

Foreword

The Philippine National Standard for Corn Silage intends to provide guidance on the composition and quality of Corn Silage as feeds intended for ruminants and other animals. It includes sections on the essential composition and quality parameters, contaminants, hygiene, packaging, labeling and methods of analysis and sampling.

A Technical Working Group (TWG) for the crafting of the standard for corn silage was organized and represented by several agencies of the Department of Agriculture- Agri-Pinoy Corn Program, Bureau of Animal Industry, Bureau of Agricultural Research, Philippine Carabao Center and Philippine Center for Postharvest Development and Mechanization, University of the Philippines Los Baños – Institute of Plant Breeding (UPLB-IPB) and Agricultural Machinery Testing And Evaluation Center (AMTEC), National Corn Competitiveness Board, Ploughshares Incorporated and other sectors.

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

Introduction

According to Philippine Statistics Authority (PSA), the corn-livestock sector accounts for approximately thirteen percent (13.5%) of growth rate for the Gross Value Added (GVA) in Agriculture on the first quarter of 2013. Some 600,000 farm households depend on corn as a major source of livelihood, in addition to transport services, traders, processors and agricultural input suppliers who directly benefit from corn production, processing, marketing and distribution.

Corn silage is popular forage for ruminant animals because it is high in energy and digestibility and is easily adapted to mechanization from the stand-crop to the time of feeding.

Fortunately, corn farmers earn higher from corn silage production. Net income from grain production more or less is doubled the net income for corn silage production. With corn silage, the cost for furrowing, shelling, drying, and hauling is omitted. The labor for harvesting is reduced as well.

The creation of the Philippine National Standard for corn silage is one measure being done to promote corn silage competitiveness and ensure product safety in both domestic and foreign market.

1 Scope and Description

The main purpose of this standard is to provide safe and high quality corn silage intended for ruminants and other animals to promote its competitiveness to local and international trade.

This Standard should be applied to corn plants with intact corn ears harvested 25 mm to 100 mm length from the ground with 60% to 70% moisture content (MC) wet basis and approximately has 2/3 of the milk line or has reached the soft dough stage.

2 References

The publications referred to in this standard are listed on the inside back cover.

3 Definition

For the purpose of this standard, the following definitions should apply:

3.1 aflatoxin

group of toxic compounds which are carcinogenic (cancer causing), produced by strains of the fungi, *Aspergillus flavus* and *Aspergillus parasiticus* on suitable substrates such as corn, peanut, copra, cassava and other oilseeds.

3.2 anaerobic fermentation

natural chemical changes brought about by enzymes produced by various microorganisms in the absence of air.

3.3 corn silage

processed feedstuff for ruminants and other animals produced by anaerobic fermentation of corn plant as described in section 1.

3.4 feedstuff

any single or multiple materials, whether processed, semi-processed or raw, which is intended to be fed directly to food producing animals.

3.5 putrefaction

decomposition of an organic matter by microorganisms that produce a foul smell

3.6 ruminant

any of a group of hoofed mammals that have a 4-compartment stomach and that ruminate or chew a cud. Examples are cattle, carabao, buffalo, goat, sheep and deer.

Corn Silage

4 Essential Composition and Quality Parameters

4.1 The corn silage should conform to the required quality parameters:

4.1.1 Moisture content

The required moisture content of corn, chopped for silage should range from 60% to 70% wet basis.

4.1.2 pH

The pH of corn silage should range from 3.5 to 4.7.

4.1.3 Processing Time

The processing time of harvested corn plant should be within 24 hours to avoid putrefaction.

4.2 Other physical quality parameters:

Table 1 - Quality Standard of Corn Silage

Quality	Grain Content (% wet basis) from Philippine Practice	Color	Odor	Cut Size
Highly Acceptable	20 and above	Green	<ul style="list-style-type: none"> Mild, pleasant pickle aroma with no indication of putrefaction 	Small (10 mm and below) and uniformly cut
Acceptable	12 to 19	Yellow to light brown	<ul style="list-style-type: none"> Fruity, yeasty, musty, indicating poor fermentation. Slight burnt sugar odor. Sharp vinegar odor 	Silage uniform with longer cut size (11mm - 50 mm), but slightly stringy with some large pieces of shucks, cobs, and stalks
Not Acceptable	Below 12	White, gray, dark brown or black due to mold	<ul style="list-style-type: none"> Strong burnt odor indicating excessive heating. Putrid, indicating improper fermentation. A very musty odor indicating excessive mold which is readily visible throughout the silage. 	Silage largely stringy, puffy with variable sized pieces (longer than 50 mm)

4.3 Additional Quality Parameters are set at Annex A of the standard

5 Contaminants

5.1 Aflatoxin
The maximum allowable level should be 50ppb.

5.2 Microorganisms
Harmful microorganisms that thrive under aerobic condition.

6 Hygiene

6.1 It is recommended that the produce covered by the provisions of this standard should be prepared and handled in accordance with Code of Practice on Good Animal Feeding(CAC/RCP 54-2004) specifically Section 5.4 (Annex B).

7 Packaging

7.1 Corn silage should be properly packed in an airtight container that will ensure anaerobic condition (e.g. high density polyethylene (HDPE) bag with thickness of at least 0.002 mm, plastic barrels or drums).

8 Labeling

8.1 The product covered by this Standard should conform to the description given in section 1.

Corn silage should be directly bagged and properly labeled with the following minimum information:

- 8.1.1 Name of the product;
- 8.1.2 Name and Address of Trader/Processor/Packer;
- 8.1.3 Net Weight in kilogram; and
- 8.1.4 Date of Production and/or Batch Code.

8.2 Additional information may also be indicated:

- 8.2.1 Advice/s on proper handling
- 8.2.2 Logo of the processor/company
- 8.2.3 Nutritional composition

9 Methods of Sampling and Analysis

9.1 The grain content of the entire feedstuff should be determined using percent by weight analysis wet basis.

9.2 For claims regarding nutrient composition, the sampling and analytical procedure should conform to the Volume 13 Codex Alimentarius Methods of Analysis and

Sampling by Codex Alimentarius Commission/ PNS/ISO 874 and Cereals and Cereal products – Sampling ISO 24333:2009.

References:

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ANNEX A
(Informative)
Additional Quality Parameters

Table 1- Nitrate concentrations and feeding instructions¹

Corn silage should conform to the nitrate concentration as specified below.

Nitrate (NO₃) in dry matter (ppm)	Nitrate nitrogen (NO₃-N) in dry matter (ppm)	Potassium Nitrate (KNO₃) in dry matter (ppm)	Feeding instructions
0 – 4000	0 – 1000	0- 7200	Safe to feed.
4400 -6600	1000 – 1500	7200 - 10800	Safe to non-pregnant animals. Limit to 50% of total dry ration for pregnant animals.
6600 – 8800	1500 – 2000	10800 – 14400	Limit to 50% of total dry ration Avoid feeding pregnant animals.
		14400 – 25200	Limit to 33% of total dry ration.
8800 – 17600	2000 – 4000	25200 – 28800	Limit to 25% of total dry ration.
> 17600	> 4000	> 28800	Toxic. Do not feed to animals.

¹Lee, C., Herbek, J., Lacefield, G., and Smith, R. (2005). Producing Corn for Silage. Department of Plant and Soil Sciences. College of Agriculture, University of Kentucky.

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