



# CORN (MAIZE) GRITS - GRADING AND CLASSIFICATION

PNS/BAFS 15:2018

ILLUSTRATIVE GUIDE





Corn (maize) grits - Grading and classification  
(PNS/BAFS 15:2018)

---

Bureau of Agriculture and Fisheries Standards (BAFS)  
Quezon City, 2022



**Contributors:** Mr. Jan Vincent DR. Tecson, Ms. Brooklyn S. Flores,  
Engr. Abraham L. Perez III

**Edited By:** Dr. Vivencio R. Mamaril, Ms. Mary Grace R. Mandigma

**Layout and Design:** Mr. Jan Vincent DR. Tecson, Engr. Abraham L. Perez III

**Published by:** Bureau of Agriculture and Fisheries Standards  
BAFS Building, BPI Compound, Visayas Avenue, Diliman, Quezon City  
(+632) 8928 8756 to 65 local 3301 - 3325  
info.dabafs@gmail.com | bafs@da.gov.ph  
ISBN 978-621-455-461-4 (PDF)

BAFS encourages the reproduction and dissemination of material in this knowledge product. Non-commercial uses will be authorized free of charge upon request. Applications for the permission to reproduce or disseminate these materials and all other queries shall be addressed to the publisher.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Bureau of Agriculture and Fisheries Standards (BAFS) Secretariat concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Mention of company names or commercial products does not imply endorsement by the Bureau.

# Introductory Note

In 2017, the Philippine National Standard (PNS) for Corn (maize) grits – Grading and classification was revised in order to check if its provisions are still relevant and effective to the current regulatory and market needs. The PNS aims to specify the minimum requirements for the kernels of flint corn, also known as maize, *Zea mays* L. var *indurata*, intended for direct human consumption .

This year, BAFS developed the Illustrative Guide for PNS Corn (maize) grits – Grading and classification in order to further illustrate the PNS provisions, and to facilitate better appreciation and adoption of standards. The IG contains supplementary photographs or images of the adopted or draft PNS covering quality matters.

For more information, please visit our website <http://www.bafs.da.gov.ph> and Facebook page (<https://www.facebook.com/da.bafs>).

# Director's Message



Food security and food availability are the current thrusts of the Department of Agriculture. The Bureau of Agriculture and Fisheries Standards (BAFS) is one with the DA in surmounting this challenge by developing standards for commodities such as corn products.

Considered as the second most important crop in the Philippines, corn is one of the major sources of livelihood for farmers, transporters, processors, and agri-input suppliers.

Thus, we need to inform our stakeholders of the Philippine National Standards (PNS) that will ensure the safety and quality of corn-related products.

With this, we are proud to share with you the Illustrative Guides (IGs) of the Philippine National Standards (PNS) for Grains - Grading and classification - Corn (PNS/BAFS 10:2017), and PNS for Corn (maize) grits - Grading and classification (PNS/BAFS 15:2018). These IGs will serve as supplementary learning materials.

The Bureau is hopeful that this document will aid the Philippine corn industry towards achieving food and feed self-sufficiency.

  
**VIVENCIO R. MAMARIL, PhD**  
*Director IV*  
Bureau of Agriculture  
and Fisheries Standards

# Table of Contents

Section 1	Scope, Normative references .....	1
Section 2	Terms and definitions .....	2
Section 3	Essential composition and quality factors .....	8
Section 4	Classification .....	9
Section 5	Grading .....	10
Section 6	Sampling and methods of analysis .....	11
Section 7	Determination of moisture content .....	13
Section 8	Packing, Labeling .....	14
Section 9	Contaminants .....	16
Section 10	Hygiene .....	17
	References .....	18
	Technical Working Group.....	19

## Scope

This standard applies to corn grits for direct human consumption milled from kernels of flint corn, also known as maize, *Zea mays* L. var *indurata*.

## Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

CAC/RCP 1-1969, Rev. 2003, Recommended International Code of Practice – General Principles of Food Hygiene

PNS/BAFS 142, Code of hygienic practice for the processing and handling of corn grits

PNS/BAFS 194, General Standard for Contaminants and Toxins in Food and Feed



**Aflatoxin**

group of highly poisonous and carcinogenic compounds which are produced by strains of the fungi, *Aspergillus flavus* and *Aspergillus parasiticus* on suitable substrate such as corn, peanuts, copra, and other oilseeds, etc. Aflatoxin content is expressed in parts per billion (ppb)

**Mycotoxin**

diverse group of chemical substances (secondary metabolites) produced by fungi



**Contaminant**

any substance not intentionally added to corn grits as a result of the production, postharvest handling, processing, packing, transport, or storage

**Filth**

impurities of animal origin, including dead insects

**Foreign matter**

all matters other than corn grits such as sand, gravel, metal pieces, dirt, pebbles, stones, lumps of earth, clay, mud, chaff, straw, and seeds of other crops

**Corn grits**

milled corn grains where the outer covering (pericarp) and germ (embryo) have been removed leaving only the endosperm that passed through different sieve sizes. Table 1 shows the different sieve sizes.

**Table 1.** US sieve size equivalents

US sieve size	Tyler equivalent	Opening	
		millimeter	inch
-	2 ½ Mesh	8.00	0.312
-	3 Mesh	6.73	0.265
No. 3 ½	3 ½ Mesh	5.66	0.233
No. 4	4 Mesh	4.76	0.187
No. 5	5 Mesh	4.00	0.157
No. 6	6 Mesh	3.36	0.132
No. 7	7 Mesh	2.83	0.111
No. 8	8 Mesh	2.38	0.0937
No. 10	9 Mesh	2.00	0.0787
No. 12	10 Mesh	1.68	0.0661
No. 14	12 Mesh	1.41	0.0555
No. 16	14 Mesh	1.19	0.0469
No. 18	16 Mesh	1.00	0.0394
No. 20	20 Mesh	0.841	0.0331
No. 25	24 Mesh	0.707	0.0278
No. 30	28 Mesh	0.595	0.0234
No. 35	32 Mesh	0.500	0.0197
No. 40	35 Mesh	0.420	0.0165
No. 45	42 Mesh	0.354	0.0139
No. 50	48 Mesh	0.297	0.0117
No. 60	60 Mesh	0.250	0.0098
No. 70	65 Mesh	0.210	0.0083



Sieves used for identifying grit sizes

### Corn Grits Sizes



Corn grits No. 10

corn grits with particle size from 1.69 mm to 2.00 mm which passed through US Sieve No. 10 but are retained in US Sieve No. 12



### Corn grits No. 12

corn grits with particle size from 1.42 mm to 1.68 mm which passed through US Sieve No. 12 but are retained in US Sieve No. 14



### Corn grits No. 14

corn grits with particle size from 1.20 mm to 1.41 mm which passed through US Sieve No. 14 but are retained in US Sieve No. 16



**Corn grits No. 16**

corn grits with particle size from 1.01 mm to 1.19 mm which passed through US Sieve No. 16 but are retained in US Sieve No. 18



**Corn grits No. 18**

corn grits with particle size from 0.841 mm to 1.00 mm which passed through US Sieve No. 18 but are retained in US Sieve No. 20



**Corn grits No. 10**



**Corn grits No. 12**



**Corn grits No. 14**



**Corn grits No. 16**



**Corn grits No. 18**





**Discolored grits**

corn grits which are materially discolored and damaged by external heat, fermentation, or enzymatic browning



**Moisture content**

Water content of corn grits, expressed in percent wet basis.

**Odor**

Corn grits shall have the characteristic odor of corn and shall not have any foul odor.

**Color**

Corn grits shall reasonably be uniform in color according to type.

Corn grits shall be classified according to type.



**White corn grits**

White corn grits with not more than the permitted percentage of corn grits of other colors as indicated in the quality grade requirement for corn grits. A slight tinge of color other than white shall not affect their classification as white corn grits.



**Yellow corn grits**

Yellow corn grits with not more than the permitted percentage of corn grits of other colors as indicated in the quality grade requirement for corn grits. A slight tinge of color other than yellow shall not affect their classification as yellow corn grits.



Source: Thekitchn.com

**Pigmented corn grits**

Consist of corn grits of various colors (e.g. purple, red, brown, blue, black).



Source: Farmviewmarket.com

**Mixed corn grits**

Consist of corn grits of various colors that do not meet the color requirements for either white, yellow, or pigmented corn grits.

Corn grits shall conform to the quality grade requirements specified in Table 1.

