



DRAFT TANZANIA STANDARD

Oat grains — Specification

Oat grains — Specification and grading

0. Foreword

Oat grains are obtained from either *Avena byzantina* or *Avena sativa* a tall, erect annual cereal grass up to 1.5 m. It is widely grown as a food grain and fodder in temperate and sub-tropical regions. It also does well in the high-altitude tropics.

Oats have numerous uses in food; most commonly, they are rolled or crushed into oatmeal, or ground into fine oat flour. Oatmeal is chiefly eaten as porridge, but may also be used in a variety of baked goods, such as oatcakes, oatmeal cookies, and oat bread. Oats are also an ingredient in many cold cereals, in particular muesli and granola. Oats may also be consumed raw, and cookies with raw oats are becoming popular. Oats are also occasionally used in several different drinks such as brewing beer. Oats may also be used in soup preparations.

Development of this Tanzania standard was necessitated by the need to ensure the safety and quality of oat grains being produced and or marketed in Tanzania as well as for import and export markets.

In preparation of this draft Tanzania standard assistance was drawn from CODEX STAN 201, *Standard for Oats*.

In reporting the result of a test or analysis made in accordance with the Tanzania standard, if the final value observed or calculated is to be rounded off, it shall be done in accordance with TZS 4: (see clause 2).

1. Scope

This Tanzania standard specifies the requirements, sampling and methods of test for oat grains of varieties (cultivars) grown from *Avena sativa* and *Avena byzantina* intended for human consumption.

This standard does not apply to *Avena nuda* (hulless oats).

2. Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

TZS 4, *Rounding off numerical values*

TZS 109, *Food processing units – Code of hygiene*

TZS 117, *Food – Handling of samples for microbiological analysis – Code of practice*

TZS 122, *Microbiology of food and feeding stuffs – Horizontal method for the detection of salmonella spp*

TZS 125, *Microbiology of food and animal feeding stuffs – Horizontal method for the enumeration of coagulase-positive staphylococci (Staphylococcus aureus and other species) – Part 1: Technique using Baird-Parker agar medium – Amendment 1: Inclusion of precision data*

TZS 131, *Microbiology of food and animal feeding stuff: General guidance for enumeration of yeasts and moulds- Colony Count technique at 25oC*

TZS 268, *General atomic absorption spectrophotometric method for determination of lead in food and food stuffs*

TZS 330, *Cereals – Sampling of milled products*

TZS 331 – *Cereals – Milled products - Methods of test*

TZS 538, *Labelling of pre-packaged foods — General requirements*

TZS 730, *Microbiology of food and animal feeding stuffs – Horizontal method for the enumeration of β -glucuronidase-positive Escheria coli – Part 2 – Colony-count technique at 44 0C using 5-bromo-4-chloro-3-indolyl- β -D-glucuronide.*

TZS 1490, *Fruits, vegetables and derived products – Sampling and method of test – Part 4: Determination of mineral impurities content*

TZS 1495, *Fruits, vegetables and derived products — Determination of copper content — Method using flame atomic absorption spectrometry*

TZS 1501, *Fruits, vegetables and derived products — Determination of mercury content — Flameless atomic absorption method*

TZS 1502, *Fruits, vegetables and derived products – Sampling and methods of test Part 14: Determination of arsenic content - Silver diethyldithiocarbamate spectrophotometric method*
TZS 1495 *Fruits, vegetables and derived products — Determination of copper content — Method using flame atomic absorption spectrometry*

TZS 1770, *Hazard Analysis and Critical Control Point (HACCP) System — Requirements for any organization in the food chain*

3.0 Terms and Definitions

For the purpose of this Tanzania standard the following terms and definitions shall apply: -

3.1

oat grains

grains obtained from either *Avena byzantina* or *Avena sativa*

3.2

dockage

any material intermixed with a parcel of oat grain, other than kernels of grain of a standard of quality fixed for a grade of that grain, that must and can be separated from the parcel of grain before that grade can be assigned to the grain. Dockage includes: all material removed by sieving or handpicking or both, soft earth pellets, which are pellets that crumble under light pressure, including earth pellets, fertilizer pellets, or pellets of any non-toxic material of similar consistency, in unprocessed samples, mudballs handpicked from the cleaned sample.

