

This Code of Practice, PNS/BAFS ____:2014, intends to provide guidance for the processing and handling of quality Corn Grits. Also, the code aims to prevent contamination and infestation of the said product with hazards like aflatoxin, heavy metals and pesticide residues. It includes sections on the over-all process of making the corn grits: pre-processing, processing and post processing with consideration of the Management and Supervision, Documentation and Records, Traceability, and its Product Recall Procedure.

This Code of Practice was made in accordance with the Philippine National Standard (PNS) for Corn (maize) grits (*Zea mays Linn.*)- Grading and Classification (PNS/BAFS 15:2004).

A Technical Working Group (TWG) for the crafting of the code of practice for corn grits was organized and represented by several agencies of the Department of Agriculture, University of the Philippines Los Baños ó Institute of Plant Breeding (UPLB-IPB) and Agricultural Machinery Testing And Evaluation Center (AMTEC), National Food Authority (NFA) and private sectors.

The Bureau in collaboration with the members of the TWG conducted a series of technical reviews and public consultations in Isabela, Cebu and General Santos for the crafting of the Code of Practice. Comments from the stakeholders on the draft were carefully assessed and deliberated prior to its finalization and approval.

Corn or maize is one of the most popular cereals in the world and forms the staple food in many countries including the Philippines. According to the analysis made by Department of Agriculture, white corn is preferred by about 14 million Filipinos to be their main staple while yellow corn is accounted for the 50% of livestock mixed feeds. Aside from being a source for human and animal consumption, corn contributes to the country's economy, livelihood and industry.

White corn is a low-fat complex carbohydrate that deserves a regular place on our healthy table. Health benefits of corn have been undeniable and deserve attention. According to the study made by World Food Program (2012), white corn is the staple food of 20% of the Filipino population primarily in the Visayas and Mindanao area. White corn is processed into grits and then mixed with rice called "rice composite" which is more nutritional and fulfilling and, cheaper. Nowadays, eating corn grits is considered in meal plans of diabetics because white corn has low glycemic index which is good for diabetic.

The creation of the code of hygienic practice for the processing and handling of corn grits is important to ensure the safety and quality of the produced corn grits. It will help promote white corn grits as grain staple and provide awareness and in depth understanding to corn stakeholders the potential health benefits of eating white corn as alternative or complementary staple to rice.

With the *Philippine National Standard (PNS) Corn (maize) grits (Zea mays Linn.) – Grading & Classification (PNS/BAFS 15:2004)* already concerned with the classification of corn grits based on their physical characteristics and current practices in existing sectors, this Code aims to provide guidance for the processing and handling of quality Corn Grits in order to prevent contamination and infestation of the said product with hazards like aflatoxin, heavy metals and pesticide residues. Specific guidelines were made for the pre-processing, processing and post processing sections of Corn Grits.

SECTION 2 – SCOPE, USE OF DOCUMENT AND DEFINITIONS

2.1 Scope

This Code of Hygienic Practice applies to the over-all production of corn grits derived from corn grains by the virtue of drying, shelling and milling. This Code also recommends measures that should be followed and implemented by all individuals and institutions who are involved in assuring an end product with good quality and is safe for human consumption.

2.2 Use of the document

The provisions of this document are supplemental to and must be used in conjunction with the *Philippine National Standard for Corn Grits Grading and Classification (PNS/BAFS 15:2004)*.

2.3 Definitions

For the purpose of this Code, the following terms should apply.

corn grits

milled corn grains with outer covering (pericarp) and germ (embryo) removed.

Good Hygiene Practices (GHP)

refer to all practices regarding the conditions and measures necessary to ensure safety and suitability of food at all stages of the food chain.

Good Manufacturing Practices (GMP)

quality assurance system aimed at ensuring that products are consistently manufactured, packed, repacked or held to quality standards appropriate for the intended use. It is thus concerned with both manufacturing and quality control procedure.

Hazard Analysis and Critical Control Points (HACCP)

refer to a science-based system which identifies, evaluates and controls hazards which are significant for food safety at critical points during a given stage in the food supply chain.

3.1 Raw materials

The principles and guidelines supplement those contained in Section 4 of the *Philippine National Standard: Corn (maize) grits (Zea mays Linn.)- Grading and Classification (PNS/BAFPS 15:2004)*.

3.1.1 White corn

White corn grains, either flint or glutinous, with not more than the allowable percentage of other colors as indicated in the grade requirement for corn

3.1.2 Yellow corn

Yellow corn grains with not more than the allowable percentage of other colors as indicated in the grade requirement for corn.

3.1.3 Other colors

Corn grains which are other than yellow or white in color.

3.2 Environmental Hygiene

The farm environment, farm structure and facility maintenance for corn should conform with Philippine National Standard (PNS) Code of Good Agricultural Practices for corn (GAP Corn) (PNS/BAFPS 20:2007).

