**Fortification of Fluid Milk Products Under Federal Orders and the Component Standards for Products Marketed in the State of California: January 2019**

This article provides an overview of how fortification of fluid milk products is addressed within the Federal milk marketing order system in relation to the solids standards established by the State of California. The analysis is divided into three parts. The first part describes what fortification was needed to meet State standards in January 2019. The second part details how the Federal order treated the fortification in handler obligations. The third part relates to the component characteristics of milk supplies and the Federal order pool.

**Part I: Fortification Needed to Meet California State Standards**

The State of California has minimum component standards that apply to fluid milk products sold in California. These standards are higher than Federal standards for certain products/components. California's basic standards are as follows:

| California State Standards * | | |
|---|---|---|
| Product | Butterfat | Solids-Not-Fat |
| Whole Milk | 3.5% | 8.7% |
| Reduced Fat (2%) | 2% | 10% |
| Lowfat (1%) | 1% | 11% |
| Nonfat (Skim) | 0.2% | 9% |

* https://www.cdfa.ca.gov/ahfss/Milk_and_Dairy_Food_Safety/Milk_Standards.html.

The degree to which a handler may need to fortify fluid milk products sold in California depends on the component composition of its milk supply, which can include milk from farms and/or by bulk transfer from another plant. Since the component test of milk follows a seasonal pattern, reaching a peak in the winter and decreasing to a low in the summer, the degree to which fluid milk products need fortification can change during the year. There are multiple ways a handler can achieve the State's solids standards. A plant can:

- purchase milk from farms or other plants whose milk component tests are above the State standards;
- condense a portion of incoming milk supplies and mix it with unmodified skim milk;
- purchase condensed skim from another plant; and /or
- purchase nonfat dry milk (NFDM), reconstitute it, and combine it with incoming milk supplies.

There are different costs associated with these four ways of achieving the higher standards that are proprietary to each plant's operation. There are examples of the latter three methods in the pool data for the first several months of the California Federal Milk Marketing Order. Some plants use multiple methods. To help the industry understand how the Federal order functions in relation to the California State standards, a summary of certain pool data is shown below.

In January 2019, 2.0 billion pounds of producer milk was pooled on the order, testing 4.00% butterfat, 3.29% true protein, 5.74% other solids, and 9.03% solids-not-fat (SNF). [1] As a reminder, solids-not-fat equals true protein plus other solids. If every load of producer milk tested the same, pool distributing plants would have needed to adjust/fortify their milk supplies to meet California State standards as

[1] See Uniform Price Announcement for **January 2019.**

shown in the following table. Note that only Reduced Fat (2%) and Low fat (1%) milk products need fortification in the following hypothetical, sample calculations.

**Sample Calculations**

| Fluid Milk Product | State SNF Standard | SNF Test, All Producer Milk 1/ | Fortification Needed (Percentage Points) |
|---|---|---|---|
| Whole Milk (3.5%) | 8.7% | 9.08% | None |
| Reduced Fat (2%) | 10% | 9.22% | +0.78 |
| Lowfat (1%) | 11% | 9.31% | +1.69 |
| Nonfat (Skim) | >9% | 9.41% | None |

1/ Producer milk tests are adjusted for butterfat by the formula: ((SNF%/(1-BF%)) x (1-target BF%)).
Example, for Whole Milk: ((0.0903 / (1-0.04)) x (1-0.035)) = 9.08%.

In January 2019, producer milk component tests at California pool distributing plants tested less than the market average tests of all producer milk. The 23 pool distributing plants received 624.3 million pounds of producer milk, testing 3.86% butterfat, 3.21% protein, 5.75% other solids, and 8.95% SNF.

The following tables categorize the market's 23 fully regulated distributing plants by size-range of producer milk receipts and by location adjustment zone. The component composition of bulk milk and concentrated milk transfers are not considered in this analysis as it would add complexity to this basic analysis. The figures shown in the right hand four columns of the two tables represent percentage point increases in tests needed to meet California State standards. As was the case using the component test of all producer milk, no distributing plant needed to fortify Whole or Skim milk products to meet State standards. Because producer milk at pool distributing plants tested less than all producer milk, pool distributing plants needed to fortify fluid milk products more to meet State standards for 2% and 1% than the sample calculations above suggest. One final observation is that there does not appear to be substantive differences between pool distributing plants with respect to the component composition of their milk supplies.

**Fortification Needed by Size-Range of Pool Distributing Plant Producer Milk Receipts: January 2019**

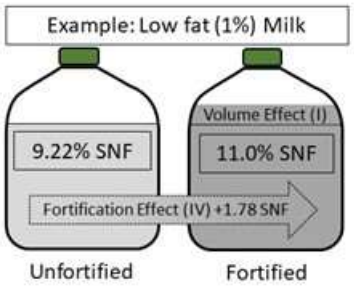
| Producer Milk Receipts (# plants) | % of Market (Lbs) | 3.5% | 2% | 1% | Skim |
|---|---|---|---|---|---|
| <10.0 million (6) | 4% | None | +0.88 | +1.79 | None |
| ≥10.0 to <20.0 million (7) | 16% | None | +0.89 | +1.80 | None |
| ≥20.0 to <30.0 million (3) | 13% | None | +0.93 | +1.83 | None |
| ≥30.0 million (7) | 67% | None | +0.86 | +1.77 | None |
| Market (23) | 100% | None | +0.87 | +1.78 | None |
| All Pool Distributing Plants | Minimum | None | +0.79 | +1.70 | None |
| | Maximum | None | +0.96 | +1.87 | None |

