MANUAL ON STANDARDS OF WHEAT.

1. INTRODUCTION

Promotion of standardization and grading of agricultural commodities is an important aspect of agricultural marketing. The agricultural commodities are heterogeneous and hence it is very essential to grade these commodities as per standards to command better price either at domestic or international market. Sale of Wheat is offered on the basis of variety, wholesomeness, appearance, colour, presence of foreign matter, damaged grains, broken grains, admixture of inferior variety, moisture, harmful contaminants, etc. A quality grain is that which meets the end user specifications with respect to range of pre-determined Quality and Safety standards.

2. OBJECTIVE

The Manual has been designed with the objectives to

i. Create awareness about standards prescribed by various organizations for domestic and international markets so as to raise quality consciousness among the farmers, entrepreneurs and other market functionaries with the objective to equip them better to face the global competition in the post WTO era.

ii. provide details of various parameters responsible for quality; and

iii. describe the advantages of grading & standardization so that farmers may get prices commensurate with the quality produced by them.

3. IMPORTANT PARAMETERS RESPONSIBLE FOR QUALITY

3.1 Following Parameters are important in determination of QUALITY of wheat :

- Wholesomeness, appearance, colour,
- Foreign matter(organic and inorganic)
- Damaged grains
- Broken grains
- Immature/Shriveled grains
- Weevilled grains
- Wheat of other variety
- Other food grains
- Moisture content

3.2 Following SAFETY parameters are important :

- Pesticides residue
- Poisonous/Heavy metals
- Aflatoxin
- Uric acid
- Microbial load

3.3 Parameters by which grades of wheat are differentiated

Important parameters by which grades can be differentiated in case of wheat are

- foreign matter,
- damaged/slightly damaged

- broken grains
- other food grains,
- weevilled/Immature/Shriveled grains,
- moisture content,
- filth,
- presence of weeds,
- Karnal bunt and ergot affected grains.

4. STANDARDS APPLICABLE FOR PURCHASES BY FOOD CORPORATION OF INDIA (FCI) AND NATIONAL AGRICULTURAL COOEPRATIVE MARKETING FEDERATION OF INDIA LTD. (NAFED).

4.1 The main objectives of the FCI are

a) Effective price support operations for safeguarding the interests of the farmers.

b) Distribution of foodgrains throughout the country for Public Distribution system and other Govt. of India schemes, and

c) Maintaining satisfactory level of operational/buffer stocks of foodgrains to ensure national food security.

4.2 The main objectives of the NAFED are

a) Providing marketing support to the farmers through its commercial purchases
b) Acting as an Agency of Government of India for purchases under Market Intervention Scheme (MIS).
c) Assisting farmers by supply of agricultural inputs.

4.3 To meet these obligations, the FCI & NAFED make purchases of wheat and for this purpose following standards for all varieties of wheat are applicable (Marketing Season 2005-2006).

Wheat shall

a) be the dried mature grains of *Triticum vulgare, T. compactum T.sphaerococcum,T.durum,T.aestivum* and *T.dicoccum.*

b) have natural size, shape, colour and lusture.

c) be sweet, clean, wholesome and free from moulds, obnoxious smell,discolouration, admixture of deleterious substances including toxic weed seeds and all other impurities except to the extent indicated in the schedule below.

d) be in sound merchantable condition.

e) not have any admixture of *Argemone mexicana* and *Lathyrus sativus* (kesari) in any form, colouring matter, and any obnoxious, deleterious and toxic material.

f) conform to Prevention of Food Adulteration Rules, 1955.

Schedule showing the maximum permissible limits of different Refractions in Fair Average Quality of Wheat.

Foreign grains Matter	Other Slightly Food grains	Damaged	Shrivelled & damaged grains	broken
%	%	%	%	%
0.75	2.0	2.0	6.0	7.0

Other Conditions:-

1) Moisture in excess of 12% and upto 14% will be discounted at full value. Stocks containing moisture in excess of 14% are to be rejected.

2) Within the overall limit specified for foreign matter, the poisonous weed seeds shall not exceed 0.4% of which Dhatura and Akra (*Vicia* species) shall not be more than 0.025% and)0.2% by weight respectively.

3) Kernels with glumes will not be treated as unsound grains. During physical analysis the glumes will be removed and treated as organic foreign matter.

