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**ANALYSIS OF COMPONENT LEVELS IN INDIVIDUAL
HERD MILK AT THE FARM LEVEL**

**PACIFIC NORTHWEST AND
SOUTHWESTERN IDAHO-EASTERN OREGON FEDERAL ORDERS**

1999

Staff Paper 00-01

Chris Werner

November 2000

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Abstract

Component levels in producer milk pooled on the Pacific Northwest and Southwestern Idaho-Eastern Oregon Orders were analyzed for 1999 to determine average levels, regional and seasonal variation, and the statistical relationship between components. Components for the Pacific Northwest Order include butterfat, protein, and other solids. Components for the Southwestern Idaho-Eastern Oregon Order include butterfat and protein. Producer milk pooled was also valued using Federal order minimum producer prices for the respective orders. For 1999, a monthly average total of 1,342 producers were pooled on the Pacific Northwest and Southwestern Idaho-Eastern Oregon Orders. During 1999, these producers delivered 8,828.6 million pounds to the two markets. The milk shed of the two Federal orders covers Washington, Oregon, Idaho, and Northern California.

Major findings of this study include:

1. The 1999 average component levels for the Pacific Northwest Order were 3.66% butterfat, 3.24% protein, and 5.48% other solids. The 1999 average component levels for the Southwestern Idaho-Eastern Oregon Order were 3.63% butterfat and 3.28% protein.
2. In both orders, component levels decrease during the summer months and increase in the late fall and winter.
3. In 1999, component levels for the majority of the producers under the Pacific Northwest Order ranged between 3.41% and 4.13% for butterfat, 3.10% and 3.48% for protein, and 5.38% and 5.56% for other solids. In 1999, component levels for the majority of the producers under the Southwestern Idaho-Eastern Oregon Order ranged between 3.39% and 3.99% for butterfat and 3.13% and 3.47% for protein.
4. Although the volume of producer milk, number of producers, and average milk production per producer varies greatly between areas, there are only small differences in component levels between geographic regions within the milk shed for the two orders.
5. The Pacific Northwest Order's linear regression in 1999 for protein is $PRO\% = 1.76 + 0.404 * BF\%$, with an R-squared of 0.60. The Southwestern Idaho-Eastern Oregon Order's linear regression in 1999 for protein is $PRO\% = 1.86 + 0.390 * BF\%$, with an R-squared of 0.48.
6. The Pacific Northwest Order's regressions for estimating other solids using either butterfat or protein have a very poor correlation (R-squared of less than 0.02).

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1999

Chris Werner ^{1/}

I. INTRODUCTION

This study examines milk component levels in milk pooled on the Pacific Northwest and Southwestern Idaho-Eastern Oregon Orders during 1999. The milk components include butterfat, protein, and other solids. Other solids is not included in any analyses concerning the Southwestern Idaho-Eastern Oregon Orders because it was not used as a basis for pricing milk in 1999 and handlers were not obligated under the order to report information on other solids levels.

Component levels in producer milk pooled on the Pacific Northwest and Southwestern Idaho-Eastern Oregon Orders were analyzed to determine average component levels, regional and seasonal variation, and the statistical relationship between components. Producer milk pooled on both orders in 1999 was valued using Federal order minimum producer prices for the respective orders.

For 1999, a monthly average total of 1,342 producers were pooled on the Pacific Northwest and Southwestern Idaho-Eastern Oregon Orders. During 1999, these producers delivered 8,828.6 million pounds to the two markets.

The Pacific Northwest Order milk shed has producers located in Washington, Western Oregon, Northern Idaho, and Northern California. The Southwestern Idaho-Eastern Oregon Order milk shed has producers located in Southwestern and South Central Idaho and Eastern Oregon. The milk shed of the two orders includes various geographic and climatic regions. These regions range from very dry areas (Central Washington, Southern Idaho, and Eastern Oregon) to very wet climates (western and coastal regions of Oregon and Washington). Geographically, the Cascade Mountain Range, Pacific Ocean, and Columbia River provide a general demarcation that may impact how dairy operations are managed.

II. DATA AND METHODOLOGY

The data included in this study comprises all producer milk pooled on the Pacific Northwest and Southwestern Idaho-Eastern Oregon Orders. The data was collected from producer payrolls submitted

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to the market administrator's office by handlers. Components available for the Pacific Northwest Order were butterfat, protein, and other solids (other solids is nonfat solids less protein). In January 1997, the Pacific Northwest Order did not report protein and other solids. Under the previous pricing system, butterfat and nonfat solids were used in determining prices. Any reference to 1997 annual averages for protein and other solids for the Pacific Northwest Order does not include data for January 1997.

The Southwestern Idaho-Eastern Oregon Order paid producers on butterfat and protein; therefore, other solids data was not available for this analysis. Eligible producer milk and producers **not** pooled were not included in this analysis. Eligible producer milk is Grade A milk production that qualifies to be pooled on the respective order. The exclusion of this milk and these producers was due to the unavailability of the information.

The Pacific Northwest and Southwestern Idaho-Eastern Oregon Orders were divided into eight areas. (See Map A-2.) Order and state lines were considered as boundaries with the exception of two counties in California. The small number of producers in California pooled on the Pacific Northwest Order made it necessary to combine them with another area (Area 5). Area 5 has a similar climate and was geographically adjacent to the two California counties. The areas within states were defined by climatic conditions and geography. Areas are as follows: Western Washington (Area 1), Central Washington (Area 2), Eastern Washington (Area 3), Northern Idaho (Area 4), Western Oregon/Northern California (Area 5), Central Oregon (Area 6), Eastern Oregon (Area 7), and Southern Idaho (Area 8).

In Oregon and Washington, the west side of the Cascade Mountain Range has more precipitation and is characterized by a milder climate than the eastern sides of the states¹. The region east of the Cascade Mountain Range has a drier climate with warmer summers and colder winters. In Eastern Washington, the precipitation rate begins to increase slightly. Idaho has two distinct areas split by the orders. Northern Idaho is in the Pacific Northwest Order, while Southern Idaho is in the Southwestern Idaho-Eastern Oregon Order. Northern Idaho is also much wetter and mountainous compared to Southern Idaho.

Ordinary Least Squares regression analysis was used to determine relationships between components.

Monthly Federal order minimum producer prices specific to the Pacific Northwest and Southwestern Idaho-Eastern Oregon Orders were used in the determination of the value of milk production.

III. SEASONAL VARIATION IN MILK COMPONENT LEVELS

In 1999, producers on the Pacific Northwest Order delivered 6,431.4 million pounds, a decrease of 191.0 million pounds or 2.9% from 1998. In 1999, not all eligible milk was pooled. In 1998

¹ Climate information based on Western Regional Climate Center precipitation maps.

