearance of the sample when its content of sprouted grains is assessed. In some kinds of cereals the germ is protuberant, e.g. in durum wheat, and the germ tegument splits when the batch of cereals is shaken. These grains resemble sprouted grains but must not be included in that group. Sprouted grains are only those where the germ has undergone clearly visible changes which make it easy to distinguish the sprouted grain from the normal grain.

4. **MISCELLANEOUS IMPURITIES**

   a. Extraneous seeds:

   ‘Extraneous seeds’ are seeds of plants, whether or not cultivated, other than cereals. They include seeds not worth recovering, seeds which can be used for livestock and noxious seeds.

   ‘Noxious seeds’ means seeds which are toxic to humans and animals, seeds hampering or complicating the cleaning and milling of cereals and seeds affecting the quality of products processed from cereals.

   b. Damaged grains:

   ‘Damaged grains’ are those rendered unfit for human consumption and, as regards feed grain for consumption by cattle, owing to putrefaction, mildew, or bacterial or other causes.

   Damaged grains also include grains damaged by spontaneous heat generation or too extreme heating during drying. These ‘heated’ or ‘smutty’ grains are fully grown grains in which the tegument is coloured greyish brown to black, while the cross-section of the kernel is coloured yellowish-grey to brownish black.

   Grains attacked by wheat midge shall be considered as damaged grains only when more than half the surface of the grain is coloured grey to black as a result of secondary cryptogamic attack. Where discolouration covers less than half the surface of the grain they must be classed with grains damaged by pests.
c. **Extraneous matter:**

All matter in a sample of cereals retained by a sieve with apertures of 3.5mm, (with the exception of grains of other cereals and particularly large grains of the basic cereal) and that passing through a sieve with apertures of 1.0mm shall be considered as extraneous matter. Also included are stones, sand, fragments of straw and other impurities in the samples which pass through a sieve with apertures of 3.5mm and are retained by a sieve with apertures of 1.0mm.

This definition does not apply to maize. For maize, all matter in a sample which passes through a sieve with apertures of 1mm shall be considered extraneous matter, in addition to that referred to in the first subparagraph.

d. **Husks; (for maize; cob fragments).**

e. **Ergot**

f. **Decayed grains**

g. **Dead insects and fragments of insects.**

5. **LIVE PESTS (see IM(C)15, Annex 7)**

6. **PIEBALD GRAINS WHICH HAVE LOST THEIR VITREOUS ASPECT (Mitadine or Piebald)**

Mitadine grains of durum wheat are grains whose kernel cannot be regarded as entirely vitreous.
B. SPECIFIC FACTORS TO TAKE INTO CONSIDERATION FOR EACH TYPE OF CEREAL FOR THE DEFINITION OF IMPURITIES

1. DURUM WHEAT

Grain impurities means shrivelled grains, grains of other cereals, grains damaged by pests, grain in which the germ is discoloured, mottled grains affected by fusariosis and grains overheated during drying.

Miscellaneous impurities means extraneous seeds, damaged grains, extraneous matter, husks, ergot, decayed grains, dead insects and fragments of insects.

2. COMMON WHEAT

Grain impurities means shrivelled grains, grains of other cereals, grains damaged by pests, grains in which the germ is discoloured and grains overheated during drying.

Miscellaneous impurities means extraneous seeds, damaged grains, extraneous matter, husks, ergot, decayed grains, dead insects and fragments of insects.

3. BARLEY

Grain impurities means shrivelled grains, grains of other cereals, grains damaged by pests and grains overheated during drying.

Miscellaneous impurities means extraneous seeds, damaged grains, extraneous matter, husks, dead insects and fragments of insects.

4. MAIZE

Grain impurities means grains of other cereals, grains damaged by pests and grains overheated during drying.

For maize, all matter in a sample which passes through a sieve with apertures of 1.0mm shall be considered extraneous matter.

All extraneous seeds, damaged grains, extraneous matter, husks, dead insects and fragments of insects shall be considered miscellaneous impurities.
5. **SORGHUM**

Grain impurities means grains of other cereals, grains damaged by pests and grains overheated during drying.

Miscellaneous impurities means extraneous seeds, damaged grains, extraneous matter, dead insects and fragments of insects.
C. STANDARD METHOD FOR DETERMINING MATTER OTHER THAN BASIC CEREALS OF UNIMPAIRED QUALITY

1. For common wheat, durum wheat, and barley, an average sample of 250g is passed through two sieves, one with slotted perforations of 3.5mm and the other with slotted perforations of 1.0mm, for half a minute each.

In order to ensure constant sifting, it is advisable to use a mechanical sieve, e.g. a vibrating table with fitted sieves.

The matter retained by the sieve with slotted perforations of 3.5mm and that passing through the sieve with slotted perforations of 1.0mm must be weighed together and regarded as extraneous matter. Where the matter retained by the sieve with slotted perforations of 3.5mm includes parts in the ‘other cereals’ group or particularly large grains of the basic cereal, those parts or grains shall be returned to the sifted sample. During sifting, in the sieve with slotted perforations of 1.0mm, a close check must be made for live pests.

From the sifted sample, a sample of 50 to 100g shall be taken using a separator. This partial sample must be weighed.

The partial sample should then be spread out on a table with tweezers or a horn spatula and broken grains, other cereals, sprouted grains, grains damaged by pests, grain damaged by frost, grain in which the germ is discoloured, mottled grains, extraneous seeds, ergots, damaged grains, decayed grains, husks and live pests and dead insects must be extracted.