3.3 Hygienic production of corn grits

3.3.1 Harvesting techniques

Harvesting practices of should conform with Section 6.2 of the *Philippine National Standard (PNS Code of Good Agricultural Practices for corn (GAP Corn) (PNS/BAFPS 20:2007)* and Section 4.2 of the *Philippine National Standard (PNS) Code of practice for the prevention and reduction of aflatoxin contamination in corn (PNS/BAFPS 27:2008)* in order to prevent damage and contamination of corn ears to be processed as corn grits.

3.3.2 Pre-Processing

It is recommended that the raw materials covered in this section be prepared and handled in accordance with the appropriate sections of the *Code of practice for the prevention and reduction of aflatoxin contamination in corn (PNS/BAFPS 27:2008)* and *Good Agricultural Practice for Corn – (GAP corn) (PNS/BAFPS 20:2008)*

3.3.2.1 Dehusking

after harvest prior to drying or shelling depending on the moisture content of the corn grains.

3.3.2.2 Drying

3.3.2.2.1 Matured corn ears should be dried within 24 hours after harvest to reduce the moisture content (MC) to at least 21% using mechanical and/or sun drying.

3.3.2.2.2 Corn grains should be dried to at least 14% MC to avoid or minimize grain deterioration from mold and insect infestation using the different methods of drying.

3.3.2.2.3 If immediate drying is not possible, temporarily store the corn ears in cribs or any appropriate structure with proper aeration not to exceed the allowable time.

3.3.2.3 Shelling

3.3.2.3.1 Sorting should be done prior to shelling to remove poor quality corn ears.

3.3.2.3.2 Shell corn ears when at least 21% MC using clean, dry and appropriate sheller.

3.3.2.3.3 As much as possible, immediately dry the shelled corn to at least 14% MC as per Section 3.3.2.2.2.

3.3.4 Storage and transport of corn grains

The dried corn grains should be transferred to a suitable storage facility as soon as possible after drying. Grain moisture accumulation should be avoided during transport by using an appropriate covering for the container.

Corn grains to be transported should be properly stacked inside the transport vehicle and covered with appropriate protection against moisture and storage pest.

3.3.5 Processing

The corn mill to be used for the milling should conform with the *Philippine Agricultural Engineering Standard (PAES) Agricultural Machinery-Corn Mill-Specifications (PAES 210:2000)*.

3.4 General hygienic practice

3.4.1 Contaminants control

The level of aflatoxin, heavy metals and pesticide residues should conform with the appropriate guidelines specified in the Section 10 of the *Philippine National Standard (PNS) Corn (maize)*

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Classification (PNS/BAFS 15:2004) and Codex General Standard for Degermed Maize (Corn) Meal and Maize (Corn) Grits (CODEX STAN 155-198 Rev. 1-1995).

3.4.2 Packaging

Corn grits should be packed in desired weight using appropriate packaging such as polyethylene and polypropylene bags and other food grade packaging materials with specific weight of the net content properly indicated. Moreover, the packaging materials to be used should conform with the Department of Health Administrative Order No. 208 Series of 1974 *Human Foods; Current Good Manufacturing Practice (Sanitation) in Manufacture, Processing, Packing of Holding* and Codex General Standard for Degermed Maize (Corn) Meal and Maize (Corn) Grits (CODEX STAN 155-198 Rev. 1-1995) and *Standard for Labelling of Prepackaged Foods* (CODEX STAN 1-1985)

3.4.3 Storage

3.2.5.3.1 The storage area for the finished product should be designed and constructed to:

- prevent re-wetting of corn grits and maintain the recommended moisture content to at most 14% MC during storage to ensure product quality;
- prevent the entry of insects, birds, rodents and other animals using appropriate measures;
- provide proper ventilation for the stored corn grits as per Section 4.1.2 of this Code.

3.2.5.3.2 The processors should conduct regular monitoring of corn grits quality during storage and prior to distribution. No corn grits should be released to the market containing more than 20 ppb aflatoxin level.

3.4.5. Equipment and utensils

Other items of equipment, containers and utensils coming into contact with the product must be designed and constructed using materials that are easily cleaned, disinfected and regularly maintained to avoid contamination of food.

3.5 Documentation and record keeping

Corn mill operators must have updated records of corn grits production to include procurement, processing, storage and distribution as integral part of the food safety control system. All records should be archived for at least 1 year.

SECTION 4 - ESTABLISHMENT: DESIGN AND FACILITIES

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4.1 Plant Construction and Layout

4.1.1 Site and premises of the corn mill

4.1.1.1 Potential sources of contamination have to be considered in the location of the corn mill. In particular, corn mills should not be in:

- areas with industrial and other activities which pose a serious threat of contaminating corn products;
- flood prone/vulnerable areas;
- areas prone to storage pest infestation;
- areas where wastes (either solid or liquid) cannot be removed effectively.

4.1.1.2 Mill owners/operators must secure immediate perimeter with adequate fences or gate to prevent any unwanted intrusion whether by human and/or by animal.

4.1.2 Building and Plant Facilities

It is recommended that the provision of this section be referred to the appropriate section of the Bureau of Food and Drugs Administration Administrative Order 2013-0022 *Guidelines for current good manufacturing practices* and National Food Authority *Revised Rules and Regulations on Grains Business*.

