NATIONAL CEREALS AND PRODUCE BOARD (GRADING OF WHEAT) REGULATIONS, 1989

[L.N. 214/1989, L.N. 363/1989.]

1. (1) These Regulations may be cited as the National Cereals and Produce Board (Grading of Wheat) Regulations, 1989 and shall come into operation on the 1st July, 1989.

(2) These Regulations shall apply to specifications and the method of sampling and determining grades of wheat grain belonging to the species *Triticum aestivum* and *Triticum durum* which are purchased for human consumption in Kenya.

2. (1) In these Regulations, unless the context otherwise requires—

"broken grains" means shrivelled grains and pieces of wheat grain that will pass readily through a sieve in the manner described in the Seventh Schedule;

"*Datura*" means that the seeds of the plant *Datura stramonium*:

"foreign matter" means any material which is not wheat grain or fragments of wheat grains other than noxious weed seeds, earth, sand and stones;

"grader" means a person in possession of a valid wheat grader's certificate issue by the Kenya Bureau of Standards;

"noxious weed" means any weed *gazetted* under the Suppression of 'Noxious Weeds Act (Cap. 325);

"reject wheat" means wheat which is or has been mouldly, musty or otherwise commercially objectionable, being unfit for human consumption;

"shrievelled grain" means grain which is undeveloped, thin and papery in appearance;

"treated wheat" means wheat which has been treated in such manner that the true quality is not reflected or has made the grain unfit for human consumption;

"undergrade wheat" means wheat which can be brought back into grade;

"wheat group" means wheat varieties which have been approved suitable to bulk or store together because of their similar baking characteristics as approved by the National Plant Breeding Station at Njoro.

(2) For the purposes of these Regulations, the following shall be considered to be defective grains—

(a) "germinated wheat", that is, wheat in which the pericarp covering the embryo has been ruptured;

(b) "infested wheat", that is wheat grains containing in or amongst the grain any form of living insect, mite or other organism known to be capable of causing damage or spoilage to the grain;

(c) "insect damaged wheat", that is, wheat grains which have been damaged by any insect or any other pest;

(d) "immature wheat", that is, wheat which is not fully developed and the grains of which are distinctly green in colour;

(e) "heat damaged wheat" that is, wheat damaged by applied external heat or as a result of natural heating caused by fermentation due to initial high moisture as described in the Tenth Schedule; and

(f) "weather damaged wheat" that is wheat grain of which one-third or more of its dorsal surface is damaged as described in the Tenth Schedule.

3. (1) Wheat grains shall have a moisture content of not more than 14.4 per cent calculated on the total mass of a sample of wheat grain as determined according to the Sixth Schedule.

(2) The maximum permitted physical defects in all grades of wheat grain shall be as shown in the following Table 1.

TABLE 1 – PERMITTED DEFECTS IN WHEAT GRAIN

Defects	*Maximum Limits*
Infested Wheat	Nil
Foreign Matter	2 per cent by mass
Earth, Sand and Stones	1 per cent by mass
Broken Grains	2 per cent by mass
Germinated Wheat	5 per cent by mass
Insect Damaged Wheat	2 per cent by mass
Heat Damaged Wheat	3 per cent by mass
Weather Damaged Wheat	10 per cent by mass
Immature Wheat	10 per cent by mass
Total Defects	20 percent by mass
Wild Oats	3 seeds per 0.5 litre
Datura	2 seeds per 0.5 litre
Dame	0.5 per cent by mass
Mixed Groups—*Triticum aestivum*	10 per cent by count on any other groups
Triticum durum	5 per cent by count on other wheat.

(3) Any sample exceeding the limits set out in Table 1 for heat damaged wheat, weather damaged wheat, immature wheat, Datura and total defects shall be classified as reject.

(4) (i) A sample exceeding the limits specified in Table 1 but not exceeding the limits set out in Table 2 and having a mass of less than 67 kg/100 litres or 335 g/0.5 litres shall be classified as undergrade and shall be subject to a mass deduction penalty of 16 per cent of Fair Average Quality, the percentage being the difference between the sum total of the minimum permitted defects as outlined in Table 2.

(ii) Any wheat samples with defects exceeding the maximum limits specified in Table 2 shall be classified as reject.

TABLE 2 – PERMITTED DEFECTS IN WHEAT GRAIN INCURRING PENALTY

Defects	*Limits*
Foreign Matter	2–5 per cent by mass
Earth, Sand and Stones	1–2 per cent by mass
Broken Grains	2–6 per cent by mass
Germinated Wheat	5–10 per cent by mass
Insect Damaged	2–5 per cent by mass

(5) The Minister may, on the advice of the National Cereals and Produce Board, by notice in the *Gazette*, vary the limits set out in this regulation for certain wheat harvest seasons in specified areas of Kenya.