**Table 1.** Quality grade requirements of corn grits

Grade factor, % by weight maximum	Grade				
	Premium	Grade No. 1	Grade No. 2	Grade No. 3	Grade No. 4
Moisture content	14.00	14.00	14.00	14.00	14.00
Aflatoxin (food), µg/kg	20	20	20	20	20
Filth	0.10	0.10	0.10	0.10	0.10
Discolored grits	Trace	0.50	1.00	2.00	3.00
Foreign matter	Trace	0.50	0.80	1.00	2.00
Grits of other color*	Trace	0.50	1.50	3.00	5.00
Grits of other sizes	1.00	4.00	7.00	10.00	13.00

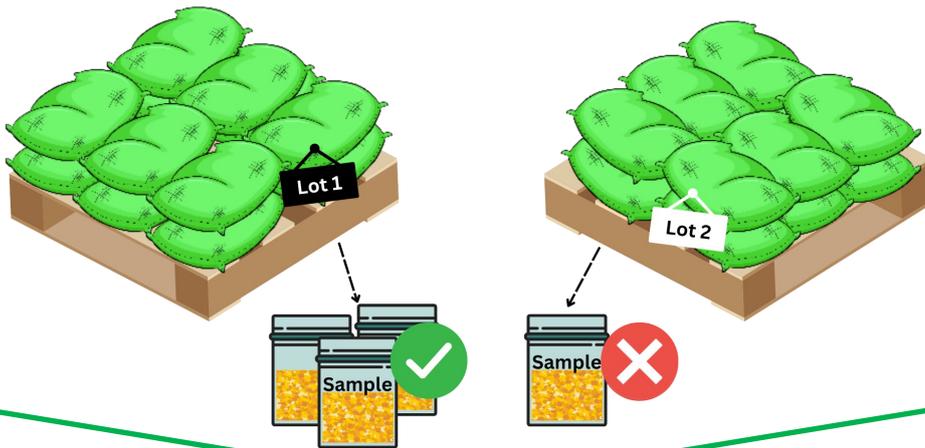
\*Does not apply to pigmented corn grits

Sampling method to be used shall be in accordance with the established procedures of the competent authority.

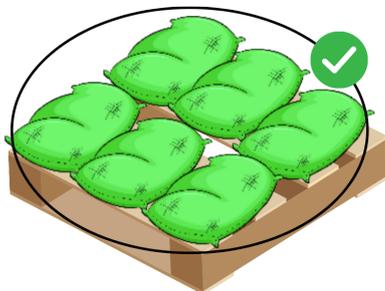
Sampling should be done by classifiers or quality assurance personnel trained by the competent authority.

**Sampling Procedure for Corn Grits**

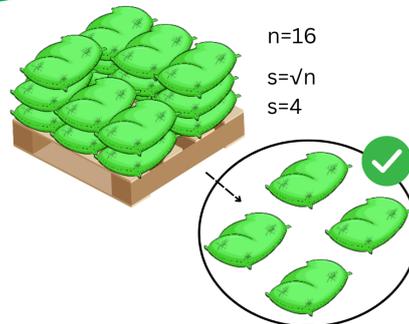
**1.** Make sure that the samples are from the same lot.



**2.** Determine the total number of packages or bags in the same lot.

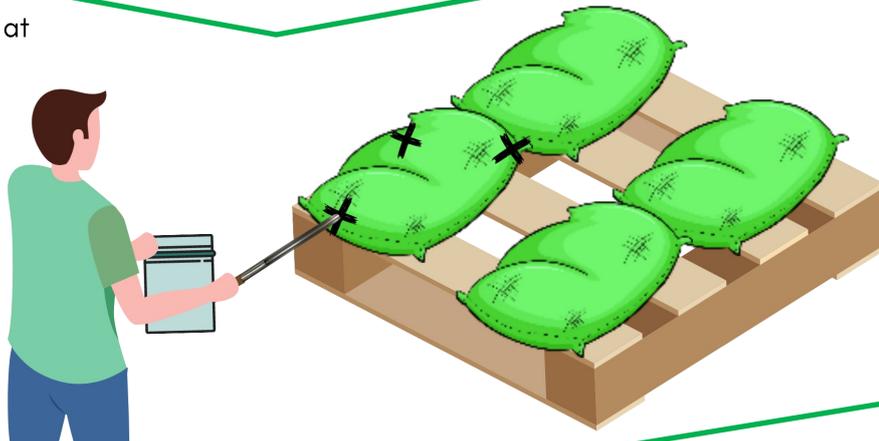


a) For bags of 10 or less, get samples for all bags.