Table 1
Monthly Component Levels
Pacific Northwest Order
1999

Month	Butterfat - percent -	Protein - percent -	Other Solids - percent -
January	3.73	3.26	5.49
February	3.73	3.27	5.48
March	3.74	3.26	5.48
April	3.64	3.22	5.46
May	3.61	3.22	5.49
June	3.57	3.18	5.50
July	3.54	3.17	5.48
August	3.55	3.15	5.47
September	3.58	3.22	5.48
October	3.70	3.30	5.47
November	3.74	3.29	5.48
December	3.73	3.27	5.53
Weighted Average	3.66	3.24	5.48

Table 2
Monthly Component Levels
Southwestern Idaho-Eastern Oregon Federal Order
1999

Month	Butterfat - percent -	Protein - percent -
January	3.70	3.31
February	3.64	3.30
March	3.63	3.28
April	3.56	3.27
May	3.56	3.22
June	3.47	3.16
July	3.45	3.15
August	3.43	3.16
September	3.53	3.25
October	3.65	3.30
November	3.71	3.34
December	3.79	3.31
Weighted Average	3.63	3.28

all eligible milk was pooled on the order. For 1999, producer milk tested on average 3.66% butterfat, 3.24% protein, and 5.48% other solids.

In the Pacific Northwest Order, the butterfat percent decreases in the spring and increases again in the fall and winter. Table 1 shows the monthly and annual average component levels for the Pacific Northwest Order. Milk production per cow typically is less, and animals are fed more stored feed in the fall and winter. In the spring, during the flush of milk production, the feeding of more fresh grass increases the total pounds produced but decreases the percentage butterfat content of milk. The spring flush is additionally impacted by the biological cycle of cows and the increase in temperature in the spring. Butterfat levels in the Pacific Northwest Order in 1999 were the highest in March and November at 3.74% and lowest in July at 3.54%. The seasonal cycle of protein levels is similar to butterfat, but with a lesser degree of variation. Protein levels in 1999 were highest in October at 3.30% and lowest in August at 3.15%. Other solids levels were much more consistent throughout the year when compared to the seasonal changes in butterfat and protein levels. Other solids had a high of 5.53% in December, and a low of 5.46% in April, and showed very little seasonality.

In 1999, producers associated with the Southwestern Idaho-Eastern Oregon Federal Order delivered 2,418.6 million pounds, an increase of 980.1 million pounds or 68.1%. Handler pooling decisions in 1998 and 1999 account for the large increase in milk pooled. For 1999, producer milk tested on average 3.63% butterfat and 3.28% protein.

Component levels in the Southwestern Idaho-Eastern Oregon Order follow the same seasonal relationship as the Pacific Northwest Order. The butterfat and protein levels decrease in the spring and rise again in the fall. (See Table 2 on the previous page.) Butterfat levels in the Southwestern Idaho-Eastern Oregon Order in 1999 were highest in December at 3.79% and lowest in August at 3.43%. Protein levels in 1999 were highest in November at 3.34% and lowest in July at 3.15%.

For 1999, the weighted average butterfat and protein levels were less than the mean averages for both components. (See Appendix Table A-1.) The relative levels of the weighted average and the mean would indicate that individual producers who deliver smaller amounts of milk (on a monthly basis) have higher levels of these components in their milk than their larger counterparts. Conversely, on the Pacific Northwest Order, the other solids weighted average is higher than the mean, indicating that producers who deliver larger amounts of milk have higher levels of other solids in their milk than their smaller counterparts.

During 1999, on the Pacific Northwest Order, producers' individual monthly average butterfat tests ranged from 2.28% to 6.40%; protein tests ranged from 2.04% to 4.59%, and other solids levels ranged from 3.51% to 5.83%. (See Table 3.) Most monthly average component tests are within one standard deviation of the mean². Based on the definition of a standard deviation, most producers had butterfat tests ranging from 3.41% to 4.13%. Similarly, most protein tests ranged

² By definition, for a *normal distribution*, approximately 68% of observations are within one standard deviation of the mean.

Table 3 Component Weighted Average, Mean, Median, Standard Deviation, Minimum, and Maximum Pacific Northwest Order 1999			
	Butterfat	Protein	Other Solids
	%	%	%
Weighted Average	3.66	3.24	5.48
Mean	3.77	3.29	5.47
Median	3.71	3.25	5.46
Standard Deviation	0.36	0.19	0.09
Minimum	2.28	2.04	3.51
Maximum	6.40	4.59	5.83

Table 4 Component Weighted Average, Mean, Median, Standard Deviation, Minimum, and Maximum Southwestern Idaho-Eastern Oregon Order 1999		
	Butterfat	Protein
	%	%
Weighted Average	3.63	3.28
Mean	3.69	3.30
Median	3.65	3.29
Standard Deviation	0.30	0.17
Minimum	2.88	2.56
Maximum	5.78	4.61

from 3.10% to 3.48% and most other solids tests ranged from 5.38% to 5.56%. (See Appendix Table A-1 for monthly component statistics.)

In 1999, the Southwestern Idaho-Eastern Oregon Order butterfat tests ranged from 2.88% to 5.78% and protein tests ranged from 2.56% to 4.61%. (See Table 4.) Based on the definition of a standard deviation, most producers had butterfat tests ranging from 3.39% to 3.99%. Similarly, most protein tests ranged from 3.13% to 3.47%. For monthly component statistics, see Appendix Table A-2.

IV. REGIONAL VARIATION IN MILK COMPONENT LEVELS

An examination of milk component levels on a geographic basis can reveal differences in climate, common management practices, feeds, and other characteristics of dairy operations. The data was divided into eight regions or areas based on the geographic location of the dairy farms. The eight areas are based on a combination of relatively homogeneous climates and state and order borders.

Areas 1 through 6 are associated with the Pacific Northwest Order and are defined in Appendix Map A-2. Table 5 on the following page provides 1999 milk production, average number of producers, and component tests for each area. In 1999, the region with the most milk associated with the Pacific Northwest Order was Area 1 followed by Areas 2, 5, 3, 6, and 4. Component levels for each area appear to vary only slightly.

The Southwestern Idaho-Eastern Oregon Order is represented by Areas 7 and 8. Total milk production by dairy farmers in these two regions was much more than what was pooled on the order in 1999. Handlers' pooling decisions greatly effected the amount of milk associated with the Southwestern Idaho-Eastern Oregon Order.

