



Dry Whole Milk (DWM) Standard

Product Definition

Dry Whole Milk (DWM) usually is obtained by the removal of water from pasteurized milk, which also may have been homogenized. Alternatively, Dry Whole Milk may be obtained by blending fluid, condensed, or nonfat dry milk with liquid or dry cream, or with fluid, condensed, or dry milk; provided that the resulting Dry Whole Milk is equivalent in composition. Dry Whole Milk contains not less than 26% but not more than 40% milkfat (by weight) on an “as is” basis and not more than 5% moisture (by weight) on a milk solids-non-fat (SNF) basis. The primary Dry Whole Milk products are those having 26.0% and 28.5% milkfat. Optionally, Dry Whole Milk may be fortified with either vitamins A or D, or both.

Dry Whole Milk complies with all provisions of the U.S. Federal Food, Drug, and Cosmetic Act.

See the separate ADPI standard for [Instant Dry Whole Milk \(iDWM\)](#) for product that has been produced in such a way as to improve its dispersion and reconstitution properties.

Composition of Extra Grade Dry Whole Milk

Extra Grade is so designated to indicate the highest quality of Dry Whole Milk. In addition to meeting the established USDA General Grading Requirements, it shall meet the following specifications:

Parameter	Units of Measure	Spray Dried	Atmospheric Roller Dried
		Limits	Limits
Fat	% (w/w)	26.0 – 40.0	
Total moisture	% (w/w, SNF basis)	4.5 maximum	
Scorched particles ¹	mg/25g	15.0 maximum	22.5 maximum
Titrateable acidity ¹	%	0.15 maximum	
Solubility index ¹	mL	1.0 maximum	15.0 maximum

1 - Scorched particles, titrateable acidity, and solubility index requirements ordinarily appear in ADPI Standards in the section defining Other Characteristics, but they are included here because they are integral to the established USDA requirements for Extra Grade.

Other Characteristics of Extra Grade Dry Whole Milk

Physico-chemical Properties			
Parameter	Units of Measure	Spray Dried	Atmospheric Roller Dried
		Limits	Limits
Color and appearance	visual	white or light cream; free from lumps that do not break up under slight pressure; practically free from visible dark particles; free from graininess when reliquefied	
Flavor	sensory	sweet, pleasing and desirable; may possess a slight feed flavor and a definite cooked flavor; free from undesirable flavors	

Microbiological Analysis			
Parameter	Units of Measure	Spray Dried	Atmospheric Roller Dried
		Limits	Limits
Standard plate count	CFU/g	10,000 maximum	
Coliforms	CFU/g	10 maximum	

Composition of Standard Grade Dry Whole Milk

Standard Grade includes Dry Whole Milk that fails in one or more particulars to meet the requirements of Extra Grade, but which meets the following specifications:

Parameter	Units of Measure	Spray Dried	Atmospheric Roller Dried
		Limits	Limits
Fat	% (w/w)	26.0 – 40.0	
Total moisture	% (w/w, SNF basis)	5.0 maximum	
Scorched particles ²	mg/25g	22.5 maximum	32.5 maximum
Titrateable acidity ²	%	0.17 maximum	
Solubility index ²	mL	1.5 maximum	15.0 maximum

2 - Scorched particles, titrateable acidity, and solubility index requirements ordinarily appear in ADPI Standards in the section defining Other Characteristics, but they are included here because they are integral to the established USDA requirements for Standard Grade.

Other Characteristics of Standard Grade Dry Whole Milk

Physico-chemical Properties			
Parameter	Units of Measure	Spray Dried	Atmospheric Roller Dried
		Limits	Limits
Color and appearance	visual	white or light cream, but may possess a slight unnatural color; free from lumps that do not break up under moderate pressure; reasonably free from visible dark particles; reasonably free from graininess when reliquefied	
Flavor	sensory	sweet and pleasing; may possess bitter, oxidized, scorched, stale and storage flavors to a slight degree; and feed and cooked flavors to a definite degree; free from undesirable flavors	

Microbiological Analysis			
Parameter	Units of Measure	Spray Dried	Atmospheric Roller Dried
		Limits	Limits
Standard plate count	CFU/g	50,000 maximum	
Coliforms	CFU/g	10 maximum	

Optional Tests for Dry Whole Milk

Other tests which may be made on any Dry Whole Milk (not mandatory for grade designation, but, if determined, must comply with the limits as indicated) are:

Parameter	Units of Measure	Spray Dried	Atmospheric Roller Dried
		Limits	Limits
Direct microscopic clump (DMC) count	count/g	100 million maximum	
Oxygen content (for gas packed product)	%	3 maximum	
Protein	%	for information	
Copper (Cu) ³	ppm	1.5 maximum	
Iron (Fe) ³	ppm	1.0 maximum	

3 - Not relevant when oxygen content meets the defined requirement.