**Fortification Needed by Location Adjustment Zone of Pool Distributing Plant: January 2019**

| Loc. Adj. Zone (# plants) | % of Market (Lbs) | 3.5% | 2% | 1% | Skim |
|---|---|---|---|---|---|
| $2.10 to $2.00 * (11) | 46% | None | +0.86 | +1.77 | None |
| $1.80 (5) | 21% | None | +0.90 | +1.81 | None |
| $1.70 to $1.60 * (7) | 33% | None | +0.87 | +1.78 | None |

* Certain zones were combined to prevent the disclosure of confidential data.

**Part II: The Milk Math of Fortification**




The treatment of condensed and NFDM used to fortify Class I fluid milk products under Federal orders has two parts. The first part is the volume effect, i.e., the displacement or volume increase resulting from the addition of a fortifying agent to a quantity of milk. This portion is valued as Class I in the pool. The second part is the fortification effect, the resulting increase in nonfat solids test of adding extra nonfat solids to milk. This latter portion is valued as Class IV in the pool. These effects represent the two parts of the skim equivalent factor that is used to properly account for the receipt and utilization dairy products used in fortification such as condensed milk and NFDM.[2] All Federal orders treat fortification in the same way.

Fortification is accomplished by using either condensed milk or NFDM, which each have unique factors to determine their skim equivalent. For condensed milk, different factors are used depending on the nonfat solids test of the product. Condensed milk testing 33.5% SNF has a volume factor of 0.904 and a fortification factor of 2.709 (0.904 + 2.709 = 3.613 skim equivalent). These factors reflect the fact that about two-thirds of the water has been removed in the condensing process, and 1,000 pounds of condensed milk used for fortification (3,613 pounds skim equivalent) is associated with a 904-pound increase in Class I volume and a 2,709-pound Class IV utilization. NFDM has similar factors but reflect that nearly all the water has been removed in the drying process. For nonfat dry milk, the volume factor is 0.65 and the fortification factor is 9.89 (0.65 + 9.89 = 10.54 skim equivalent). It is worth emphasizing that the volume factor for condensed is larger than for nonfat dry milk because there is more water in condensed milk that is being sold as Class I in addition to the displacement effect of the nonfat solids in condensed skim milk.

The factors for condensed and NFDM are used to apportion the dairy product used for fortification between Class I (fluid use) and Class IV (manufacturing use). The receipt is described using the total skim equivalent factor. Part of the utilization is described using the fortification factor which is assigned to Class IV. The volume effect is implicit in Class I utilization, i.e., the number of gallons produced is multiplied by a weight per gallon to calculate the pounds of milk. Combining the Class I valuation of the volume effect and the Class IV valuation of the fortification effect results in a value of condensed/NFDM used to fortify. For those plants that condense milk internally, the fortification effect portion is similarly assigned to and valued at Class IV, while the volume effect portion is valued as Class I.

Described above are implicit (pool) values that can be translated into values per gallon. The treatment of fortification is effectively built into the Federal order pricing and accounting system. In addition, all handlers are held to the same standards as defined in the order language and administratively. A video illustrating similar information can be found on the FO 51 website under Critical Order Information: Module - Fortification. A fortification calculator is also available: Sample Fortification Calculation.

There are other aspects of the cost of meeting the State of California's fortification standards. Other costs associated with fortification exist, but these are outside the Federal order pool and pricing

[2] The concept of skim equivalent is necessary because the fortifying agents of NFDM and condensed are modified milk products, i.e., water is removed. Such products must be converted to the same form as a handler's other milk records. A skim equivalent reflects the original amount of skim milk needed to make a specific quantity of fortifying agent.

structures. These other costs include premiums, transportation, labor, equipment, logistics, etc., and are unique to how each handler chooses to meet the State's fortification standards.

**Part III: Component Characteristics of a Milk Supply and the Pool**

The last aspect of the fortification relates to the pool and each handler's obligation. Since the California Order (FO 51) is a component order and producer prices reflect butterfat, protein and other solids values, a handler's obligation to the pool takes into consideration the component composition of the handler's producer milk supply. Generally, a handler's obligation to the pool is comprised of the classified value of their producer milk receipts, less the Class III component value and the value of the Producer Price Differential, i.e., the minimum value they must pay for their producer milk supplies. A handler's Class I producer milk uses are priced on a butterfat and skim basis, while Class II/III/IV uses of producer milk are priced on a component basis. Thus, a pool distributing plant handler whose producer milk supply may test higher in SNF, relative to another, similarly situated handler, will pay less into the pool and more to their milk supplier. Conversely, a pool distributing plant handler whose producer milk supply may test lower in SNF, relative to another, similarly situated handler, will pay more into the pool and less to their milk supplier. If each handler at the same location adjustment has the same number of skim and butterfat pounds in their Class I milk, their overall Class I obligation to the pool will be the same, but their settlement to the pool will differ by the composition of their respective milk supplies. In effect, the difference between the two similarly situated bottlers will be the economics of how they choose to fortify their products to the California State standards.