Table 5			
Various Statistics by Area For 1999			
Area 1 (Western Washington)		Area 2 (Central Washington)	
Milk Production	3,083,546,923	Milk Production	1,577,302,330
Average Number of Producers	533	Average Number of Producers	100
Average Pounds Per Producer	5,787,076	Average Pounds Per Producer	15,746,779
Butterfat Test	3.65%	Butterfat Test	3.62%
Protein Test	3.23%	Protein Test	3.22%
Other Solids Test	5.47%	Other Solids Test	5.48%
Area 3 (Eastern Washington)		Area 4 (Northern Idaho)	
Milk Production	308,250,215	Milk Production	21,395,089
Average Number of Producers	61	Average Number of Producers	18
Average Pounds Per Producer	5,018,999	Average Pounds Per Producer	1,188,616
Butterfat Test	3.61%	Butterfat Test	3.79%
Protein Test	3.22%	Protein Test	3.23%
Other Solids Test	5.48%	Other Solids Test	5.46%
Area 5 (Western Oregon)		Area 6 (Central Oregon)	
Milk Production	1,340,633,964	Milk Production	100,311,489
Average Number of Producers	286	Average Number of Producers	19
Average Pounds Per Producer	4,695,741	Average Pounds Per Producer	5,188,525
Butterfat Test	3.74%	Butterfat Test	3.73%
Protein Test	3.28%	Protein Test	3.20%
Other Solids Test	5.52%	Other Solids Test	5.54%
Area 7 (Eastern Oregon)		Area 8 (Southern Idaho)	
Milk Production	50,180,117	Milk Production	2,368,392,518
Average Number of Producers	29	Average Number of Producers	296
Average Pounds Per Producer	1,760,706	Average Pounds Per Producer	8,005,834
Butterfat Test	3.79%	Butterfat Test	3.63%
Protein Test	3.35%	Protein Test	3.28%
Other Solids Test	n/a	Other Solids Test	n/a

n/a = not applicable

In general, comparing all the areas, Area 1 had the most milk pooled in 1999, with 3.1 billion pounds and the most producers, with 533 producers on average. Average milk production per producer was the highest in Area 2 with an average of 15.7 million pounds per producer. The highest butterfat levels in 1999 were in Areas 4 and 7 with annual tests of 3.79%, while Area 3 had the lowest annual butterfat test of 3.61%. Protein levels in Area 7 (3.35%) and other solids levels in Area 6 (5.54%) were the highest for each of those components.

Although producer milk, number of producers, and average milk production per producer varied greatly between areas, there are only small differences in component levels between designated areas.

V. STATISTICAL RELATIONSHIP AMONG MILK COMPONENTS

Regression analysis was used to analyze the linear relationship between milk component levels. The analysis revealed that the only significant relationship between components was between butterfat (BF) and protein (PRO). Regressions of nonfat solids and protein and nonfat solids and butterfat were found to be insignificant and not included in this study. This latter finding was expected and is due to: (1) nonfat solids, by definition, is protein plus other solids; and (2) other solids levels are somewhat random and show little seasonal variation. (See Appendix Figures A-8 and A-9.)

The Pacific Northwest Order had 12,208 observations in 1999, compared to the Southwestern Idaho-Eastern Oregon Order's 3,893 observations. The linear regression for protein and butterfat for 1999 varied slightly between the Pacific Northwest and Southwestern Idaho-Eastern Oregon Orders. The regression equation calculated for each order was:

$$\begin{array}{ll} \text{Pacific Northwest:} & \text{PRO\%} = 1.7617 + 0.4045 \text{ BF\%} \\ & R^2 = 0.6006 \end{array}$$

$$\begin{array}{ll} \text{Southwestern Idaho-Eastern Oregon:} & \text{PRO\%} = 1.8643 + 0.3905 \text{ BF\%} \\ & R^2 = 0.4771 \end{array}$$

The correlation (R^2) between protein and butterfat is slightly higher in the Pacific Northwest Order compared to the Southwestern Idaho-Eastern Oregon Order. The Pacific Northwest's slope is slightly steeper, but the intercept is slightly less. Both equations are similar to previous Federal order publications³. Appendix Figures A-6 through A-9 show graphical representations of the respective linear regressions.

The butterfat and protein regression equations for the Pacific Northwest and Southwestern Idaho-Eastern Oregon Orders, on a combined basis, were done for 1997, 1998, and 1999. (See Table 6 on page 8.) The Pacific Northwest Order did not price milk based on protein in January 1997; no data

³ See *Analysis of Component Levels and Somatic Cell Count in Individual Herd Milk at the Farm Level, 1997*, Upper Midwest Marketing Area, Staff paper 98-01, July 1998.

was available for this month. Over the three periods, the general trend of the regression is toward a lower intercept but a steeper slope. This would suggest that, in general, a change in the butterfat level is associated with a larger change in the protein level in 1999 compared to 1997 or 1998.

Table 6
Pacific Northwest and Southwestern Idaho-Eastern Oregon Federal Order
Comparison of Regression Results: Butterfat Level as a Predictor of Protein Levels
1997 through 1999

<u>Year</u>	<u>Equation</u>	<u>Correlation</u>
1997	PRO% = 1.917 + 0.360 BF%	R ² = 0.512
1998	PRO% = 1.810 + 0.390 BF%	R ² = 0.538
1999	PRO% = 1.809 + 0.395 BF%	R ² = 0.561

VI. MINIMUM ORDER VALUE OF MILK PRODUCTION

The use of multiple component pricing allows the evaluation of the minimum order value of milk components in a hundredweight of milk.

The minimum order value of producer milk pooled on the Pacific Northwest Order in 1999 averaged \$13.63 per hundredweight. The value of each component comprised by the \$13.63 per hundredweight was \$4.75 for butterfat, \$6.00 for protein, \$1.83 for other solids, and a producer price differential of \$1.05.

The value of producers' milk pooled on the Southwestern Idaho-Eastern Oregon Order in 1999 averaged \$11.86 per hundredweight. The value of each component comprised by the \$11.86 per hundredweight was \$4.66 for butterfat, \$6.96 for protein, and a producer price differential of \$0.24.

The aggregated value of milk production by size-range of milk production is summarized in Appendix Table A-6 and Figure A-10. For the Pacific Northwest Order, on average, using 1999 Federal order prices, producers with less than 50,000 pounds of production received more per hundredweight, \$14.53, than other producers. Producers with more than three million pounds of production averaged the lowest amount per hundredweight, at \$13.44. Producers on the Southwestern Idaho-Eastern Oregon Order followed the same trend as producers on the Pacific Northwest Order. Producers with less than 50,000 pounds of production received more per hundredweight, \$12.69, than other producers. Producers with more than three million pounds of production averaged the lowest amount per hundredweight, at \$11.72. This relationship is generally indicative of the fact that smaller herds typically have higher component levels than larger herds.

VII. SUMMARY

This paper analyzes the milk components associated with the Pacific Northwest and Southwestern Idaho-Eastern Oregon Orders. Components for the Pacific Northwest Order include butterfat, protein, and other solids. Components for the Southwestern Idaho-Eastern Oregon Order include butterfat and protein. For each order, producer information was collected from handler payrolls submitted to the market administrator's office. Component levels were examined using a variety of measures including: the annual averages, seasonal and regional averages, relationships between components, frequency distributions and scatter plots of regressions, and the value of milk components by size-range of production.