4.1.2.1 The following are the required characteristics of plant facilities to be used for the processing and handling of corn grits in order to ensure its food safety:

- 4.1.2.1.1 Adequate lighting must be provided in areas where processing and packing are done. There should be protection against food contamination in case of light bulb breakage.
- 4.1.2.1.2 Doors and windows of warehouses must be adequately provided with screens or other protection to prevent the entry of insects, rodents, birds, and other animals.
- 4.1.2.1.3 The floors in the packaging and warehouse areas should be kept clean and maintained without cracks or leaks.
- 4.1.2.1.4 Good over-all ventilation of the facility must be maintained in order to avoid air-borne contamination of the product.

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Separate and sufficient areas for receiving raw materials, processing, packaging, and storage of finished products. Pallet board (plastic or wood) should be used for the piling and storage of sacks of corn.

4.1.2.3 Proper waste management should be observed. Containers for waste disposal must be far from the location of the product and should be covered and cleaned regularly.

4.1.3 Sanitary facilities and control

4.1.3.1 The plant/warehouse must provide adequate supply of potable water for personnel handling corn grits and for cleaning of equipment surfaces coming into contact with grits.

4.1.3.2 There should be proper drainage and sewage system to avoid the contamination from the waste water and accumulation of foul odor.

4.1.3.3 Separate toilet for men and women should be installed away from the processing facility proper and should be cleaned regularly.

4.1.3.4 Personnel should be provided with mess hall/canteen, locker rooms and accessible hand washing facility.

SECTION 5 - CONTROL OF OPERATION

5.1 Key aspects of hygiene control systems

5.1.1 Temperature, moisture and time controls

Temperature, moisture and time in the over-all process of producing of corn grits as stated in Section 3 of this Code should be properly observed in order to avoid or minimize grain deterioration from mold and insect infestation.

5.1.2 Management and Supervision of products within the plant

Corn grits operators must have adequate knowledge on food hygiene principles and practices to be able to assess potential risks, take appropriate preventive and corrective action, and ensure that effective monitoring and supervision is carried out. Training or orientation on GMP/GHP and HACCP will be conducted for interested corn mill operators.

SECTION 6 - PERSONAL HYGIENE

Guidelines on the personnel's health and safety should conform with the appropriate sections of the Department of Health Administrative Order No. 208 Series of 1974.

Specifically, all the personnel of the facility:

ing, processing, and post production activities should wear proper working clothes and protective equipment.

- should have a regular medical check-up.
- who have open lesions, infected wounds, or any possible source of microbial contamination should be excluded from any food handling operation until the desired condition is attained.

SECTION 7 - END PRODUCT SPECIFICATION

Corn grits should conform with the quality grade requirements on corn grits as stated on Section 5 of the *Philippine National Standard (PNS) Corn (maize) grits (Zea mays Linn.)- Grading and Classification (PNS/BAFS 15:2004)*.

The product should also comply with the acceptable levels of aflatoxin, heavy metals and pesticide residues as specified by *Codex General Standard for Degermed Maize (Corn) Meal and Maize (Corn) Grits (CODEX STAN 155-198 Rev. 1-1995)*.

SECTION 8 - PRODUCT INFORMATION AND CONSUMER AWARENESS

8.1 Labelling

The packaged corn grits should contain minimum information (i.e. name and type of the product, grade and grit size, net weight in kilograms, name and address of miller and date of milling) in its label as stated in the standard for Corn Grits Grading and Classification PNS/BAFS 15:2004 Section 9. It may also provide additional information such as:

- a. Best before
- b. Nutritive value
- c. Year and season harvested
- d. Moisture content

In addition, the labeling of product should conform with the Department of Health Administrative Order No. 208 Series of 1974 *Human Foods; Current Good Manufacturing Practice (Sanitation) in Manufacture, Processing, Packing of Holding*, *Codex General Standard for Degermed Maize (Corn) Meal and Maize (Corn) Grits (CODEX STAN 155-198 Rev. 1-1995)*, *Standard for Labelling of Prepackaged Foods (CODEX STAN 1-1985)* and *National Food Authority Revised Rules and Regulations on Grains Business*.

8.2 Traceability

Each product package must be traceable to the source (e.g. milling operator's certificate number, date of milling/expiration date, lot or batch numbers).

In case of complaint or issues regarding product quality and safety, the FDA should follow the procedure for product recall in coordination with the manufacturers/distributors of corn grits. The general procedure for product recall should conform with the FDA Bureau Circular No. 8 Series of 2001: Guidelines To Be Observed On The Implementation Of Product Recall System.

8.4 General Provision on Sanctions

Sanctions for the manufacturers/distributors of corn grits who failed to comply for product recall should conform with the FDA Bureau Circular No. 8 series of 2001: Guidelines To Be Observed On The Implementation Of Product Recall System.

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Republic Act No. 10611. An act to strengthen the food safety regulatory system in the country to protect consumer health and facilitate market access of local foods and food products, and for other purposes.(For definitions 3.2, 3.3, and 3.4)

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