[L.N. 363/1989, s. 2.]

4. GRADES

(1) Wheat shall be graded on the 'basis of mass of 100 litres as shown in Table 3 or regulation 4(2)(a)(ii), and determined in the manner provided in the Fifth Schedule.

TABLE 3 – WHEAT GRADE LIMITS

Grade	*Mass in Kilograms per 100 litres*	*Equivalent Mass in g/0.5 litres*
1	79 or over	395 or over
2	75—79	375—395
3	70—75	350—375
4	65—70	325—350
Undergrade	Less than 6	Less than 325

(2) FAIR AVERAGE QUALITY GRADES

(a) Fair Average Quality wheat shall mean—

(i) wheat which does not have physical defects in excess of those permitted in Table 1 (Table 2 shall not apply); and

(ii) wheat which has a minimum mass of 67 kg per NO litres or 335 g per 0.5 litre.

(b) Undergrade wheat in relation to Fair Average Quality wheat shall mean wheat which does not meet the requirements of Table 1 and is not reject.

[L.N. 363/1989, r 2(c).]

5. Wheat samples shall be drawn by appointed graders at point of sale unless otherwise agreed in accordance with the procedures described in the Ninth Schedule.

6. The following instruments, equipment and methods shall be used for the purposes of grading wheat in accordance with the provisions of these Regulations—

(a) the sampling of wheat grains in bags shall be carried out in the manner provided for in the First Schedule;

(b) the sampling of wheat grains in bulk shall be carried out in the manner provided for in the Second Schedule;

(c) the mechanical sample divider shall conform to the provisions of the Third Schedule;

(d) the dividing of samples which have been mixed and evenly spread over a flat surface or "quartering" shall be in accordance with the Fourth Schedule;

(e) the apparatus to be used for the determination of grade mass from a sample shall conform to the specifications set out in the Fifth Schedule;

(f) the apparatus to be used for the determination of moisture shall conform to the specifications set out in the Sixth Schedule;

(g) the method for determining the percentage of broken grains shall be as set out in the Seventh Schedule;

(h) the weighing instrument for determining the mass of wheat grains contained in a measure shall be as set out in the Eighth Schedule;

(i) the grading of samples shall be in the manner specified in the Ninth Schedule; and

(j) the method for the recognition of weather damaged and heat damaged wheat grains shall be as set out in the Tenth Schedule.

7. The National Cereals and Produce Board (Grading of Wheat) Regulations, 1988 (L.N. 301/1988), are revoked.

FIRST SCHEDULE

[Rule 6(a).]

SAMPLING OF WHEAT GRAINS IN BAGS

1. The standard sack sampler shall be a tapered steel tube capable of drawing representative samples when inserted through a gunny bag filled with wheat grains, and of a type approved by the Kenya Bureau of Standards.

2. Primary samples shall be drawn from different parts of the bag (for example, top, middle and bottom) by means of a standard sack sampler. The sampler shall be put into each sack towards the centre and to the full extent on the inverted slotted opening and then turned through 180 degrees. The sample shall then be withdrawn and the contents emptied into a container. The quantity of the grading sample drawn from a specific consignment shall not be less than two litres in volume. The contents of any bag which differs in any respect from this sample, shall be graded separately.

SECOND SCHEDULE

[Rule 6(b).]

SAMPLING OF WHEAT GRAINS IN BULK

1. A bulk sampler shall be a type of device capable of drawing a representative sample from a bulk wagon, lorry or moving stream of wheat grains, and be of a type approved by the Kenya Bureau of Standards. The method of obtaining samples from the above containers shall be as follows—

(i) probe in the centre of the container;

(ii) probe from 1 to 2 metres back from the door-post towards the end of the container and 60 cm from one side of the container;

(iii) probe from 1 to 2 metres from the same end of the container and approximately 60 cm from the opposite side of the container as in (ii);

(iv) probe same as in (ii) and (iii) except in opposite end and sides of the container;

(v) a sample may ‘be taken after direct transfer or “drop-back”, or by binning run method at the time of loading, or unloading as mentioned above.

2. Each probed sample of the grain shall be examined for uniformity in respect of group odour, moisture content, weather damage, heat damage and infestation with insects or other pests. If all portions are found to be uniform they shall be composited into one sample representing the entire consignment. If any portion is found to differ in grades or in quality characteristics, further sampling shall be dune to establish the fractional part of the entire consignment that is different and the result shall be indicated.

THIRD SCHEDULE

[Rule 6(c).]

MECHANICAL SAMPLE DIVIDER

1. The mechanical sample divider shall be the apparatus used for randomly dividing a sample of wheat grains into equal separate portions, and be of a type approved by the Kenya Bureau of Standards.