4) Within the overall limit specified for damaged grains, ergot affected grains shall not exceed 0.05%.

5) In case of stocks having living infestation, a cut at the rate of Rupee one per quintal may be charged as fumigation charges.

For weevilled grains determined by count, following price cut will be imposed,

i. from the beginning of the season till end of August the rate of cut will be Rupee one per quintal, for every 1% or part thereof.

ii. from 1st September till end of October ,no cut will be imposed up to 1% while for any excess, the cut will be @Rs.1/- per qtl.,for every 1% or part thereof.

iii. from 1st November till end of season no cut will be imposed upto 2% while for any excess the cut will be @ Rs.1/- per qtl, for every 1% or part thereof.

iv. stocks containing weevilled grains in excess of 3% will be rejected.

DEFINITIONS.

Foreign Matter : Includes inorganic and organic matter. The inorganic matter shall include sand, gravel, dirt, pebbles, stones, glass and metallic pieces, lumps of earth, clay and mud. Organic matter shall include husk, chaff, straw, weed seed and other inedible grains. Paddy shall be considered as foreign matter in commodities other than paddy.

Other Foodgrains : foodgrains other than the grain under consideration.

Damaged : Kernels or pieces of kernels that are sprouted or internally damaged as a result of heat, moisture, weather or microbes.

Slightly damaged : Kernels or pieces of kernels that are damaged or discoloured, superficially so as not to affect the quality of the material.

Brokens : Pieces of sound kernels that are less than three-fourths of the size of the full kernels. In case of dals, pieces that are less than the size of three-fourths of the split pulses shall be considered as brokens.

Immature : Kernels or pieces of grain kernels that are not fully developed.

Weeviled Grains : Weeviled grains are grain kernels that are partially or wholly bored by insects injurious to grain but do not include germ-eaten grains and egg-spotted grains.

5. STANDARDS APPLICABLE FOR STORAGE OF WHEAT

5.1 CENTRAL WAREHOUSING CORPORATION (CWC) : The CWC works as an agent of the government for purchase, sale, storage and distribution of agricultural and industrial commodities, seeds, fertilizers and notified commodities for individual, cooperatives and other institutions in the country. CWC provides modern efficient warehousing to ensure maximum returns to the growers with better opportunities. It provides scientific facilities to the farmers for the stock of agricultural produce at a reasonable cost. CWC issues Warehouse Receipts to a person depositing goods in the warehouse. The banking institutions accept the Warehouse Receipts as co-lateral security for grant of loans to the holder of the Warehouse Receipt on its being endorsed and delivered to them. Thus, warehousing plays an active role in marketing and also provides socio-economic gains to the farmers, who otherwise get exploited by the middlemen and are forced to have distress sales.

5.1.1 Standards of Central Warehousing Corporation

Central Warehousing Corporation follows Standards given in Item 4.3 for accepting wheat for storage in the warehouses.

In addition, CWC has following categorization for deciding the period of storability of wheat in the warehouses.

Percentage of Weevilled grains :

Upto 1%	A
Above 1% and upto 4%	B
Above 4% and upto 7%	C
Above 7% and upto 15%	D

In order to have better storability of wheat. farmers are advised to ensure that wheat for storage has Weevilled grains less than 1% (by count).

6. STANDARDS APPLICABLE FOR DOMESTIC MARKET

6.1 The Prevention of Food Adulteration Act, 1954 (PFA Standards)

Prevention of Food Adulteration Rules, 1955 (PFA Rules) have been notified to carry out the provisions of the Prevention of Food Adulteration Act, 1954. These rules define the standards of quality and fix the limit of variability permissible in respect of article of food. These rules also provide guidelines for packing and labeling of an article of food. Standards framed under the provisions of the Rules are popularly called PFA standards. PFA standards prescribe minimum limit for Quality as well as Safety parameters. PFA standards are minimum standards and are**mandatory.** They do not differentiate between Quality. **Food**

articles being sold in the market should comply with PFA standards. Standards of Wheat prescribed in PFA Rules, 1955 are as follows :

6.1.1 QUALITY PARAMETERS

Description: Wheat shall be the dried mature grains of *Triticum aestivum Linn.,Triticum vulgare vill.,Triticum durum* Desf, *Triticum sphaerococcu m* perc.,*Triticum dicoccum schubl, Triticumcompactum* Host.
It shall be sweet, clean and wholesome.
It shall also conform to the following standards, namely:

Moisture: Not more than 14 per cent by weight (obtained by heating the pulverized grains at 130 °C. ï 133 °C. for two hours).

