UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Marketing Service
Dairy Programs

FEDERAL MILK ORDERS 124 & 131

1930-220th Street SE, Ste. 102
Bothell, WA 98021
Phone: (425) 487-6009
Fax: (425) 487-2775
Email: fmmaseattle@fmmaseattle.com

4835 E. Cactus Road, Ste. 440
Scottsdale, AZ 85254
Phone: (602) 547-2909
Fax: (602) 547-2906

THE CONTRIBUTION OF COMPONENT TESTS AND FEDERAL ORDER MINIMUM PRODUCER COMPONENT PRICES TO PRODUCER MILK COMPONENT VALUES: 2000-2020

PACIFIC NORTHWEST ORDER

Staff Paper 21-01

John Mykrantz

March 2021

THE CONTRIBUTION OF COMPONENT TESTS AND FEDERAL ORDER MINIMUM PRODUCER COMPONENT PRICES TO PRODUCER MILK COMPONENT VALUES: 2000-2020

PACIFIC NORTHWEST ORDER

John Mykrantz

Background

The Pacific Northwest Order uses component pricing to set basic minimum prices for producers whose milk is pooled on the order each month.[1] A form of component pricing has been used for the order since the early 1990's when the idea of component pricing was introduced in the region. Between the early 1990's and 2000, the form of component pricing used evolved to its present form of pricing butterfat, true protein and other solids. And while the basic form of component pricing has stayed the same since 2000, the underlying component pricing formulas have been updated, with the last update effective October 2008. However, the formulas are only part of the equation that defines a minimum basic value for milk under the order. The other part of the equation is the component character of milk being pooled, i.e., the butterfat, protein, and other solids content. Combined, the Federal order component pricing formulas and the character of milk define a majority of the basic value of milk under the order.

Component Tests of Producer Milk

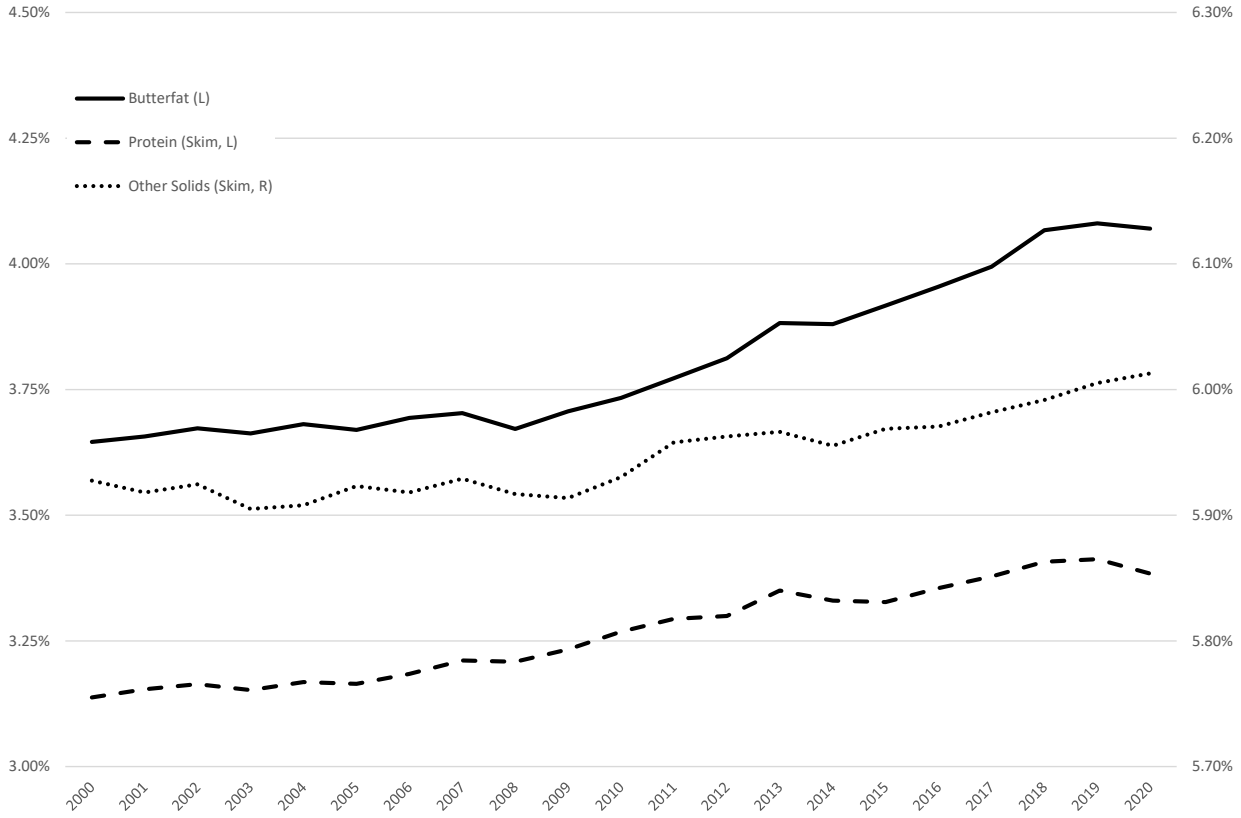
Historically, the component character of milk in the Pacific Northwest has remained fairly stable. Even after the introduction of component pricing in the early 1990's, component tests of milk did not change substantively. However, about 2008 or so, the component character of producer milk began to show a noticeable upward trend, particularly for butterfat. While the reason for the change in trend is not readily knowable, it may well be a function of breeding and feeding practices of the region's dairy farmers in response to how milk is priced under the order and the character of dairy commodity markets for butter, cheese, and whey which drive the Federal order prices for butterfat, protein and other solids.