3.3

commercially clean

primary samples are considered commercially clean when they contain no dockage material

3.4

contaminated oat grain

grain containing any substance in sufficient quantity that the grain is unfit for consumption by persons or animals or is adulterated within the meaning of food safety regulations.

3.5

damaged oat grain

kernels are damaged if the groats are fire burnt, heated, frost-damaged, insect damaged, sprouted, mildewed, green, rotted, badly weather stained, affected by fusarium or are otherwise damaged. Weather stained and/or mildewed groats are considered damaged if there is significant brown or black discoloration on 50% or more of the groats or the discoloration penetrates into the groat.

3.6

earth pellets

Hard earth pellets are pellets that do not crumble under light pressure. Soft earth pellets are pellets that crumble under light pressure using a finger only—if they do not crumble, they are considered *Stones* any non-toxic material of similar consistency

3.7

ergot

a plant disease producing elongated fungus bodies with a purplish-black exterior, a purplish-white to off white interior, and a relatively smooth surface texture.

3.8

fertilizer pellets

fertilizer pellets are typically either small, round and white or irregular shaped and pink or red. Fertilizer pellets are not considered a hazardous substance however there is no visible means of assuring that material resembling fertilizer pellets is not some other contaminant.

3.9

fine seeds

all matter that passes through a 2 mm [5/64"] triangular-hole sieve after sieving

3.10**fireburnt**

fireburnt kernels have been charred or scorched by fire. A cross-section of a fireburnt kernel resembles charcoal with numerous air holes. The air holes result in a low weight kernel that crumbles easily under pressure.

3.11**foreign matter**

anything other than oats that remains in the sample after the removal of dockage. Some types of foreign material have separate tolerances.

3.12**frost damage**

frost-damaged kernels of oats have a black or sunken ventral side and grey or black groats. Frost-damaged oat groats show discoloration in the ventral crease as a dark line. The discoloration may extend throughout the groats depending on the severity of frost damage. There is no limit for frost damage in Grade 4. When the inclusion of frost damage in *Total damage* or *Total damage and foreign material* would result in either of these totals exceeding 8%, only that percentage of frost that brings the total up to 8% is considered in grade assessment. That is, the percentage of the frost component in a sample cannot be used to assign a grade lower than Grade 4.

3.13**Fusarium damage**

Fusarium damage is rare on oats. It resembles fusarium damage in barley. Kernels are discolored by pink, orange or black encrustations of fusarium mold. Under magnification, the black encrustations appear raised above the surface of the kernel and are surrounded by a white mould. The black encrustations can be scraped off. Some degree of judgment is required when identifying kernels with the fusarium mould. Only those kernels which meet this description are to be designated as fusarium damaged.

3.14**green**

green kernels in oats are an indication of immaturity. Green hulls are assessed in the general color of the sample. Green groats are considered damaged.

3.15**heated**

heated kernels have the color or odor typical of grain that has deteriorated in storage or has been damaged by artificial drying. When the hull of a heated oat is removed, the groat appears brown or orange-red.

3.16**hulled and hullless**

hulled oats have the hulls removed. Hullless oats have loose hulls which are usually removed during harvesting. Groats are the oat kernels without the hulls.

3.17**immature and shrivelled grains**

grains that are not properly developed.

3.18**large seeds**

domestic and wild seeds that remain on top of the 1.79 mm round-hole sieve. Large seeds are assessed As dockage if they are removed by *Cleaning for grade improvement*. As large seeds and included in *Total damage and foreign material* if they remain in the sample.

3.19**mildew**

a fungal condition that develops in unthreshed grain usually under conditions of excessive moisture. The affected kernels are greyish in colour and lower in quality. In the evaluation of mildew, consider the number of affected kernels and their severity. Hull discolouration is assessed in the general colour of the sample. Discoloured groats are considered as damaged when there is significant brown or black discolouration on 50% or more of the groat or the discolouration penetrates into the groat.

Note:

If the discolouration is on the groats, from mildew the sample is considered damaged. If the discolouration is on the hull, but groats are undamaged the sample is considered superficially mildewed, but sound.