Foreign matter (extraneous matter) : Not more than 1 per cent by weight of which not more 0.25 percent by weight shall be mineral matter and not more than 0.10 percent weight shall be impurities of animal origin.

Other Edible Grains : Not more than 6 per cent by weight.

Damaged Grains: Not more than 6 per cent by weight including Karnal bunt affected grains and ergot affected grains. The limit of Karnal Bunt affected grains, ergot affected grains shall not exceed 3 per cent and 0.05 per cent by weight respectively.

Weevilled Grains : Not more than 10 per cent by count.

Provided that the total of foreign matter, other edible grains shall not exceed 12 percent by weight.

6.1.2 SAFETY PARAMETERS

Limits for insecticides and pesticides
Following maximum limits are prescribed for residues of insecticides and pesticides

Sl.No.	Name of insecticides	Tolerance Limit mg/kg. (ppm)
1	Aldrin, dieldrin, (The limits apply to aldrin and dialdrin singly or in any combination and are expressed as dieldrin)	0.01
2	Bitertanol	0.05
3	Benomyl	0.50
4	Carbaryl	1.5
5	Chlordane (residue to be measured as cis plus trans chlordane)	0.02
6	Chlorfenvinphos (residues to be measured as alpha and beta isomers of chlorfenvinphos)	0.025
7	Chlorpyrifos	0.05
8	Cypermethrin (sum of isomers) (fat soluble residue)	0.05
9	Carbendazim	0.50
10	Carbofuran(Sum of carbofuran and 3-hydroxy carbofuranexpressed as carbofuran)	0.10
11	Diazinon	0.05
12	Dichlorvos (Content of dichloracetaldehyde (D.C.A) be	1.0

	reported where possible	
13	Decamethrin/Delta methrin	0.50
14	2,4-D	0.01
15	Dithiocarbamates	0.20
16	Ethion	0.025
17	Fenitrothion	0.02
18	Fenthion	0.10
19	Heptachlor	0.01
20	Hexachlorocyclohexane and its isomers(Gamma isomer known as Lindane)	0.10
21	Hydrogen cyanide	37.5
22	Inorganic bromide (determined and expressed as total bromide from all sources)	25.0
23	Malathion (Malathion to be determined and expressed as combined residue of malathion and malaoxon)	4.0
24	Methyl Choloro phenoxyacetic Acid (MCPA)	0.05
25	Monocrotophos	0.025
26	Oxydemeton methyl	0.02
27	Paraquat-Dichloride(Determined as paraquat cations)	0.1
28	Phosphamidon residues (expressed as the sum ofphosphamidon and its desethyl derivative).	0.05
29	Phenthoate	0.05
30	Phorate (sum of phorate, its oxygen analogue and theirsulphoxide and sulphones, expressed as phorate)	0.05
31	Pirimiphos-methyl	5.00
32	Trichlorfon	0.05
33	Thiometon (residuesm determined as thiometon its sulfoxideand sulphone expressed as thiometon)	0.025
34	Tridemorph	0.1
35	Propicomazole	0.05
36	Sulfosalfuron	0.02
37	Trifluralin	0.05
38	Chlorimuron-ethyl	0.05
39	Diclofop-methyl	0.1
40	Pendimethalin	0.05
41	Metasulfuron-methyl	0.1
42	Methabenzthiazuron	0.5
43	Triallate	0.05
44	Fenoxy-prop-p-ethyl	0.02
45	Clodinafop-propanyl	0.1
46	Triademelon	0.5
47	Isoproturon	0.1

Poisonous Metals
Following limits are prescribed for poisonous metals

	Name of the Poisonous metal	**parts per million by weight**
1	Lead	2.5
2	Copper	30.0

3	Arsenic	1.1
4	Tin	250.0
5	Zinc	50.0
6	Cadmiun	1.5
7	Mercury	1.0
8	Methyl Mercury (Calculated as the element)	0.25

Uric Acid : Not more than 100 mg. per kg.

Aflatoxin : Not more than 30 micrograms per kg.

Deoxynivalenon (DON) : Not more than 1000 micrograms per kg.