Weighted average component levels for the Pacific Northwest Order in 1999 were: 3.66% butterfat, 3.24% protein, and 5.48% other solids. In 1999, butterfat and protein percentages peaked in the November through March period and reached a low in July. Other solids had very little seasonal change.

Although the volume of producer milk, number of producers, and average milk production per producer varies greatly between areas, there are only small differences in component levels between geographic regions within the milk shed for the two orders.

The linear relationship between butterfat and protein on the Pacific Northwest Order was:

$$\text{Protein} = 1.7617 + 0.4045 * \text{Butterfat} \quad (R^2 = 0.6006).$$

In 1999, the Federal order weighted average price received for milk was \$13.63 per hundredweight, at test.

Weighted average component levels for the Southwestern Idaho-Eastern Oregon Order in 1999 were: 3.63% butterfat and 3.28% protein. In 1999, butterfat and protein percentages peaked in the October/November/December period and reached lows in the July/August period.

The linear relationship between butterfat and protein on the Southwestern Idaho-Eastern Oregon Order was:

$$\text{Protein} = 1.8643 + 0.3905 * \text{Butterfat} \quad (R^2 = 0.4771).$$

In 1999, the Federal order weighted average price received for milk was \$11.86 per hundredweight, at test.

APPENDIX

Table A-1

STATISTICAL DATA FOR PRODUCERS ON THE
PACIFIC NORTHWEST ORDER INCLUDED IN COMPONENT ANALYSIS

1999

<u>Month</u>	Butterfat						<u>Number of Observations</u>
	<u>Weighted Average</u>	<u>Mean</u>	<u>Standard Deviation</u>	<u>Median</u>	<u>Minimum</u>	<u>Maximum</u>	
	- % -	- % -	- % -	- % -	- % -	- % -	
January	3.73	3.85	0.36	3.77	2.30	5.55	1,122
February	3.73	3.86	0.35	3.78	2.28	5.35	1,111
March	3.74	3.85	0.34	3.79	2.54	5.43	1,108
April	3.64	3.73	0.29	3.69	2.59	5.11	938
May	3.61	3.70	0.33	3.64	2.72	5.01	1,100
June	3.57	3.66	0.35	3.59	2.52	5.09	865
July	3.54	3.61	0.29	3.58	2.73	5.03	896
August	3.55	3.62	0.29	3.58	2.68	5.08	901
September	3.58	3.67	0.32	3.63	2.69	5.58	912
October	3.70	3.84	0.39	3.75	2.66	6.18	1,090
November	3.74	3.89	0.39	3.81	2.65	6.40	1,084
December	3.73	3.89	0.39	3.81	2.74	6.34	1,080
For the Year	3.66	3.77	0.36	3.71	2.28	6.40	12,207

<u>Month</u>	Protein						<u>Number of Observations</u>
	<u>Weighted Average</u>	<u>Mean</u>	<u>Standard Deviation</u>	<u>Median</u>	<u>Minimum</u>	<u>Maximum</u>	
	- % -	- % -	- % -	- % -	- % -	- % -	
January	3.26	3.31	0.19	3.26	2.28	4.09	1,122
February	3.27	3.31	0.19	3.27	2.04	4.05	1,111
March	3.26	3.30	0.18	3.26	2.14	4.01	1,108
April	3.22	3.26	0.16	3.23	2.28	3.96	938
May	3.22	3.28	0.18	3.23	2.56	3.95	1,100
June	3.18	3.25	0.19	3.20	2.86	3.94	865
July	3.17	3.21	0.15	3.18	2.87	3.90	896
August	3.15	3.19	0.16	3.16	2.84	4.01	901
September	3.22	3.28	0.17	3.24	2.84	4.44	912
October	3.30	3.36	0.19	3.31	2.94	4.59	1,090
November	3.29	3.35	0.20	3.30	2.92	4.51	1,084
December	3.27	3.33	0.20	3.28	2.91	4.58	1,080
For the Year	3.24	3.29	0.19	3.25	2.04	4.59	12,207

Table A-1 (Continued)

STATISTICAL DATA FOR PRODUCERS ON THE
PACIFIC NORTHWEST ORDER INCLUDED IN COMPONENT ANALYSIS

1999

<u>Month</u>	Other Solids						<u>Number of Observations</u>
	<u>Weighted Average</u>	<u>Mean</u>	<u>Standard Deviation</u>	<u>Median</u>	<u>Minimum</u>	<u>Maximum</u>	
	- % -	- % -	- % -	- % -	- % -	- % -	
January	5.49	5.46	0.10	5.47	4.27	5.76	1,122
February	5.48	5.46	0.10	5.47	3.51	5.75	1,111
March	5.48	5.46	0.09	5.46	3.70	5.71	1,108
April	5.46	5.44	0.09	5.44	3.89	5.79	938
May	5.49	5.47	0.09	5.47	4.24	5.81	1,100
June	5.50	5.49	0.08	5.47	4.76	5.80	865
July	5.48	5.48	0.07	5.46	4.89	5.76	896
August	5.47	5.46	0.09	5.45	5.13	5.82	901
September	5.48	5.46	0.07	5.46	5.13	5.80	912
October	5.47	5.45	0.08	5.45	5.10	5.83	1,090
November	5.48	5.46	0.08	5.47	5.03	5.75	1,084
December	5.53	5.50	0.09	5.52	4.88	5.74	1,080
For the Year	5.48	5.47	0.09	5.46	3.51	5.83	12,207

Table A-2

STATISTICAL DATA FOR PRODUCERS ON THE
SOUTHWESTERN IDAHO-EASTERN OREGON ORDER INCLUDED IN COMPONENT ANALYSIS

1999

Butterfat

<u>Month</u>	<u>Weighted Average</u> - % -	<u>Mean</u> - % -	<u>Standard Deviation</u> - % -	<u>Median</u> - % -	<u>Minimum</u> - % -	<u>Maximum</u> - % -	<u>Number of Observations</u>
January	3.70	3.78	0.30	3.72	3.11	5.18	388
February	3.64	3.75	0.30	3.70	3.01	5.17	388
March	3.63	3.74	0.29	3.68	3.00	4.94	313
April	3.56	3.61	0.24	3.56	2.91	4.75	221
May	3.56	3.59	0.25	3.56	3.06	4.92	382
June	3.47	3.53	0.25	3.49	2.97	4.78	324
July	3.45	3.49	0.21	3.47	2.96	4.53	224
August	3.43	3.55	0.26	3.53	2.89	4.61	236
September	3.53	3.61	0.25	3.59	2.88	4.82	309
October	3.65	3.74	0.30	3.69	2.98	5.78	388
November	3.71	3.80	0.30	3.74	2.92	5.13	399
December	3.79	3.88	0.32	3.80	3.17	5.23	320
For the Year	3.63	3.69	0.30	3.65	2.88	5.78	3,892