3.20**odour**

refers to the basic quality of the sample, the type and degree of the odour, the presence of visible residue causing the odour since there is no numeric tolerance for odour .

3.21**other edible grains**

any edible grains other than oat grain including oil seeds, barley, corn, cultivated buckwheat, einkorn, emmer, flaxseed, guar, hull-less barley, nongrain sorghum, Polish wheat, popcorn, poulard wheat, rice, rye, safflower, sorghum, soybeans, spelt, sunflower seed, sweet corn, triticale, and wheat.

3.22**poisonous, toxic and/or harmful seeds**

any seed which if present in quantities above permissible limit may have damaging or dangerous effect on health, organoleptic properties or technological performance such as Jimson weed — datura (*D. fastuosa* Linn and *D. stramonium* Linn.) corn cokle (*Agrostemma githago* L., *Machai Lallium remulenum* Linn.) Akra (*Vicia* species), *Argemone mexicana*, Khesari and other seeds that are commonly recognized as harmful to health.

3.23**rotted**

rotted kernels are discolored, swollen, soft and spongy as a result of decomposition by fungi or bacteria. Rotted kernels in oats are considered as damaged.

3.24**Sclerotinia sclerotiorum**

a fungus producing hard masses of fungal tissue, called *sclerotia*. The sclerotia vary in size and shape, have a coarse surface texture, vary in exterior color from dark black to gray to white and have a pure white interior.

3.26**sprouted**

kernels that show definite signs of germination. Sprouted oats are assessed as damaged.

3.27**sound oats**

kernels and pieces of oat kernels (except wild oats) that are not badly ground-damaged, badly weather-damaged, diseased, frost-damaged, germ-damaged, heat-damaged, insect-bored, mold-damaged, sprout-damaged, or otherwise materially damaged.

3.28**stones**

are hard shale, coal, hard earth pellets, and any other non-toxic materials of similar consistency. Fertilizer pellets are assessed as stones when constituting 1.0% or less of the net sample weight. (See *Fertilizer pellets* for specific procedures to be followed when samples contain fertilizer pellets.)

3.29**total damage and foreign material**

total damage and foreign material includes all foreign material and all damage. Frost damage is not included in Grade 4 oats.

3.30**treated seed and other chemical substances**

Treated seed is grain that has been coated with an agricultural chemical for agronomic purposes. These seed dressings contain a dye to render the treated seed visually conspicuous. The colour of the dye varies depending upon the type of treatment and the type of grain. The coatings or stains may appear greasy or powdery and surface area distribution ranges from tiny flecks to complete coverage.

Other chemical substance refers to any chemical residues either adhering to the kernel or remaining in the sample and to samples having a chemical odour of any kind.

3.31**weevilled grains**

grains that are partially or wholly bored by insects injurious to grains but does not include germ eaten grains and egg spotted grains

3.32**wild oats**

seeds of *Avena fatua* L. and *A. sterilis* L

3.33**filth**

impurities of plant and animal origin including dead insects, rodent hair and excreta

4.0 Requirements**4.1 General quality requirements**

4.1.1 Oat grains shall meet the following general requirements;

- a) shall consist of oats (*Avena sativa* L. and *A. byzantina* C. Koch) and may contain, singly or in combination, and of wild oats and other grains as per stipulated in Table 1 of this standard.
- b) be hard, clean, wholesome, uniform in size, shape, colour and in sound merchantable condition;
- c) shall be safe and suitable for human consumption;
- d) shall be free of pests, live animals, animal carcasses, animal droppings, fungus infestation, added coloring matter, moulds, weevils, obnoxious substances, discoloration and all other impurities except to the extent indicated in this standard and must meet any other phytosanitary requirements specified by the importing country authority;
- e) shall be free from filth in amounts that represent a hazard to human health;
- f) shall be free from toxic or noxious seeds viz. *Crotalaria* (*Crotalaria* spp.), Corn cockle (*Agrostemma githago* L.), Castor bean (*Ricinus communis* L.), Jimson weed (*Dhatura* spp.), *Argemone mexicana*, Khesari and other seeds that are commonly recognized as harmful to health;
- g) shall be free from abnormal flavours, obnoxious smell and discoloration.