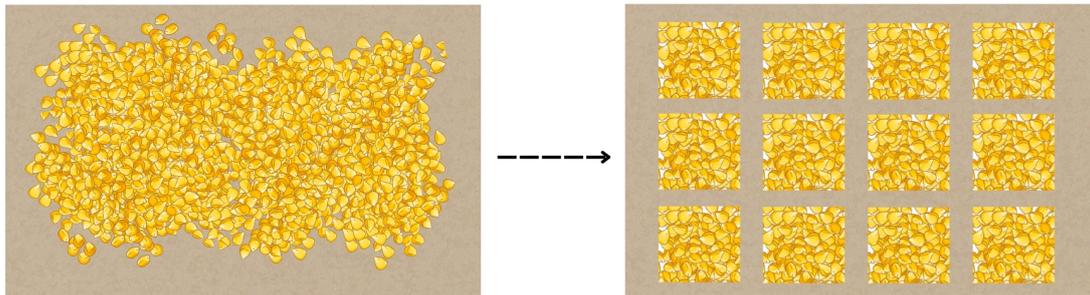


b) For bags of more than 10, get the square root of the total number of bags which will determine the number (n) of packages to be sampled.

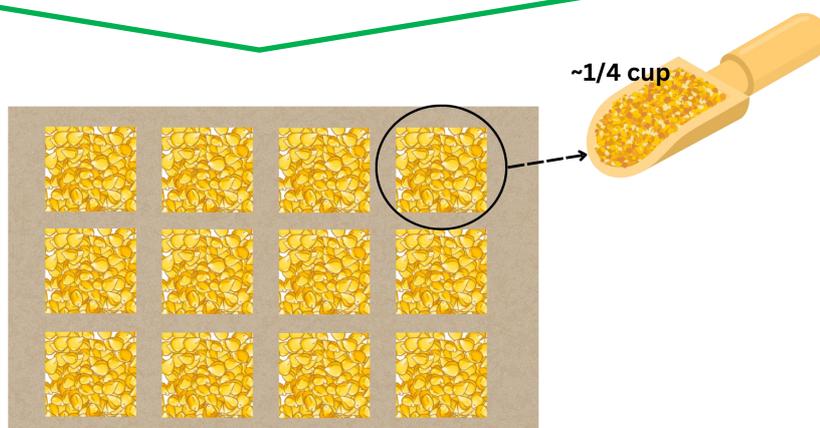
**3.** Probe from (n) packages at random at 3 points.



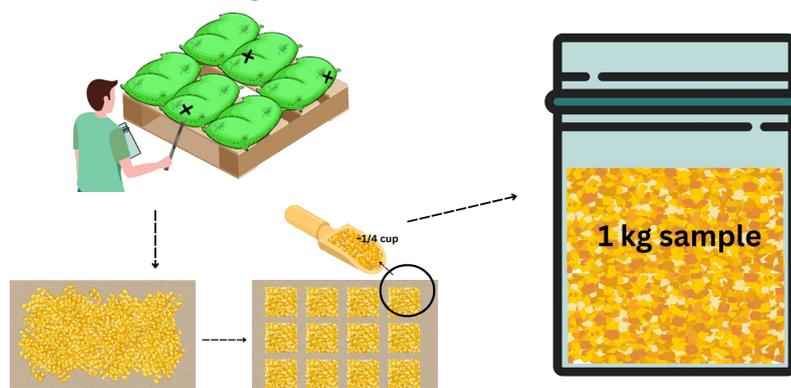
- 4.** Mix thoroughly on a clean sheet, flatten and partition into 12 divisions to 20 divisions.



- 5.** Get one scoop (approximately 1/4 cup) from each partition.



- 6.** Repeat procedures 3, 4, and 5 until you get a laboratory sample of approximately 1 kg.



- 7.** Submit for laboratory analysis.



The moisture content of the corn grits shall be determined using verified and properly adjusted moisture meters.



## 8.1 Packaging

Corn grits shall be directly packed in food-grade polyethylene bag. Corn grits shall be properly packed in 1, 2, 5, 10, or 25 kg packing size. To facilitate handling and transport, the individual packs could be placed inside clean polypropylene sack or any appropriate container to protect them from spillage and contamination.