2. The usage of this apparatus shall be according to the manufacturers' instructions.

FOURTH SCHEDULE

[Rule 6(d).]

QUARTERING

1. The quartering apparatus is constructed of two pieces of rigid material measuring approximately 45 cm. x 3 cm. each. They are joined at their centres to intersect at right angles in one plane.

2. The sample shall be thoroughly mixed and spread evenly in layers over a flat surface and divided into four approximately equal quarters by placing the quartering apparatus over the sample. Two quarters situated diagonally across the dividing line shall be combined together to constitute the sample. Further operation of the quartering apparatus using the above method shall be done where the original quartered sample is too large.

FIFTH SCHEDULE

[Rule 4.]

DETERMINATION OF GRADE MASS FROM THE SAMPLE

1. (1) The apparatus consists of four different pieces of equipment, as described below. If other apparatus to that described proves to be accurate in determining grade mass, then, with Kenya Bureau of Standards approval, this apparatus can be authorized for use in the industry.

(2) The funnel.—This shall be a metal funnel and shall conform to the following dimensions—

top diameter (internal)	21.5 cm. ± 0.5 cm.
bottom diameter	3.3 cm. ± 0.2 cm.
perpendicular height between top and bottom openings	16.5 cm. ± 0.5 cm.

The funnel shall be supported on three fixed metal legs and the lower aperture shall be closed by means of a metal slide capable of being freely withdrawn. The legs shall be adapted to support the funnel on the rim of the measure so that the vertical distance between the underside of the slide and the top of the brass measure is 3.8 cm. ± 0.2 cm.

(3) The Metal Measure.—This shall be a cylindrical measure of rigid construction with the seam soldered so that it retains water. It shall have the following internal dimensions—

capacity shall be between 500 and 502 millilitres,	
diameter	7.2 cm. ± 0.3 cm.
depth	12.3 cm. ± 1.0 cm.

(4) The weighing balance shall be as described in the Eight Schedule.

(5) The Stroker—Shall be a cylindrical piece of wood having a length of approximately 15 cm and diameter of approximately 2.5 cm.

2. All relevant provisions of the Weights and Measures Act (Cap. 513) and the Rules thereunder shall be applicable to the weighing instruments and the other apparatus described above.

3. (1) The metal measure shall be first filled to over-flowing capacity with the sample of wheat grain to be measured by using a scoop or other suitable means. The over-flowing measure of wheat grain shall then be transferred to the funnel with the slide previously closed. The measure shall be stood on a firm level surface free from any vibration. The funnel containing the sample shall be placed on top of the measure. The slide shall then be withdrawn fully and smartly. After the funnel has been emptied it shall be removed from the measure without jarring the measure. The measure shall then be struck by placing the stroker horizontally on the edge of the measure and sweeping it across the top in one light semi-circular movement.

(2) The contents of the metal measure shall then be transferred to the pan of the weighing instrument and the mass read. The mass shall be read to the nearest 5 gram division. The mass of the grain must be determined twice on each sample; if the two weightings do not agree the test must be repeated:

Provided that the mass of grain ascertained by the above procedure can be converted to the hectolitre mass, as set out in Table 3.

SIXTH SCHEDULE

[Rule 3(1) and 6(f).]

MOISTURE DETERMINATION APPARATUS

1. The electronic moisture meter shall be of a type approved by the Kenya Bureau of Standards.

(2) It shall be used in the manner laid down by the manufacturers subject to the standards of the Kenya Bureau of Standards which may require changes in procedure to ensure that readings are consistent with the standard air-oven method.

The performance of each meter shall be checked at least biannually, to ensure that it reads correctly, against the oven method.

2. The formula used for computing percentage loss in mass is as follows—

$$\frac{100 \times (M1 - M2)}{100 - M2}$$

Where MI = Initial percentage moisture content

and M2 = Final percentage moisture content

SEVENTH SCHEDULE

[Rule 6(g).]

THE SIEVE AND 'METHOD FOR DETERMINING PERCENTAGE OF BROKEN GRAINS

1. Apparatus—the sieve shall measure internally approximately 25 cm square by 5 cm. deep. The sieve shall be perforated with slots 1.6 mm wide and 9.5 mm long. In use it shall be fitted to a catch-box below and with a suitable lid on top to avoid spillage of any fraction being tested.

2. Description of the Sieving Test.—(1) A sample shall be made up of half a litre wheat grain already weighed for the hectolitre mass test which shall be used for determining shrivelled and broken grain.

(2) The sieve shall be held level in both hands directly in front of the body with the elbows close to the sides. It shall be held so that the grain moves lengthwise with the perforation. The sieve shall be moved approximately 25 cm from right to left and returned from left to right to complete an operation, while maintaining the horizontal place.