Protein

<u>Month</u>	<u>Weighted Average</u> - % -	<u>Mean</u> - % -	<u>Standard Deviation</u> - % -	<u>Median</u> - % -	<u>Minimum</u> - % -	<u>Maximum</u> - % -	<u>Number of Observations</u>
January	3.31	3.36	0.16	3.33	3.07	4.11	388
February	3.30	3.35	0.16	3.32	3.03	4.15	388
March	3.28	3.32	0.16	3.30	2.89	4.08	313
April	3.27	3.28	0.13	3.26	2.94	3.91	221
May	3.22	3.24	0.14	3.21	2.94	3.88	382
June	3.16	3.19	0.13	3.16	2.88	3.80	324
July	3.15	3.15	0.13	3.14	2.76	3.83	224
August	3.16	3.19	0.16	3.17	2.56	3.78	236
September	3.25	3.30	0.13	3.28	2.94	3.92	309
October	3.30	3.37	0.18	3.34	2.73	4.61	388
November	3.34	3.40	0.16	3.37	2.98	4.13	399
December	3.31	3.38	0.17	3.35	3.04	4.11	320
For the Year	3.28	3.30	0.17	3.29	2.56	4.61	3,892

Table A-3

**WEIGHTED AVERAGE COMPONENT LEVELS BY REGION
1999**

Butterfat

	<u>Region 1</u>	<u>No.*</u>	<u>Region 2</u>	<u>No.*</u>	<u>Region 3</u>	<u>No.*</u>	<u>Region 4</u>	<u>No.*</u>	<u>Region 5</u>	<u>No.*</u>	<u>Region 6</u>	<u>No.*</u>	<u>Region 7</u>	<u>No.*</u>	<u>Region 8</u>	<u>No.*</u>
	-% -		-% -		-% -		-% -		-% -		-% -		-% -		-% -	
January	3.69	574	3.73	109	3.73	63	3.84	18	3.80	336	3.77	22	3.85	33	3.69	355
February	3.71	572	3.72	109	3.72	63	3.87	18	3.81	327	3.77	22	3.85	33	3.63	355
March	3.73	570	3.71	110	3.75	64	3.86	18	3.79	325	3.74	21	3.81	33	3.63	280
April	3.64	526	3.59	87	3.65	63	3.80	18	3.71	224	3.72	20	3.59	12	3.56	209
May	3.61	567	3.52	109	3.55	64	3.77	18	3.71	323	3.75	19	3.67	35	3.55	347
June	3.56	333	3.51	109	3.46	62	3.67	18	3.66	324	3.68	19	3.61	28	3.47	296
July	3.54	529	3.51	70	3.50	61	3.67	18	3.59	199	3.64	19	3.49	12	3.45	212
August	3.55	527	3.51	81	3.49	60	3.60	18	3.60	197	3.62	18	3.54	35	3.43	201
September	3.57	524	3.56	87	3.52	59	3.73	18	3.63	206	3.67	18	3.70	22	3.53	287
October	3.70	561	3.66	111	3.64	60	3.92	18	3.77	322	3.77	18	3.78	33	3.65	355
November	3.73	557	3.71	110	3.67	59	3.92	18	3.82	322	3.80	18	3.85	33	3.71	366
December	3.71	554	3.68	110	3.64	59	3.89	18	3.83	321	3.83	18	3.92	33	3.78	287
For the Year	3.65	6,394	3.62	1,202	3.61	737	3.79	216	3.74	3,426	3.73	232	3.79	342	3.63	3,550

Protein

	<u>Region 1</u>	<u>No.*</u>	<u>Region 2</u>	<u>No.*</u>	<u>Region 3</u>	<u>No.*</u>	<u>Region 4</u>	<u>No.*</u>	<u>Region 5</u>	<u>No.*</u>	<u>Region 6</u>	<u>No.*</u>	<u>Region 7</u>	<u>No.*</u>	<u>Region 8</u>	<u>No.*</u>
	-% -		-% -		-% -		-% -		-% -		-% -		-% -		-% -	
January	3.25	574	3.27	109	3.26	63	3.27	18	3.29	336	3.20	22	3.39	33	3.30	355
February	3.26	572	3.26	109	3.26	63	3.28	18	3.30	327	3.25	22	3.39	33	3.30	355
March	3.25	570	3.24	110	3.24	64	3.25	18	3.29	325	3.19	21	3.35	33	3.28	280
April	3.21	526	3.20	87	3.21	63	3.22	18	3.27	224	3.18	20	3.30	12	3.27	209
May	3.21	567	3.18	109	3.19	64	3.21	18	3.28	323	3.17	19	3.29	35	3.22	347
June	3.18	333	3.13	109	3.16	62	3.18	18	3.24	324	3.15	19	3.22	28	3.16	296
July	3.17	529	3.13	70	3.15	61	3.17	18	3.23	199	3.16	19	3.19	12	3.15	212
August	3.15	527	3.11	81	3.12	60	3.14	18	3.21	197	3.15	18	3.20	35	3.16	201
September	3.22	524	3.20	87	3.20	59	3.24	18	3.27	206	3.21	18	3.31	22	3.25	287
October	3.29	561	3.29	111	3.29	60	3.32	18	3.34	322	3.24	18	3.37	33	3.30	355
November	3.28	557	3.29	110	3.28	59	3.28	18	3.32	322	3.23	18	3.41	33	3.34	366
December	3.25	554	3.26	110	3.27	59	3.25	18	3.32	321	3.22	18	3.37	33	3.31	287
For the Year	3.23	6,394	3.22	1,202	3.22	737	3.23	216	3.28	3,426	3.20	232	3.35	342	3.28	3,550

Table A-3 (continued)

**WEIGHTED AVERAGE COMPONENT LEVELS BY REGION
1999**

Other Solids

	<u>Region 1</u>	<u>No.*</u>	<u>Region 2</u>	<u>No.*</u>	<u>Region 3</u>	<u>No.*</u>	<u>Region 4</u>	<u>No.*</u>	<u>Region 5</u>	<u>No.*</u>	<u>Region 6</u>	<u>No.*</u>	<u>Region 7</u>	<u>No.*</u>	<u>Region 8</u>	<u>No.*</u>
	-% -		-% -		-% -		-% -		-% -		-% -		-% -		-% -	
January	5.48	574	5.49	109	5.49	63	5.46	18	5.50	336	5.46	22	N/A	N/A	N/A	N/A
February	5.47	572	5.47	109	5.48	63	5.46	18	5.51	327	5.50	22	N/A	N/A	N/A	N/A
March	5.47	570	5.47	110	5.47	64	5.45	18	5.51	325	5.51	21	N/A	N/A	N/A	N/A
April	5.44	526	5.45	87	5.45	63	5.42	18	5.51	224	5.53	20	N/A	N/A	N/A	N/A
May	5.48	567	5.48	109	5.49	64	5.46	18	5.53	323	5.54	19	N/A	N/A	N/A	N/A
June	5.50	333	5.47	109	5.47	62	5.46	18	5.53	324	5.59	19	N/A	N/A	N/A	N/A
July	5.47	529	5.47	70	5.46	61	5.45	18	5.53	199	5.59	19	N/A	N/A	N/A	N/A
August	5.45	527	5.46	81	5.46	60	5.45	18	5.54	197	5.59	18	N/A	N/A	N/A	N/A
September	5.46	524	5.48	87	5.47	59	5.45	18	5.52	206	5.54	18	N/A	N/A	N/A	N/A
October	5.45	561	5.47	111	5.47	60	5.44	18	5.50	322	5.52	18	N/A	N/A	N/A	N/A
November	5.46	557	5.47	110	5.49	59	5.47	18	5.50	322	5.51	18	N/A	N/A	N/A	N/A
December	5.52	554	5.53	110	5.55	59	5.54	18	5.54	321	5.55	18	N/A	N/A	N/A	N/A
For the Year	5.47	6,394	5.48	1,202	5.48	737	5.46	216	5.52	3,426	5.54	232	N/A	N/A	N/A	N/A