7. STANDARDS FOR GRADING

7.1 GRADING - Grading provides description of the quality of the consignment and assists in the formation of a legally binding agreement. It facilitates proper marketing of agricultural commodities. It also ensures that agricultural commodities move through the market faster and without obstructions. This also facilitates transactions without physical verification by the distant buyers.

Advantages of Grading

- It brings confidence between the buyer and the seller.
- It facilitates interstate and international marketing.
- Disputes in the market can be solved amicably.
- Stability of the price is ensured.
- Farmers can take loans easily from the banks on the basis of grades of produce stored in the godown
- Arbitrary fixation of price by middlemen is eliminated.
- Brings about improvement of the crop.
- Reduces risk of producer and seller in transactions.
- Future marketing is facilitated. Grades become a commercial measure of quality.
- It also helps in implementation of contract farming.

7.2 AGRICULTURAL PRODUCE (GRADING & MARKING) ACT, 1937 (AGMARK STANDARDS).

Standards of various agricultural commodities prescribed under the provisions of the Agricultural Produce (Grading & Marking) Act, 1937 are popularly known as AGMARK Standards. AGMARK standards comply with minimum standards of quality & safety prescribed in Prevention of Food Adulteration Rules, 1955. In addition AGMARK standards differentiate between quality by having four grades for Wheat. The grades are differentiated on the basis of damaged grains, weeviled/shriveled/immature grains, other food grains, etc.

7.2.1 AGMARK Standards of Wheat

Grade designation and definition of quality of wheat

Special characteristics
(Maximum limits of tolerance)

Grade Designation	Foreign matte	Other food	Otherwheats (% by wt.)	Damaged grains	Slightly damaged	Immatureshrivelled and Broken Grains	Weevilled Grains

	r (% by wt.)	grains (% by wt.)		(% by wt.)	grains (% by wt.)	(% by wt.)	(% by wt.)
I	1.0	1.6	5.0	1.0	2.0	2.0	1.0
II	1.0	3.0	15.0	2.0	4.0	4.0	3.0
III	1.0	6.0	20.0	4.0	6.0	10.0	6.0
IV	1.0	8.0	20.0	5.0	10.0	10.0	10.0

Note : In foreign matter, not more than 0.25% by wt. shall be mineral matter and not more than 0.10% by wt. shall be impurities of animal origin.

General characteristics

(a) Wheat shall be the dried grains of *Triticum vulgare* and *Triticum durum* Desf,

(b) have uniform size, shape and colour;

(c) Shall be sweet, hard, clean, wholesome and free from moulds, weevils, obnoxious smell, discolouration, admixture of deleterious substances and all other impurities except to the extent as indicated in the Schedule;

(d) be in sound merchantable condition;

(e) not have moisture exceeding 12 per cent.

Definitions

Foreign Matter : It includes dust, stones, lumps of earth, chaff, stem or straw and any other impurity including non edible seeds.

Other Food Grains : Edible foodgrains other than wheat.

Other Wheat : For this purpose wheat would be divided into two classes (1) Durum or Macaroni wheat and (2) vulgare or common wheat. Durum again would be sub divided into twocolour groups (1) amber and (2) red and vulgare would be sub divided into three colour groups - (1) white (2) amber and (3) red.

Damaged Grains : Grains that are internally damaged or discoloured, damaged and discolouration materially affecting the quality.

Slightly Damaged Grains : Grains that are superficially damaged or discoloured, damaged and discolouration not materially affecting the quality.

Immature, Shriveled and Broken Grains : Immature and shrivelled grains are those that are not properly developed, Broken grains are pieces of whole grains.

Weevilled Grains : Grains that are partially or wholly bored or eaten by weevils or other grain insects.

N.B.- Grades I and II should be free from living insect infestation.

Maximum tolerance limits for various food safety parameters such as poisonous metals, pesticide residues, aflatoxin, uric acid, etc. are as prescribed in Prevention of Food Adulteration Rules, 1955.