4.2 Classification

Oats shall be classified into four (4) grades on the basis of the tolerable limits established in Table 1 which shall be additional to the general requirements set out in this standard.

4.3 Unclassified oat grains

Shall be oat grains which do not fall within the requirements of Grades 1, 2, 3 and 4 of Table 1 but are not rejected oats.

4.4 Rejected oat grains

- (a) (i) shall contain 8 or more stones which have an aggregate weight in excess of 0.2 percent of the sample weight,
 - (ii) 2 or more pieces of glass,
 - (iii) 3 or more crotalaria seeds (*Crotalaria* spp.),
 - (iv) 2 or more castor beans (*Ricinus communis* L.),
 - (v) 4 or more particles of an unknown foreign substance(s) or a commonly recognized harmful or toxic substance(s),
 - (vi) 8 or more cocklebur (*Xanthium* spp.) or similar seeds singly or in combination,
 - (vii) 10 or more rodent pellets, bird droppings, or equivalent quantity of other animal filth per 1065 ml to 1183 ml of oats; or
- (b) have a musty, sour, or commercially objectionable foreign odor (except smut or garlic odor); or
- (c) are heated or otherwise of distinctly low quality.

| Characteristic | | | Grade | | | | Method of test |
|--|----------------------------|--|--|---|------------------|------------------|----------------|
| | | | 1 | 2 | 3 ⁽¹⁾ | 4 ⁽²⁾ | |
| Foreign matter, whole grains, % by mass, <i>max.</i> | Other grains and wild oats | Barley | 1 | 2 | 6 | 14 | TZS 331 |
| | | Cereal grains other than wheat or barley | 3 | 4 | 6 | 14 | |
| | | Wheat | 1 | 2 | 6 | 14 | |
| | | Wild oats | 1 | 2 | 3 | 8 | |
| | | Total | 3 | 4 | 6 | 14 | |
| | | Large seeds | 0.20 | 0.30 | 0.50 | 1.0 | |
| | Sclerotin | Nil | 0.05 | 0.05 | 0.10 | | |
| | Stones | 0.017 | 0.066 | 0.15 | 0.15 | | |
| | Ergot | Nil | 0.05 | 0.05 | 0.10 | | |
| | Excreta | 1 piece in 1000 g or less | 0.01 | 0.02 | 0.02 | | |
| | Standard quality | Min. test weight, kg/h (g/0.5 L) | 51 (255) | 49(245) | 46(230) | 43(215) | |
| Degree of soundness | | Well matured, good natural colour, 97 % sound oats | Reasonably well matured, reasonably good natural colour, 96 % sound oats | Fairly well matured, fair colour, 94 % sound groats | | | |
| Hulled and hullless, % | | | 6 | 8 | 20 | No limit — if | |

| | | | | | | |
|--|---|------|------|------|---|---------|
| | | | | | sample contains 75% or more of hulless oats, hulls becomes part of grade name | |
| Damage, % by mass, max. | Fireburnt | Nil | Nil | Nil | 0.25 | |
| | Fusarium | 0.1 | 2.0 | 4 | 6 | |
| | Heated | Nil | 0.1 | 1.0 | 3 | |
| | kernel Insect bored s, kernels which have been visibly bored or tunnelled by insects | 0.1 | 0.3 | 0.5 | 0.5 | |
| | Total | 0.1 | 2.0 | 4 | 6 | |
| Moisture content, % by mass, max. | | 12.0 | 12.0 | 13.0 | 14.0 | |
| Total damage and foreign material, % by mass, max. expressed as kilogrammes per hectolitre. | | 3 | 4 | 6 | 14 | TZS 331 |
| <p>1) Oats that are slightly weathered shall be graded not higher than Grade 3.</p> <p>2) Oats that are badly stained or materially weathered shall be graded not higher than Grade 4.</p> | | | | | | |

5 Contaminants

5.1 Pesticide residues

Oat grains shall comply with those maximum pesticide residue limits established by the Codex Alimentarius Commission for this commodity.