Where the partial sample includes grains still in the husk, they shall be husked by hand, the husks obtained being considered as pieces of husks. Stones, sand and fragments of straw shall be considered extraneous matter.

The partial sample shall be sifted for half a minute in a sieve with slotted perforations of 2.0mm for common wheat, 1.9mm for durum wheat, 2.2mm for barley. Matter which passes through this sieve shall be considered as shrivelled grains. Grains damaged by frost and unripe green grains belong to the ‘shrivelled grains’ group.
2. An average sample of 500g in the case of maize and 250g for sorghum, is shaken for half a minute in a sieve which has slotted perforations of 1.0mm. Check for the presence of live pests and dead insects.

Using tweezers or a horn spatula, extract from the matter retained by the sieve with slotted perforations of 1.0mm stones, sand, fragments of straw and other extraneous matter.

Add the extraneous matter thus extracted to the matter which has passed through the sieve with slotted perforations of 1.0mm and weigh them together.

Using a separator, prepare a partial sample of 100 to 200g in the case of maize or 25 to 50g for sorghum from the sample passed through the sieve. Weigh this partial sample. Spread it out in a thin layer on a table. Using tweezers or a horn spatula, extract the pieces of other cereals, grains damaged by pests, grains damaged by frost, sprouted grains, extraneous seeds, damaged grains, husks, live pests and dead insects.

Next, pass this partial sample through a sieve with a 4.5mm round mesh for maize and 1.8mm round mesh for sorghum. The matter which passes through this sieve shall be considered as broken grains.

3. Groups of matter other than basic cereals of unimpaired quality, determined according to the methods referred to in 1 and 2 must be weighed very carefully to the nearest 0.01g and distributed according to percentage over the average sample. The particulars entered in the analysis report shall be to the nearest 0.1%. Check for live pests.

As a general rule, two analyses must be made for each sample. They must not differ by more than 10% in respect of the total of the above mentioned matter.

4. The apparatus to be used for the operation referred to in 1, 2 and 3 is as follows:

a. sample separator, e.g. a conical or grooved apparatus;

b. precision or assay balance;

c. sieves with slotted perforations of 1.0mm, 1.8mm, 1.9mm, 2.0mm, 2.2mm and 3.5mm and sieves with a 1.8mm an 4.5mm round mesh. The sieves may be fitted to a vibrating table.
PART II

STANDARD METHOD OF TESTING FOR MOISTURE CONTENT

1. PRINCIPLE

The product is dried at a temperature of 130°C to 133°C under atmospheric pressure, for a period appropriate to the size of the particles.

2. SCOPE

This drying method applies to cereals crushed into particles of which at least 50% pass through a sieve with a 0.5mm mesh and leave not more than 10% residue on the sieve with a 1.0mm round mesh. It also applies to flour.

3. APPARATUS

Precision balance.

Crusher made of a material which does not absorb moisture, is easy to clean, enables crushing to be effected quickly and evenly without overheating, limits contact with the outside air to the minimum, and meets the requirements mentioned in 2 (e.g. a detachable roller mill).

Receptacle made of non-corrodible metal or glass fitted with a sufficiently tight-fitting lid; working surface allowing distribution of the test sample at 0.3g per cm sq.

Electrically heated isothermic heating-chamber, set at a temperature of 130°C to 133°C (1), having adequate ventilation (2).

Dessicator with a metal or, failing metal, porcelain plate (thick, perforated), containing any suitable desiccant.

4. PROCEDURE

Drying:

Weigh to the nearest 1mg a quantity slightly greater than 5g of the crushed small-grained cereals or 8g of the crushed maize in the pre-weighed receptacle. Place the receptacle in a heating chamber heated to a temperature of 130°C to 133°C. This should be done as quickly as possible, so as to prevent too great a drop in temperature. Leave small-grained cereals to dry for two hours and maize for four hours after the heating chamber regains a temperature of 130°C to 133°C. Remove the receptacle from the heating chamber, quickly replace the lid, leave to cool for 30 to 45 minutes in a dessicator and weigh (to the nearest 1mg).
5. **METHOD OF CALCULATION AND FORMULAE**

   E = the initial mass, in grams, of the test sample

   M ' = the mass, in grams, of the test sample after preparation

   M = the mass, in grams, of the test sample after crushing

   m = the mass, in grams, of the dry test sample

   The moisture content as a percentage of the product is equal to:

   - without previous preparation \((E-m) \times 100/E\)

   - with previous preparation \((M'-m)M'/M + E-M) \times 100/E = 100 \left(\frac{1-Mm}{EM'}\right)\)

   Test to be made in duplicate at least.

6. **REPETITION**

   The difference between the values obtained from the two determinations carried out simultaneously or in rapid succession by the same analyst shall not exceed 0.15g of moisture per 100g of sample. If it does so, the determinations shall be repeated.

   (1) Air temperature inside the heating chamber
   (2) Its heating capacity should be such that, when it has been pre-set to a temperature of 130°C to 133°C, that temperature can be regained in less than 45 minutes after the maximum number of test samples have been placed in the chamber to dry simultaneously.

   Ventilation should be such that, when small-grained cereals (common wheat, durum wheat, barley, sorghum and rye) are dried for two hours and maize for four hours, the results from all the test samples of semolina or, as the case may be, maize that the heating chamber can hold differ be less than 0.15% from the results obtained after drying small-grained cereals for three hours and maize for five hours.