For the period 2000 through 2020, component tests of producer milk pooled on the Pacific Northwest have increased (See Figure 1). Annual average butterfat tests have increased by 0.42 percentage points or 11 percent. Protein skim tests have increased by 0.25 percentage points or 8 percent. Other Solids skim tests have increase by 0.09 percentage points or 1 percent. As previously stated, these increases occurred more so after 2008 than before. As can be deduced from published Federal order data, these increases represent a low estimate of changes in the Pacific Northwest region as milk depooled for reasons of price is characterized by relatively high component tests.

[1] The producer price differential (PPD) is also a part of a producer's minimum order value but it is not dealt with in this article. The PPD represents an accounting reconciliation between the total Federal order value of producer milk and its Class III component value. The level of the PPD is influenced primarily by relative prices and utilization, and, to a lesser degree, the protein and other solids test of producer milk. Protein and other solids tests above Federal order price formula assumptions decrease the PPD. Since 2000, on average, the PPD has represented about two percent of the Federal order value of producer milk on the Pacific Northwest Order, or about $0.25 per cwt.

The experience of the Pacific Northwest is not unique with respect to increases in component tests. Generally, producer milk under most of the Federal orders have shown similar trends albeit to a lesser degree and lagged slightly.

Figure 1: Butterfat, Protein and Other Solids Tests
Pacific Northwest Order: 2000-2020



FO Component Prices

Federal order component prices are driven by what are commonly called product price formulas that relate a storable dairy commodity with the associated milk components that affect product yield. Each formula is simply the price of a dairy commodity minus a make-allowance, multiplied by an equivalency between the component content of a dairy product relative to the component content of milk. Sometimes, this equivalency is referred to as a yield factor.

The product price formula for the Federal order protein price is somewhat more complicated as two components (butterfat and protein) drive the yield of cheese. The product price formula for protein is based on a rewritten form of the Van Slyke cheese yield formula, to calculate the contribution of both protein and butterfat, separately.[2] To accommodate only one butterfat price for manufacturers of both cheese (Class III) and butter/nonfat dry milk (Class IV), an adjustment is made to back out the value of butterfat from the value of cheese to arrive at a value of protein. A result of having one butterfat price for Class III and IV is that the value of protein is a residual. The value of protein is therefore a function of the price of butter and the price relationship

[2] The Van Slyke cheese yield formula, as used by Federal orders, provides a defined linkage between the component character of standard milk and its value in cheese. The relationship between the Van Slyke cheese yield formula and the Federal order protein price formula is based on simple algebra.

between butter and cheese. Under current Federal order formulas, when the price of butter increases one cent relative to the cheese price, the protein price decreases by 1.3 cents; when the price of cheese increases one cent relative to the butter price, the protein price increases 3.2 cents. [3] These relationships influence what portion of component value, butterfat or protein, a producer experiences in Federal order minimum producer component pay prices and, by extension, their mailbox price.

