

CODEX STANDARD FOR QUICK FROZEN CORN-ON-THE-COB**CODEX STAN 133-1981****1. SCOPE**

This standard shall apply to quick frozen Corn-on-the-Cob of the species *Zea mays* L. convar *saccharata* Koern as defined below and offered for direct consumption without further processing, except for repacking, if required. It does not apply to the product when indicated as intended for further processing or for other industrial purposes.

2. DESCRIPTION**2.1 Product Definition**

Quick frozen Corn-on-the-Cob is the product prepared from fresh, clean, sound, properly matured whole or pieces of ears conforming to the characteristics of the sweet corn variety *Zea mays* L. convar *saccharata* Koern which are trimmed (except for the style "Whole"), separated from husk and silk, sorted and washed and sufficiently blanched to ensure stability of colour and flavour during normal marketing cycles.

2.2 Process Definition

2.2.1 Quick frozen Corn-on-the-Cob is the product subjected to a freezing process in appropriate equipment and complying with the conditions laid down hereafter. This freezing operation shall be carried out in such a way that the range of temperature of maximum crystallization is passed quickly. The quick freezing process shall not be regarded as complete unless and until the product temperature has reached -18°C (0°F) at the thermal centre after thermal stabilization.

2.2.2 The recognized practice of repacking quick frozen products under controlled conditions is permitted.

2.3 Handling Practice

The product shall be handled under such conditions as will maintain the quality during transportation, storage and distribution up to and including the time of final sale. It is recommended that during storage, transportation, distribution and retail, the product be handled in accordance with the provisions in the Recommended International Code of Practice for the Processing and Handling of Quick Frozen Foods (CAC/RCP 8-1976).

2.4 Presentation**2.4.1 Style**

- 2.4.1.1 (a) **Whole** - the whole, intact ear of corn to which a small part of the stalk may be attached. Minimum length not less than 120 mm.
- (b) **Trimmed whole** - the product obtainable from one whole ear after trimming of both ends. Minimum length not less than 120 mm.
- (c) **Cut Cob** - portions of the whole trimmed ear, cut transversely into pieces not

shorter than 40 mm.

2.4.1.2 The diameter of the product of any style, measured perpendicularly to the axis at the maximum diameter shall be not less than 30 mm.

2.4.2 **Other Styles**

Any other presentation of the product shall be permitted provided that it:

- (a) is sufficiently distinctive from other forms of presentation laid down in this standard;
- (b) meets all other requirements of this standard;
- (c) is adequately described on the label to avoid confusing or misleading the consumer.

2.4.3 **Standard Sample Unit for Presentation**

The standard sample unit shall be 4 ears for whole and trimmed whole corn and 8 pieces of ear for the cut cob.

2.4.4 **Definition of "Defectives" for Presentation**

Any standard sample unit from a sample taken in accordance with the FAO/WHO Codex Alimentarius Sampling Plans for Prepackaged Foods (AQL 6.5) (CAC/RM 42-1969) (see Codex Alimentarius Volume 13) shall be regarded as defective if any individual whole ear, trimmed whole ear or cut cob fails to comply with the requirements in sections 2.4.1.1 and 2.4.1.2.

2.4.5 **Lot Acceptance for Presentation Factors**

A lot will be considered acceptable with respect to presentation factors when the number of defectives as defined in section 2.4.4 does not exceed the acceptance number (c) for the appropriate sample plan as specified in the FAO/WHO Codex Alimentarius Sampling Plans for Prepackaged Foods (AQL 6.5)(CAC/RM 42-1969) (see Codex Alimentarius Volume 13).

3. **ESSENTIAL COMPOSITION AND QUALITY FACTORS**

3.1 **Optional Ingredients**

- (a) Salt (sodium chloride)
- (b) Condiments, such as spices and herbs.

3.2 **Quality Factors**

3.2.1 **General Requirements**

Quick Frozen Corn-on-the-Cob shall be:

- free from foreign flavour and odours, taking into consideration any added optional ingredients;
- clean, free from sand and grit and other foreign material;

- free from insect contamination;

and with respect to visual defects subject to a tolerance shall be:

- of reasonably uniform white, cream to yellow (golden) colour;
- reasonably well developed;
- reasonably uniform in size;
- reasonably free from blemished or mechanically damaged areas;
- reasonably free from poorly trimmed units (except for whole style);
- reasonably free from extraneous vegetable matter (EVM).

3.2.2 Analytical Requirements

3.2.2.1 The Alcohol Insoluble Solids (A.I.S.) content of the whole kernels detached from the cob, as determined by the method specified in Codex Alimentarius Volume 13, shall not exceed 30% mm.