## 8.2 Labeling

Each container shall have a label or legible characters grouped on the same side, stamped in indelible ink to provide the following:

1. Name and type of product;
2. Grade and grits size;
3. Net weight in kilograms;
4. Name and address of miller, packer, or distributor;
5. Date of milling;
6. Moisture content;
7. Lot no.; and
8. Batch no.



Sample packaging for corn grits

### Additional note:

For corn grits intended as feed ingredient, additional labeling information is required per Section 5 of the Bureau of Animal Industry (BAI) Administrative Order No. 12 Series of 2007 – the Revised Implementing Rules and Regulations on the Registration of Feed Establishments and Feed Products.

The label may also have the following optional information:

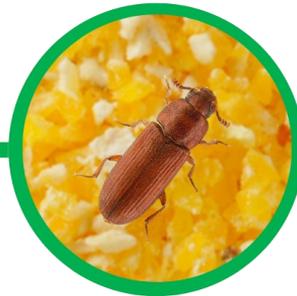
1. Storability depending on packaging material (e.g. best before date)
2. Nutrition information (e.g. protein, fat, carbohydrates, minerals, vitamins, dietary fiber)
3. Functionality (e.g. antioxidant capacity, glycemic index)
4. Cooking procedure



Sample small packaging for corn grits

**Aflatoxin**

Corn grits shall not contain more than 20 µg/kg or parts per billion (ppb) aflatoxin.

**Live insects**

Corn grits shall be free of any live stored grain pest.

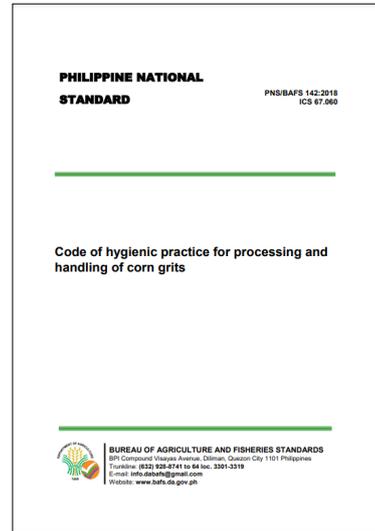
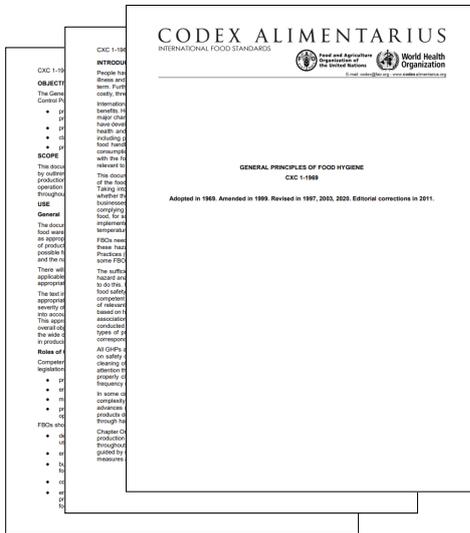
**Pesticide residues**

Corn grits shall comply with those maximum residue limits established by the Codex Alimentarius Commission for this commodity.

**Heavy metals**

Corn grits shall comply with those maximum levels for heavy metals established by the Codex Alimentarius Commission and PNS General Standard for Contaminants and Toxins in Food and Feed (PNS/BAFS 194) for this commodity.

It is recommended that the provisions of this Standard for Corn be implemented in accordance with appropriate sections of the Recommended International Code of Practice General Principles of Food Hygiene (CAC/RCP 1-1969, Rev. 4 - 2003) and other relevant Codex texts such as Codes of Hygiene practice and Codes of Practice.



## DOCUMENT REFERENCES

Bureau of Agriculture and Fisheries Standards. (2018). PNS/BAFPS 15:2018 – Corn (maize) grits – Grading and classification

Bureau of Animal Industry. (2007). Administrative Order No. 12 Series of 2007 – the Revised Implementing Rules and Regulations on the Registration of Feed Establishments and Feed Products

## PHOTO REFERENCES

### **Page 9 (Left to right)**

Rocafort, R. (n.d.). *Untitled image of air oven* [Photograph].

Canva. (n.d.) *Untitled edited image of woman smelling corn grits* [Edited photograph].