8. STANDARDS APPLICABLE FOR INTERNTIONAL TRADE.

8.1 CODEX ALIMENTARIUS COMMISSION (CAC) : Codex Alimentarius Commission (CAC) implements joint FAO/WHO Food Standards Programme. The purpose of the CAC programmeis to protect the health of consumers and ensure fair practices in the food trade. The CAC is a collection of internationally adopted food standards presented in a uniform manner. Sanitary andPhyto-Sanitary Agreement and Technical Barriers to Trade Agreement of World Trade Organisation recognizes standards framed by CAC with respect to safety and quality aspects of food items. **Thus for international trade standards framed by CAC are recognized.**

8.1.1 Codex Standard For Wheat And Durum Wheat :

Description ï Wheat is the grain obtained from varieties of the species Tritticum aestivum L.
Durum Wheat is the grains obtained from varieties of the species Tritticum durum Desf.

Quality & Safety factors.

Parameter	Wheat	Durum Wheat
Moisture Max.	14.5% m/m	14.5% m/m
Organic extraneous matter, Maximum	1.5% m/m	1.5% m/m
Inorganic extraneous matter, Maximum	0.5% m/m	0.5% m/m
Test weight (wt. of a hundred litre volume expressed in Kg/hectoliter), Minimum	68	70
Shrunken & broken kernels, Maximum	5.0% m/m	6.0% m/m
Edible grains other than wheat and durum wheat, Maximum	2.0% m/m	3.0% m/m
Damaged kernels, Maximum	6.0% m/m	4.0% m/m
Insect bored kernels, Maximum	1.5% m/m	2.5% m/m
Filth (impurities of animal origin, including dead insects), Maximum	0.1% m/m	0.1% m/m
Ergot (Sclerotium of the fungus Claviceps purpurea), Maximum	0.05% m/m	0.05% m/m

Toxic or Noxious Seeds

The wheat and Durum wheat shall be free from the following toxic or noxious seeds in amounts which may represent a hazard to human health.

Crotolaria (Crotalaria spp.), Corn cockle (Agrostemma githago L.) Castor bean (Ricinus communis L.), Jimson weed (Datura spp.) and other seeds that are commonly recognized as harmful to health.

Heavy Metals

Maximum levels for Lead 0.2 mg/kg.

Pesticide Residues:
Wheat and Durum wheat shall comply with following maximum pesticide residue limits.

Sl.No.	PESTICIDE	MRL or EMRL	(Mg/kg)
1	2,4-D	MRL	0.5
2	ALDICARB	MRL	0.02
3.	ANILAZINE	MRL	0.1
4	BENTAZONE	MRL	0.1
5.	BIFENTHRIN	MRL	0.5
6.	BIORESMETHRIN	MRL	1
7.	BITERTANOL	MRL	0.1*
8.	CARBARYL	MRL	5
9.	CARBOFURAN	MRL	0.1*
10.	CHLORDANE	EMRL	0.02
11.	CHLORMEQUAT	MRL	5
12.	CHLOROTHALONIL	MRL	0.1
13.	CHLORPYRIFOS-METHYL	MRL	10
14.	CYPERMETHRIN	MRL	0.2
15.	DICHLOFLUANID	MRL	0.1
16.	DIQUAT	MRL	2
17.	DITHIOCARBAMATES	MRL	1
18.	ETHEPHON	MRL	1
19.	FENBUCONAZOLE	MRL	0.1
20.	FLUCYTHRINATE	MRL	0.2
21.	FLUSILAZOLE	MRL	0.1
22.	GLYPHOSATE	MRL	5
23.	HEXACONAZOLE	MRL	0.1
24.	IMAZALIL	MRL	0.01
25.	METHOMYL	MRL	0.5
26.	MONOCROTOPHOS	MRL	0.02
27.	PHORATE	MRL	0.05
28.	PIPERONYL BUTOXIDE	MRL	10
29.	PIRIMICARB	MRL	0.05
30.	PROCHLORAZ	MRL	0.5
31.	PROPICONAZOLE	MRL	0.05
32.	PYRAZOPHOS	MRL	0.05
33.	TEBUCONAZOLE	MRL	0.05
34.	TERBUFOS	MRL	0.01
35.	TRIADIMEFON	MRL	0.1
36.	TRIADIMENOL	MRL	0.2

HYGIENE

Wheat and Durum wheat, after cleaning and sorting, and before further processing :

- Shall be free from microorganisms in amounts which may represent a hazard to health.

- Shall be free from parasites which may represent a hazard to health.
- Shall not contain any substance originating from microorganisms, including fungi, in amounts which may represent a hazard to health.