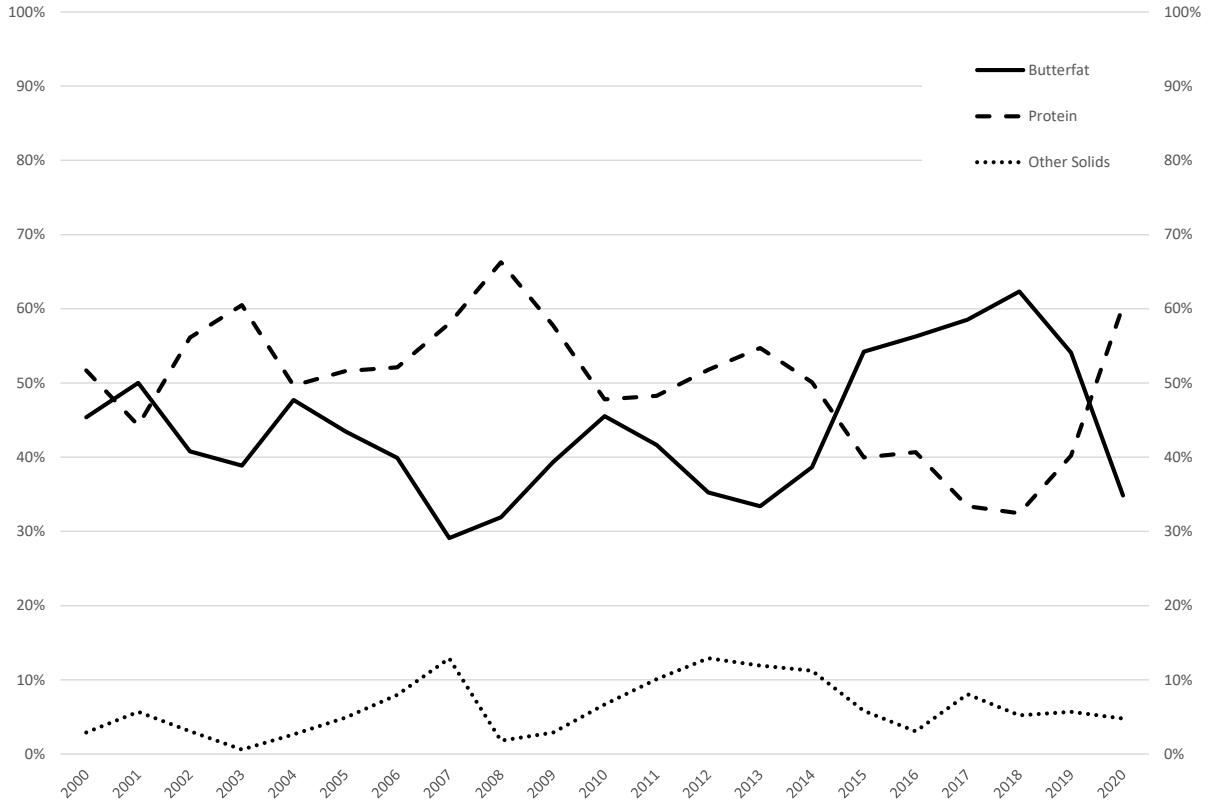
Interaction of Component Tests and FO Component Prices

Over time, the relationship between butterfat and protein prices and their relative value in producer milk appears to fluctuate and reflect a somewhat cyclical pattern. From 2000 through 2020, the relationship between Federal order values of butterfat and protein have fluctuated (See Figure 2). On an annual basis, the contribution of each appears to have followed multi-year trends which generally mirror each other. This mirroring reflects how protein prices are a function of butterfat prices. With the exception of 2001, the value of protein exceeded the value of butterfat until the middle of 2014. In late 2015, the value of butterfat began to consistently exceed the value protein. During the intervening years, however, the two components' values converged in 2004, 2010, and, as noted, mid-2014 through late 2015. By late 2015, butterfat began to exceed the value of protein with the associated divergence reaching a maximum in 2018. In 2019, butter and protein values began to converge, and for 2020, protein values have again exceeded butterfat values. The proportion that other solids represents of the total component value does not appear to display a defined pattern other than being less than 10 percent in five of the twenty years. Since 2000, the protein price has contributed 49 percent of the component value of milk while the butterfat price has contributed 44 percent. The other solids price has contributed the remaining seven percent.

While the preceding suggests protein has more value than butterfat, looking at the weighted average of each component's price multiplied by the change in tests between 2000 and 2020 shows that butterfat ($0.79=$1.87 x 0.42 percentage points) has made a greater incremental contribution of value on average than protein ($0.63=$2.55 x 0.25 percentage points) over the period.