### **Page 10 (Left to right)**

Wilson, R. (2022). *Untitled image of pink grits* [Photograph]. The Kitchn. <https://www.thekitchn.com/marsh-hen-mill-unicorn-grits-review-23381403>

Farmview Market. (n.d.). *Farmview Market Stone Ground Grits* [Photograph]. Farmview Market. <https://www.farmviewmarket.com/products/farmview-market-stone-ground-grits>

### **Page 14**

Rocafort, R. (n.d.). *Untitled edited image of air oven* [Edited photograph].

Canva. (n.d.). *Untitled edited image of woman smelling corn grains* [Edited photograph].

### **Page 17 (Top to bottom; left to right)**

Goergen, G. (n.d.). *The red flour beetle, Tribolium castaneum* [Edited photograph]. BioNET-EAFRINET. [https://keys.lucidcentral.org/keys/v3/eafrinet/maize\\_pests/key/maize\\_pests/Media/Html/Tribolium\\_castaneum\\_%28Herbst\\_1797%29\\_-\\_Red\\_Flour\\_Beetle.htm](https://keys.lucidcentral.org/keys/v3/eafrinet/maize_pests/key/maize_pests/Media/Html/Tribolium_castaneum_%28Herbst_1797%29_-_Red_Flour_Beetle.htm)

Canva. (n.d.). *Untitled illustration of pesticide sprayer* [Vector image].

Canva. (n.d.). *Untitled image of heavy metal test* [Photograph].

### **Page 18 (Left to right)**

Codex Alimentarius Commission. (2011). *Screenshot images of pages of CXC 1-1969 GENERAL PRINCIPLES OF FOOD HYGIENE* [Screenshot image]. Codex Alimentarius Commission. [https://www.fao.org/fao-who-codexalimentarius/sh-proxy/en/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252Fstandards%252FCXC%281-1969%252FCXC\\_001e.pdf](https://www.fao.org/fao-who-codexalimentarius/sh-proxy/en/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252Fstandards%252FCXC%281-1969%252FCXC_001e.pdf)

Bureau of Agriculture and Fisheries Standards. (2018). *Screenshot image of cover page of PNS/BAFS 142:2018 Code of hygienic practice for processing and handling of corn grits* [Screenshot image]. Bureau of Agriculture and Fisheries Standards. [https://bafs.da.gov.ph/bafs\\_admin/admin\\_page/pns\\_file/PNS.BAFS.142.2018.COHP%20corn%20grits%20\(1\).pdf](https://bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS.BAFS.142.2018.COHP%20corn%20grits%20(1).pdf)

# Technical Working Group

## Members:

### Former PNS TWG Member



Mr. Rolando B. Gomez



Engr. Arlene Tanseco

### Bureau of Animal Industry (BAI)



Mr. Allen Joseph P. Canta



Ms. Jayce Ann V. Bocala

### Bureau of Plant Industry - Crop Research and Production Support Division (BPI-CRPSD)



Mr. Noli P. Garcia

### BPI - National Seed Quality Control Services (NSQCS)



Ms. Elalin T. Torio

### Department of Agriculture - Food Development Center (DA-FDC)



Ms. Rachel F. Rocafort

**Department of Science & Technology - Food and Nutrition Institute (DOST-FNRI)**



Ms. Kristine Biona - Nacionales



Ms. Regina G. Rodriguez

**Philippine Center for Postharvest Development and Mechanization**



Ms. Mia V. Dela Cruz



Engr. Donald V. Mateo

**Project Managers:**

**Bureau of Agriculture and Fisheries Standards (DA-BAFS)**



Mr. Jan Vincent DR. Tecson



Engr. Abraham L. Perez III



Ms. Brooklyn S. Flores

An Illustrative Guide (IG) serves as a supplementary Philippine National Standards (PNS) learning material to aid stakeholders to have uniform understanding and interpretation of the PNS for its efficient adoption and implementation.

The development of IG for PNS/BAFPS 15:2018 Corn (maize) grits – Grading and Classification was initiated in 2022 in view of the promotion and adoption of standards. Specifically, this IG for Corn Grits provides supplementary photographs or images pertaining to some provisions of the end-product quality standard for corn grits.

 [fb.com/da.bafs](https://fb.com/da.bafs)

 [instagram.com/da.bafs](https://instagram.com/da.bafs)

 [www.bafs.da.gov.ph](http://www.bafs.da.gov.ph)

 [bafs@da.gov.ph](mailto:bafs@da.gov.ph)

 (+632) 8928 8756 to 65 local 3301 – 3325