3.2.2.2 The total soluble solids content of the juice pressed from the kernels by refractometer at 20°C, uncorrected for acidity and read as °Brix on the International Sucrose Scale shall be not less than 20 (see Codex Alimentarius Volume 13).

3.2.3 Definition of Visual Defects

- (a) *Uniform white, cream to yellow (golden) colour* means, that all kernels on one ear are of the same colour and that the different units in one standard sample unit are of the same colour.

Light variation - Some difference in colour exists, only slightly affecting the appearance.

Pronounced variation - difference in colour between the different kernels and/or ears are noticeable and affecting the appearance.

- (b) *Uniform in size* means that the length of the longest ear in the sample unit does not exceed the length of the shortest ear by more than 50 mm for whole and trimmed whole styles or by more than 20 mm for cut style, and that the largest diameter of the largest unit does not exceed the largest diameter of the smallest unit by more than 15 mm.

Minor - outside one of the limits (length or diameter) by maximum 5 mm = 1 defect;

Major - outside both limits by maximum 5 mm = 2 defects;

Major - outside one or both of the limits by more than 5 mm = 4 defects.

- (c) *Well developed* means that the kernels shall be positioned in a symmetrical pattern in distinct lines or rows which are not seriously affected by missing or shrunken kernels. The whole style may have some shrunken or under-developed parts.

- Minor** - Appearance materially affected by irregular pattern of kernels = 1 defect;
- Major** - More than 10 percent but less than 15 percent by count of the kernels missing or shrunken = 2 defects;
- Serious** - 15 percent or more by count of the kernels missing or shrunken = 4 defects.

In "whole style" the length of the part of ear which is shrunken or underdeveloped shall be considered as follows:

- Minor** - more than 20 mm and up to 25 mm = 1 defect;
- Major** - more than 25 mm and up to 30 mm = 2 defects;
- Serious** - more than 30 mm = 4 defects.

(d) **Blemished or mechanically damaged areas**

Blemished: A unit affected by pathological or insect injury with associated discolouration which affects the kernels.

Mechanically damaged: A unit affected by cuts or by crushing of the kernels. Kernels at the ends of the units which are damaged by cutting shall not be considered as damaged by mechanical injury.

- Minor** - more than 5 percent but less than 10 percent by count of the kernels are slightly affected but not more than 0.5 percent by count of all kernels are seriously blemished or damaged = 1 defect;
- Major** - 10 percent or more but less than 15 percent by count of the kernels are slightly affected but not more than 1 percent by count of all kernels are seriously blemished or damaged = 2 defects;
- Serious** - More than 15 percent by count of the kernels are slightly affected or more than 1 percent by count of the kernels are seriously affected = 4 defects.

(e) *Poorly trimmed means* (i) ears or cut cobs where at the stem end a small part of stalk remains attached and also means (ii) that the top end of the ear or the cut cob is cut too high leaving under-developed kernels on the cob. For the style "whole" the top is untrimmed and a piece of the stalk of maximum 15 mm may remain attached, and not be considered a defect.

- Minor** - at one end of unit maximum 5 mm left = 1 defect
- Major** - at one end of unit 5 - 10 mm left = 2 defects
- Serious** - at one end of unit more than 10 mm left = 4 defects.

(f) **EVM (Extraneous Vegetable Material)**

Husk - means the membranous outer covering and one of the constituent parts of an ear of corn that is removed during processing.

Silk - means the coarse thread-like filaments that are one of the constituent parts of an ear of corn. Such silk is found beneath the husk and in immediate contact with the corn kernels (on-the-cob). Corn silk is normally removed during processing. Silk to the total length twice of that of the unit in question are considered normal and not a defect.

Minor - silk to a total length of 2-6 times the length of the units = 1 defect

Minor - husks not more than 2 squares cm in total surface = 1 defect

Major - silk to a total length greater than 6 times the length of the units or husks larger than 2 square cm in total surface = 2 defects.

3.2.4 Standard Sample Unit¹

The standard sample unit for the respective styles shall be

Whole and trimmed whole4 ears
Cut Cob 8 pieces of ears

3.2.5 Tolerances for Visual Defects

Based on the standard sample unit defined in section 3.2.4, visual defects shall be assigned points in accordance with Table 1 in this section. The maximum number of defects permitted in the Total Allowable Points rating are indicated for the respective categories Minor, Major and Serious or the Combined Total of the foregoing categories.

Table 1 - All Styles

Defect	Unit of Measurement	Defect Categories			
		Minor	Major	Serious	Total
(a) Colour variation (Kernel)					
- Light	One ear	1			
- Pronounced			2		
Colour variation (Ears)					
- Light	Standard	1			
- Pronounced	Sample Unit		2		
(b) Difference in size outside given range (in standard sample unit)		1	2 or 4		
(c) Not well developed	Each ear	1	2	4	
(d) Blemished or damaged	Each ear	1	2	4	
(e) Poorly trimmed	Each ear	1	2	4	

¹ "Standard Sample unit": This term should not be confused with individual units of product i.e., whole ear, trimmed whole ear or cut cob.