(3) The complete operation. shall be repeated thirty times at the above rate and the shaking shall continue for approximately 15 seconds, after which the sieve shall be given two taps on the side of the box to clear the perforations.

(4) The broken grains, as defined under regulation 2(1) which have passed through the screen and are found in the sieve box, shall be weighed. This mass divided by the original mass of the half litre of grain and multiplied by 100. shall be reported as the "percentage of broken grains".

EIGHTH SCHEDULE

[Rule 6(h).]

WEIGHING BALANCES

1. The weighing instrument used for determining the mass of wheat grains containing in the measure shall be of a self-indicating pattern which is acceptable by the Weights and Measures Department and the Kenya Bureau of Standards. For the purposes of assizing and stamping, the chart of the weighing instrument shall be graduated to a weighing capacity of 500 grams by 5 grams subdivisions, which shall be less than 2 mm apart. The weighing instrument shall be provided with a detachable goods pan in the form of a scoop.

2. The balance for assessing defects in wheat grain, as set out in Tables 1 and 2, shall have a capacity of 50 grams, with a minimum accuracy of 0.1 gram and of a type approved by the Kenya Bureau of Standards.

3. All relevant provisions of the Weights and Measures Act (Cap. 513)and the rules made thereunder, shall apply to the weighing instruments.

NINTH SCHEDULE

[Rule 5 and 6(i).]

GRADING SAMPLE

1. The grading sample, with a minimum volume of 2 litres, shall be obtained as set in the First and Second Schedules.

2. (1) The sequence of determining factors to reach the final wheat grade, shall be as follows—

(a) infested wheat;

(b) moisture content;

(c) quartering method—retain two quarters separately for analysis;

(d) use first quarter to determine the following—

(i) grade maw;

(ii) broken grains;

(iii) *datura;*

(e) express the results as a percentage of the grade mass.

(2) Use the second quarter to repeat determination of grade mass. Then, weigh two samples of 25 grams each from this quarter—

(i) Use the first of these samples to determine the following defects as set out below—

(a) foreign matter;

(b) earth, sand and stones;

(c) heat damaged wheat;

(d) germinated wheat;

(e) insect-damaged wheat;

(f) immature wheat;

(g) mixed groups.

(ii) The perecentage of these defects be determined by hand picking from the sample in the order above and separated from each other. The defective materials separated are then weighed to a tolerance of 0.1 gram and the defects calculated and expressed as a percentage of the total mass of the 25 gram sample.

(iii) Use the second of these samples to determine weather damage percentage as set out in the Tenth Schedule.

TENTH SCHEDULE

[Rule 2 (2).]

RECOGNITION OF WEATHER DAMAGED AND HEAT DAMAGED WHEAT

1. Weather Damaged Wheat.—Take the sample referred to in the Ninth Schedule and spread this out on a light-green tile. Examine every grain on its dorsal surface only (each grain has a ventral surface, sides and dorsal, or back, surface). Separate weather damaged grain consisting of the following types of discolouration, physical damage and mould infection, provided that 1/3 or more of the dorsal surface of the grain is affected.

2. Type of Discolouration—

(i) Parts of the grain near the brush end are grey, greyish black or dark brown.

(ii) Parts of the grain are distinctly yellow.

(iii) Parts of the grain are orange red.

Grains which are bleached or pale but otherwise sound are not considered to be discoloured. The condition known as black point, which is a brown, dark brown or almost black disc at the embryo end of the grain is not considered be discolouration due to weather damage.

3. Physical Damage—

(i) Badly distorted grains (except shrivelled grain).

(ii) Grains in which part of the seed coat covering the endosperm is actually torn or peeled off. (The condition in which the seed coat appears loose and often bubbly, but is not actually torn, must be considered to be physically damaged.)

4. Mould Infection—

(i) Small separate black spots scattered over the surface of the grain due to leaf blight (*pyronophera trichostome*).

(ii) Greyish black discolouration of the brush end of the grain due to black mould (*Cladosporium herborum*).

(iii) Pinkish red areas due to scab (*Fusarium graminearum*).

In cases where mould infection appears as spots on the grain, the total area in which the spots are spread shall be considered.

5. Heat Damage:

Heat damaged wheat displays the following defects, odour, colour, texture and chemical change.

(i) *Odour*.—A typical characteristic smell akin to that of roasted wheat.

(ii) *Colour*.—The surface colour, depending on the extent of heat damage, varies from reddish brown to black. The endosperm colour is not normal white or opaque, but is brownish.

(iii) *Texture*.—The affected grain is cut by a blade, or preferably by a grain cutter, and the cut surface may display a crumbly and brittle texture depending on the extent of heat damage.

(iv) The protein and starch has been denatured and this can be verified through rheological tests.