* Number of producers included in monthly average component level.

N/A = not applicable, Southwestern Idaho-Eastern Oregon Order, Areas 7 and 8, did not use other solids.

TABLE A-4

**LINEAR RELATIONSHIPS BETWEEN VARIOUS MILK COMPONENTS
1999**

**Butterfat Levels as a Predictor of Protein
Protein = c + b (Butterfat)**

Pacific Northwest Order

	<u>c</u> <u>Constant</u>	<u>b</u> <u>Butterfat Coefficient</u>	<u>Standard Error of b</u>	<u>R-Squared (Adjusted)</u>	<u>Standard Error</u>	<u>Number of Comparisons</u>
January	1.71702	0.41265	0.00984	0.61042	0.11716	1,122
February	1.75199	0.40364	0.01044	0.57393	0.12100	1,111
March	1.74280	0.40416	0.01049	0.57284	0.11686	1,108
April	1.79606	0.39180	0.01282	0.49887	0.11360	938
May	1.73155	0.41754	0.01091	0.57122	0.11882	1,100
June	1.64494	0.43742	0.01087	0.65195	0.11260	865
July	1.77742	0.39683	0.01190	0.55401	0.10188	896
August	1.74210	0.40003	0.01189	0.55691	0.10366	901
September	1.91571	0.37007	0.01212	0.50566	0.11785	912
October	1.86603	0.38853	0.00941	0.61029	0.11999	1,090
November	1.81860	0.39326	0.00930	0.62275	0.12027	1,084
December	1.73557	0.41008	0.00966	0.62539	0.12376	1,080
For the Year	1.76166	0.40447	0.00299	0.60060	0.11826	12,207

Southwestern Idaho-Eastern Oregon Order

	<u>c</u> <u>Constant</u>	<u>b</u> <u>Butterfat Coefficient</u>	<u>Standard Error of b</u>	<u>R-Squared (Adjusted)</u>	<u>Standard Error</u>	<u>Number of Comparisons</u>
January	2.05265	0.34586	0.02021	0.42988	0.11951	388
February	1.95091	0.37317	0.01931	0.49045	0.11426	388
March	1.98723	0.35760	0.02349	0.42519	0.12174	313
April	2.35030	0.25667	0.03216	0.22182	0.11649	221
May	2.06445	0.32674	0.02251	0.35492	0.11005	382
June	2.14621	0.29590	0.02332	0.33132	0.10549	324
July	2.23917	0.26128	0.03582	0.18971	0.11463	224
August	1.94078	0.35181	0.03286	0.32597	0.13073	236
September	2.20663	0.30331	0.02423	0.33582	0.10816	309
October	1.74276	0.43401	0.02037	0.53916	0.12091	388
November	2.08071	0.34566	0.01985	0.43163	0.11898	399
December	1.91053	0.37825	0.02140	0.49404	0.12087	320
For the Year	1.86434	0.39049	0.00656	0.47692	0.12352	3,892

TABLE A-5

**MONTHLY PRODUCER COMPONENT PRICES
1999**

Pacific Northwest Order

<u>Month</u>	<u>Butterfat Price</u> \$/ pound	<u>Protein Price</u> \$/ pound	<u>Other Solids Price</u> \$/ pound	<u>Producer Price Differential</u> \$/ hundredweight
January	1.4848	2.3225	0.6298	(0.05)
February	1.4441	1.6072	0.0000	4.20
March	1.3900	1.7281	0.2223	2.75
April	1.0349	1.7333	0.4852	(0.24)
May	1.1838	1.6713	0.3317	0.80
June	1.6679	1.6826	0.0466	1.27
July	1.4290	1.9407	0.4788	(0.83)
August	1.4703	2.2721	0.6597	(2.37)
September	1.3785	2.3790	0.6724	(1.73)
October	1.1764	1.8992	0.1756	2.40
November	1.1305	1.6029	0.0860	3.83
December	0.9262	1.4941	0.2612	1.71
Simple Average	1.3097	1.8611	0.3374	0.98

Southwestern Idaho-Eastern Oregon Order

<u>Month</u>	<u>Butterfat Price</u> \$/ pound	<u>Protein Price</u> \$/ pound	<u>Producer Price Differential</u> \$/ hundredweight
January	1.48	3.39	0.04
February	1.44	1.62	0.56
March	1.39	2.12	0.50
April	1.03	2.54	(0.21)
May	1.18	2.26	0.17
June	1.67	1.76	0.08
July	1.43	2.77	(0.61)
August	1.47	3.39	(2.46)
September	1.38	3.52	(1.46)
October	1.18	2.19	0.32
November	1.13	1.75	0.60
December	0.93	1.94	0.40
Simple Average	1.31	2.44	(0.17)

TABLE A-6

**AGGREGATED COMPONENT VALUES BY SIZE RANGE
PRODUCER MILK DELIVERIES
1999**

Pacific Northwest Order

<u>Size Range</u>		<u>Aggregated Component Values*</u> - dollars -	<u>Producer Milk</u> - pounds -	<u>Weighted Average Value</u> - dollars/cwt. -
<u>Equal to or more than</u> - pounds -	<u>Less than</u> - pounds -			
	50,000	\$ 3,179,914.87	21,891,735	14.53
50,000	100,000	12,827,797.98	90,815,208	14.13
100,000	200,000	59,120,345.48	423,641,912	13.96
200,000	300,000	60,057,463.73	434,402,183	13.83
300,000	400,000	55,510,069.05	400,708,076	13.85
400,000	500,000	50,718,110.67	367,855,062	13.79
500,000	600,000	38,718,030.58	283,766,384	13.64
600,000	700,000	55,193,646.87	401,725,452	13.74
700,000	1,000,000	115,318,959.16	846,730,432	13.62
1,000,000	3,000,000	328,862,166.60	2,435,203,275	13.50
3,000,000		97,375,954.91	724,700,291	13.44
Total/Weighted Average		\$ 876,882,459.90	6,431,440,010	13.63