When tested, oxygen content will be shown on the grading certificates as follows:

- Not more than 2% oxygen; or
- Not more than 3% oxygen; or
- Oxygen content ____%

When tested, protein content will be shown on the grading certificates as follows:

- Protein content ____%

When it is determined that Dry Whole Milk:

- 1) fails to meet the requirements of Standard Grade⁴;
- 2) fails to meet the requirements of the Optional Test, when such test has been made⁴; or
- 3) has been produced in a plant that is rated ineligible for USDA grading service or is not USDA approved;

then it shall not be assigned a grade.

4 - When tested in accordance with the standardized methods of analysis contained herein

Additional ADPI Specifications

ADPI imposes the following additional requirements on Dry Whole Milk:

Microbiological Analysis			
Parameter	Units of Measure	Spray Dried	Atmospheric Roller Dried
		Limits	Limits
Yeast and mold	CFU/g	100 maximum	
<i>Enterobacteriaceae</i> ⁵	CFU/g	10 maximum	
<i>Salmonella</i> genus	CFU/sample ⁶	not detected	
<i>Staphylococcus</i> (coagulase positive)	CFU/g	not detected ⁷	
<i>Listeria</i> genus	CFU/g	not detected	

5 - The food industry is trending toward *Enterobacteriaceae* ("EB") as the most commonly used category of indicator organisms for gauging general process sanitation. For compliance with this Standard, coliforms shall be utilized for compliance with the USDA Grade requirements, while EB may be used at the discretion of the manufacturer.

6 - Typical minimum sample size for *Salmonella* testing is 25 g, but the exact sample size and methodology is left to the discretion of the manufacturer.

7 - Where the effective limit of quantitation for the test is 10 CFU/g (such as when a dilution factor of 10 is applied) then the test result must be not detected in order to comply with this Standard. Where the testing method is capable of quantifying microbial counts below 10 CFU/g, then a compliant result must be a value less than 10 CFU/g.

Permissible Additives

Dry Whole Milk may be fortified with vitamin A and/or vitamin D, provided that each quart of the resulting fluid milk, reconstituted in accordance with the label directions, conforms to the following fortified content requirements, as appropriate:

Parameter	Units of Measure	Content
Vitamin A	IU	2000
Vitamin D	IU	400

Methods of Analysis

Parameter	Reference Method
Fat	AOAC 989.05
Total moisture	AOAC 925.45
Scorched particles	ADPI
Titrateable acidity	AOAC 947.05
Standard plate count	SMEDP
Coliforms	SMEDP
Direct microscopic clump (DMC) count	SMEDP
Oxygen	AOAC
Protein	AOAC
Copper (Cu)	AOAC
Iron (Fe)	AOAC
Yeast and mold	FDA BAM
<i>Enterobacteriaceae</i>	FDA BAM
<i>Salmonella</i>	AOAC
<i>Staphylococcus</i>	AOAC
<i>Listeria</i>	FDA BAM

Revision History

This Standard is a legacy document and has been assigned prior version numbers on an *ex post facto* basis, according to its documented history of modifications, in order to comply with our new document control features and format. Full revision history is on file at ADPI and is available for query via info@adpi.org or by directly contacting the Vice President of Technical Services.

Current version details:

Version	Effective Date	Notes
3.0	07/07/2023	Migrated this Standard to the new modernized format as authorized by the ADPI Standards Committee. No previously established test parameters or limits were materially altered by this update. A reference to related ingredient standard Instant Dry Whole Milk was added to the Product Definition section. Footnotes added in multiple sections, explaining: positioning of the scorched particles out of order as established by the new modernized format; optional nature of EB testing; sample size discretion for <i>Salmonella</i> testing; and the restatement of the limit for coagulase positive <i>Staphylococcus</i> . Included mention of oxygen less than 2% as a possible outcome of testing that could be reported on grading certificates. Added protein, copper, and iron as optional tests which were not carried over from the established USDA standard. Added test method references for all parameters not already covered in version 2.0.