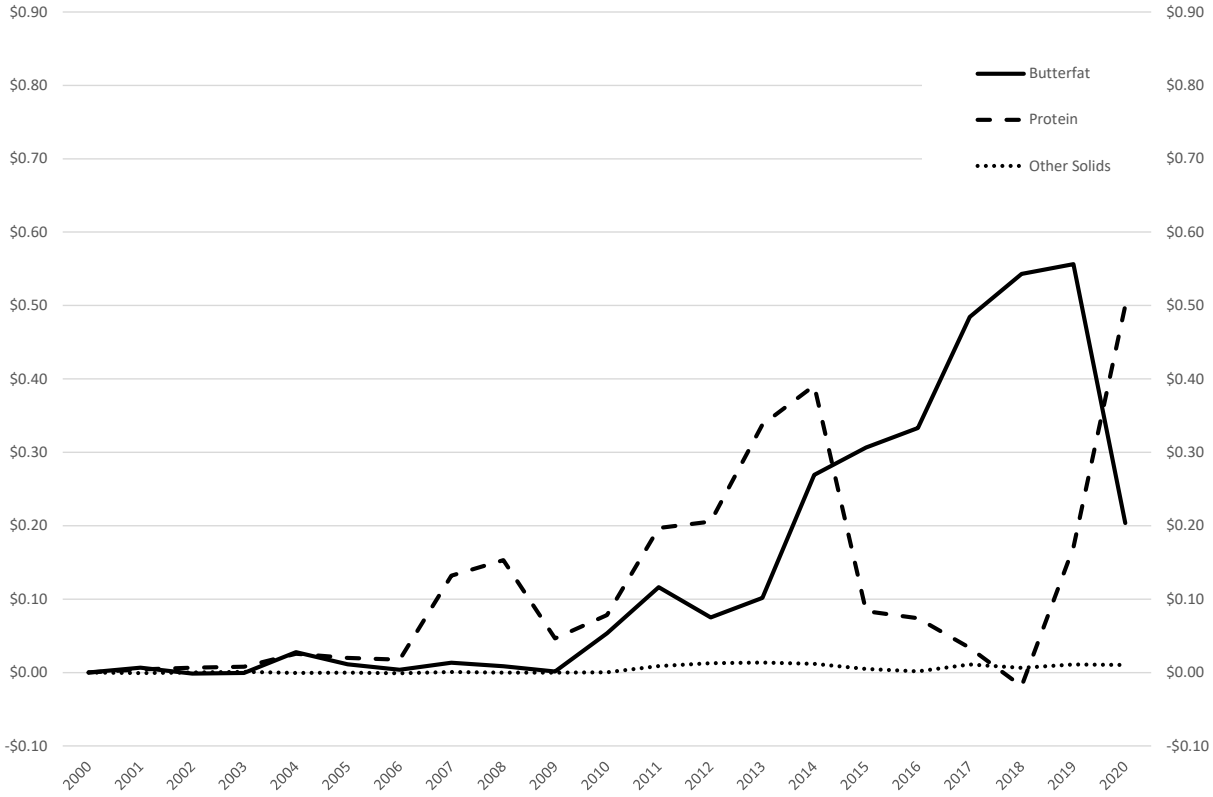
[3] These relationships reflect Federal order component price formulas that became effective in October 2008.

Figure 2: Contribution to Producer FO Component Value
Pacific Northwest Order: 2000-2020



Another way to look at how component test changes affect component values is to multiply the change in price by the change in tests relative to their levels in 2000. This calculation shows how the incremental value of these changes trend over time (See Figure 3 on page 5). The increase in contribution of protein to the total component value appears to have begun in 2006, while butterfat began in 2009. From 2006 through 2014, protein contributed more than butterfat on a per hundredweight basis. Beginning in the latter half of 2015, butterfat's contribution began to exceed protein's, and reached a peak in 2018. As previously mentioned, high butter prices relative to cheese prices drive the contribution of protein down. Since 2019, butterfat's contribution has been on a downward trend. In 2020, butterfat contributed less than protein. In 2020, as a result of increases in component tests, butterfat and protein, combined, added an additional $0.70 per hundredweight to producer milk values on average relative to 2000.

Figure 3: Contribution to Producer FO Component Values, Change in Tests
Pacific Northwest Order: 2000-2020



Conclusion

Federal milk marketing orders provide a window on the character and value of milk in the marketplace through the prices inherent in the system of regulation and the data that is collected from handlers each month and published. Since 2000, the Pacific Northwest Order has incorporated multiple component pricing involving butterfat, true protein, and other solids. Since 2000, the character of milk pooled under the order has seen significant change that in combination with component pricing has affected the value of milk expressed in minimum order prices and, by extension, mailbox prices. Relative to 2000, the milk produced by the producers at present has greater value not only because prices are higher but because milk component tests are higher as well. Butterfat contributed more value than protein for the period 2015-2019, a change from 2000-2014 when protein contributed more value. In late 2019 through 2020, protein has contributed more value than butterfat to minimum order values. If current trends continue into 2021, protein will continue to contribute more to producer milk component values than butterfat.