(f) EVM	Standard Sample Unit	1	2		
Total Allowable Points		21	6	4	21

3.3 Definition of "defective" for Quality Factors

Any standard sample unit taken in accordance with the FAO/WHO Codex Alimentarius Sampling Plans for Prepackaged Foods AQL-6.5 (CAC/RM 42-1969) (see Codex Alimentarius Volume 13) and which is adjusted to a standard sample unit size given in 3.2.4 shall be regarded as a "defective" for the respective characteristics as follows:

- (a) Any standard sample unit that fails to meet the general requirements given in section 3.2.1
- (b) Any standard sample unit that fails the "Total Allowable Points" in any one or more of the defect categories including the Total in Table 1, in section 3.2.5
- (c) Any standard sample unit that fails to meet the analytical requirements in section 3.2.2.

3.4 Lot Acceptance for Quality Factors

A lot will be considered acceptable when the number of "defectives" as defined in section 3.3 does not exceed the acceptance number (c) for the appropriate sample plan as specified in the FAO/WHO Codex Alimentarius Sampling Plans for Prepackaged Foods (AQL 6.5) (CAC/RM 42-1969) (See Codex Alimentarius Volume 13). In applying the acceptance procedure each defective (as defined in section 3.3 (a) or (b) or (c)) is treated individually for the respective characteristics.

4. FOOD ADDITIVES

4.1 Citric or malic acid, as processing aids for use in the blanching or cooling water in accordance with GMP.

4.2 Carry-Over Principle

"Section 3" of the "Principle relating to the Carry-Over of Food Additives into Foods" as set forth in Volume 1 of the Codex Alimentarius shall apply.

5. HYGIENE

5.1 It is recommended that the product covered by the provisions of this standard be prepared and handled in accordance with the appropriate sections of the Recommended International Code of Practice - General Principles of Food Hygiene (CAC/RCP 1-1969, Rev. 2 (1985) Codex Alimentarius Volume 1), and other Codes of Practice recommended by the Codex Alimentarius Commission which are relevant to this product.

5.2 To the extent possible in Good Manufacturing Practice, the product shall be free from objectionable matter.

5.3 When tested by appropriate methods of sampling and examination, the product:

- 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; and

- shall not contain any substance originating from microorganisms in amounts which may represent a hazard to health.

6. LABELLING

In addition to the requirements of the Codex General Standard for the Labelling of Prepackaged Foods (CODEX STAN 1-1985 (Rev. 1-1991) Codex Alimentarius Volume 1), the following specific provisions apply.

6.1 The Name of the Food

6.1.1 The name of the food as declared on the label shall include "Corn-on-the-Cob" preceded or followed by a description of the style as indicated in section 2.4. The words "quick frozen" shall also appear on the label except that the term "frozen"¹ may be applied in countries where this term is customarily used for describing the product processed in accordance with section 2.2 of the standard.

6.1.2 If the product is produced in accordance with Section 2.4.2 the label shall contain in close proximity to the word "Corn-on-the-Cob" such additional words or phrases that will avoid misleading or confusing the consumer.

6.1.3 In addition, there shall for the styles "whole" and "trimmed whole" appear on the label, in conjunction with or in close proximity to the name a clear indication of the number of units included in the package.

6.2 Additional Requirements

The packages shall bear clear directions for keeping from the time they are purchased from the retailer to the time of their use, as well as directions for cooking.

6.3 Bulk Packs

In the case of quick frozen Corn-on-the-Cob, in bulk, regardless of style, the information required above shall either be placed on the container or be given in accompanying documents, except that the name of the food accompanied by the words "quick frozen" (the term "frozen" may be used in accordance with section 6.1.1 of this standard), and the name and address of the manufacturer or packer shall appear on the container.

7. PACKAGING

Packaging used for quick frozen Corn-on-the-Cob, regardless of style, shall:

- (a) protect the organoleptic and quality characteristics of the product;
- (b) protect the product from microbiological and other contamination;
- (c) protect the product from dehydration and, where appropriate, leakage as far as technologically practicable; and
- (d) not pass on to the product any odour, taste, colour or other foreign characteristics through the processing (where applicable) and distribution of the product up to the

¹ "Frozen" - this term is used as an alternative to "quick frozen" in some English-speaking countries.

time of final sale.

8. **METHODS OF ANALYSIS AND SAMPLING**

See Codex Alimentarius Volume 13.