5.2 Heavy metals

Oat grains shall be free from heavy metals in amounts which may represent a hazard to health. If present, they shall not exceed the limits established in Table 2.

Table 2 — Heavy metal contaminant limits

| | Parameter | Limit (max) ppm | Test method |
|------|------------------------|-----------------|-------------|
| i) | Arsenic (As) | 0.10 | TZS 1502 |
| ii) | Copper (Cu) | 2.0 | TZS 1495 |
| iii) | Lead (Pb) | 0.10 | TZS 268 |
| iv) | Cadmium (Cd) | 0.02 | TZS 1490 |
| v) | Mercury (Hg), ppm max. | 0.01 | TZS 1501 |

5.3 Mycotoxin limits

5.3.1 Oat grains shall comply with mycotoxin limits specified in Table 3 when tested in accordance with test methods specified therein.

Table 3 — Mycotoxins limits for oats grains

| S/N | Mycotoxin | limit (max) | Test method |
|------|-----------------------------------|-------------|-------------|
| i. | Total aflatoxins, µg/kg | 10 | TZS 331 |
| ii. | Aflatoxins B ₁ , µg/kg | 5 | |
| iii. | Fumonisin, µg/kg | 2 000 | |

5.3.2 Uric acid shall not exceed 100 milligrams per kilogram insert the test method.

6.0 Hygiene

6.1 It is recommended that the produce covered by the provisions of this Standard be prepared and handled in accordance with TZS 109 and TZS 1779.

6.2 The produce should comply with any microbiological criteria established in accordance with TZS 117

6.3 To the extent possible in good agricultural practice, the products shall be free from objectionable mater.

6.4 When tested by appropriate standards of sampling and examination listed in Clause 2, the products: shall be free from microorganisms in amounts which may represent a hazard to health and shall not exceed the limits stipulated in Table 4; shall be free from parasites which may represent a hazard to health; and shall not contain any substance originating from microorganisms in amounts which may represent a hazard to health.

Table 4 — Microbiological limits for oat grains

| | Type of micro-organism | Limits | Test method |
|------|-----------------------------------|-----------------|-------------|
| i) | Yeasts and moulds, max. per g | 10 ² | TZS 131 |
| ii) | <i>S.aureus</i> per 25 g | absent | TZS 125 |
| iii) | <i>E. Coli</i> , max. per g | absent | TZS 730 |
| iv) | <i>Salmonella</i> , max. per 25 g | absent | TZS 122 |

7.0 Packing

7.1 Oats shall be packed in gunny bags/jute bags, poly woven bags, poly pouches, cloth bags or other suitable packages which shall be clean, sound, free from insect fungal infestation. and the packing material shall be of food grade quality.

7.2 Oats shall be packed in containers which will safeguard the hygienic, nutritional, technological and organoleptic qualities of the products.

7.3 The containers, including packaging material, shall be made of substances which are safe and suitable for their intended use. They shall not impart any toxic substance or undesirable odour or flavour to the product.

7.4 Each package shall contain oats of the same type and of the same grade designation.

7.5 Each package shall be securely closed and sealed.

8.0 Marking and Labelling

8.1 In addition to the requirements in TZS 538, each package shall be legibly and indelibly marked with the following:

- i) product name as "Oat Grains";
- ii) variety;
- iii) grade;

- iv) name, address and physical location of the manufacturer/ packer/importer;
- v) lot/batch/code number;
- vi) net weight, in g/kg;
- vii) the declaration “Food for Human Consumption”;
- viii) storage instruction as “Store in a cool dry place away from any contaminants”;
- ix) crop year;
- x) packing date;
- xi) expiry date or best before;
- xii) instructions on disposal of used package;
- xiii) country of origin;
- xiv) a declaration on whether the oats were genetically modified or not

8.2 The use of pictorials or any other misrepresentation of the product on the label is prohibited.

8.3 Each container may be marked with the TBS standards mark of quality.

NOTE – The TBS Standards Mark of Quality may be used by the manufacturers only under licence from TBS. Particulars of conditions under which the licences are granted, may be obtained from TBS.

9. Sampling

Sampling shall be done in accordance with the TZS 330.