Southwestern Idaho-Eastern Oregon Order

<u>Size Range</u>		<u>Aggregated Component Values*</u> - dollars -	<u>Producer Milk</u> - pounds -	<u>Weighted Average Value</u> - dollars/cwt. -
<u>Equal to or more than</u> - pounds -	<u>Less than</u> - pounds -			
	50,000	\$ 1,069,953.91	8,433,701	12.69
50,000	100,000	4,605,801.10	37,102,757	12.41
100,000	200,000	13,964,449.29	112,816,035	12.38
200,000	300,000	10,187,552.68	83,621,256	12.18
300,000	400,000	13,065,612.70	106,762,864	12.24
400,000	500,000	11,101,722.85	93,320,831	11.90
500,000	600,000	14,450,593.58	120,725,699	11.97
600,000	700,000	9,411,474.14	78,230,208	12.03
700,000	1,000,000	30,528,134.23	259,538,667	11.76
1,000,000	3,000,000	157,442,741.69	1,343,083,633	11.72
3,000,000		21,105,346.11	174,936,984	12.06
Total/Weighted Average		\$ 286,933,382.28	2,418,572,635	11.86

Figure A-1
PACIFIC NORTHWEST ORDER
FREQUENCY DISTRIBUTION OF MONTHLY AVERAGE BUTTERFAT
LEVELS: 1999

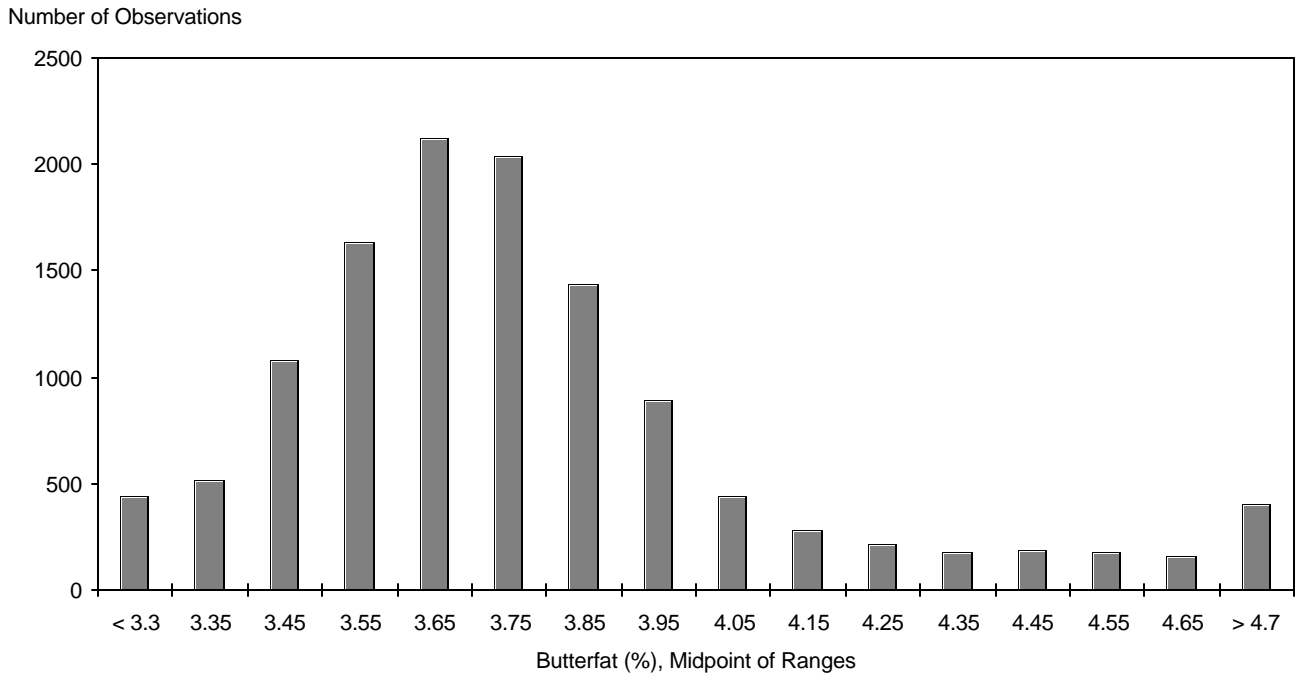


Figure A-2
PACIFIC NORTHWEST ORDER
FREQUENCY DISTRIBUTION OF MONTHLY AVERAGE PROTEIN
LEVELS: 1999

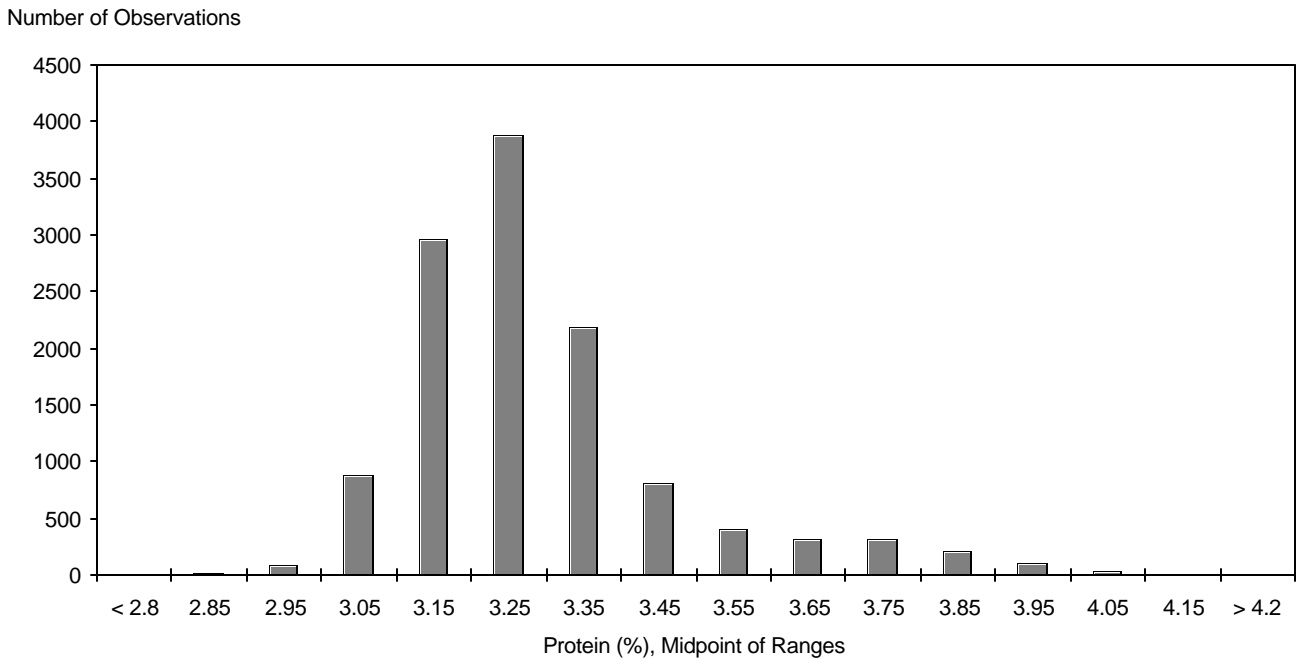


Figure A-3
PACIFIC NORTHWEST ORDER
FREQUENCY DISTRIBUTION OF MONTHLY AVERAGE OTHER SOLIDS
LEVELS: 1999

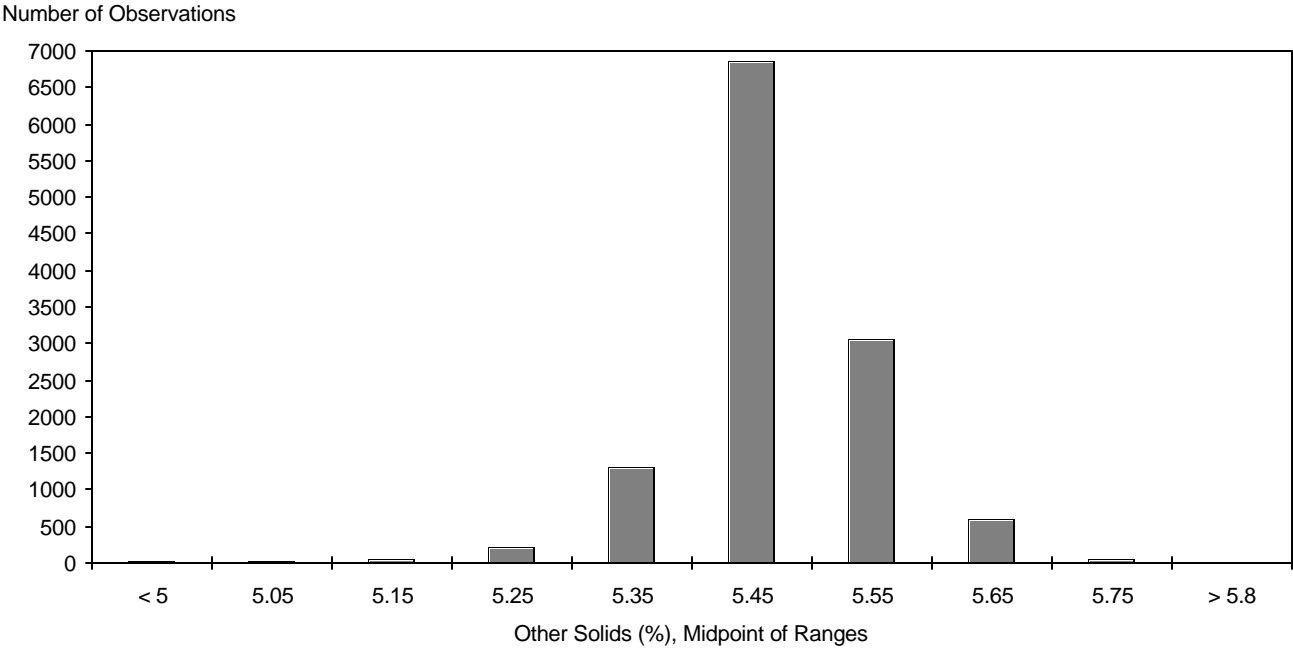


Figure A-4
SOUTHWESTERN IDAHO-EASTERN OREGON ORDER
FREQUENCY DISTRIBUTION OF MONTHLY AVERAGE BUTTERFAT
LEVELS: 1999

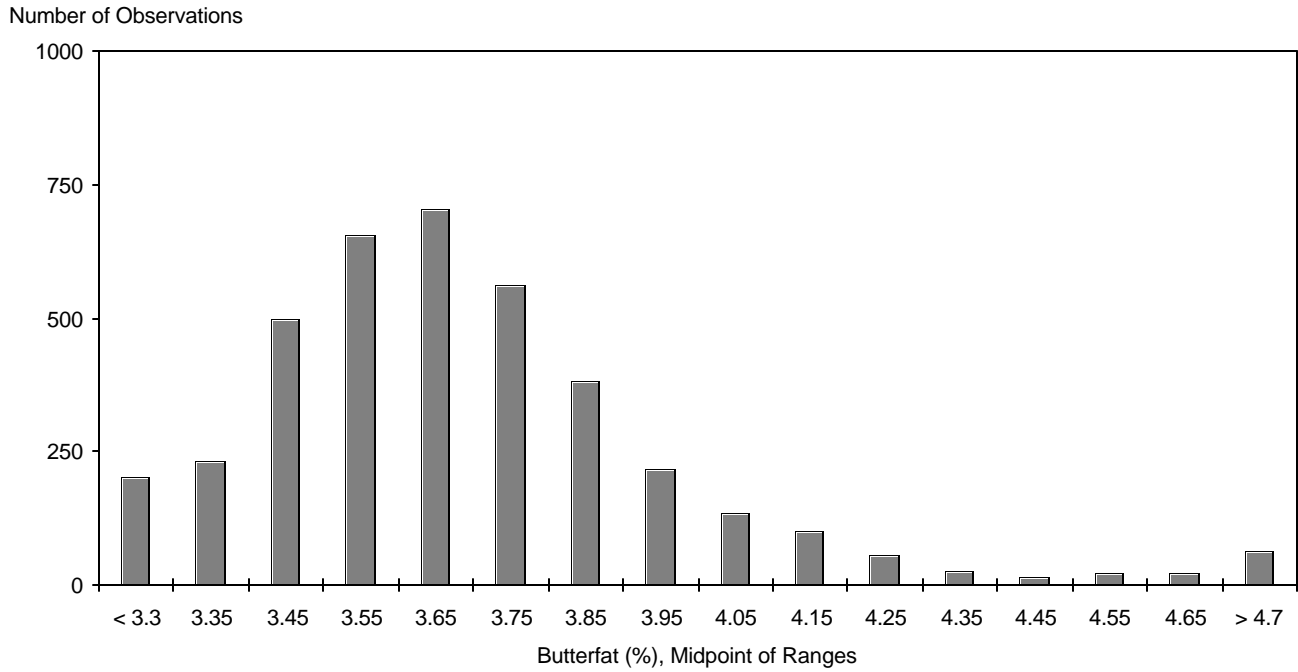


Figure A-5
SOUTHWESTERN IDAHO-EASTERN OREGON ORDER
FREQUENCY DISTRIBUTION OF MONTHLY AVERAGE PROTEIN
LEVELS: 1999

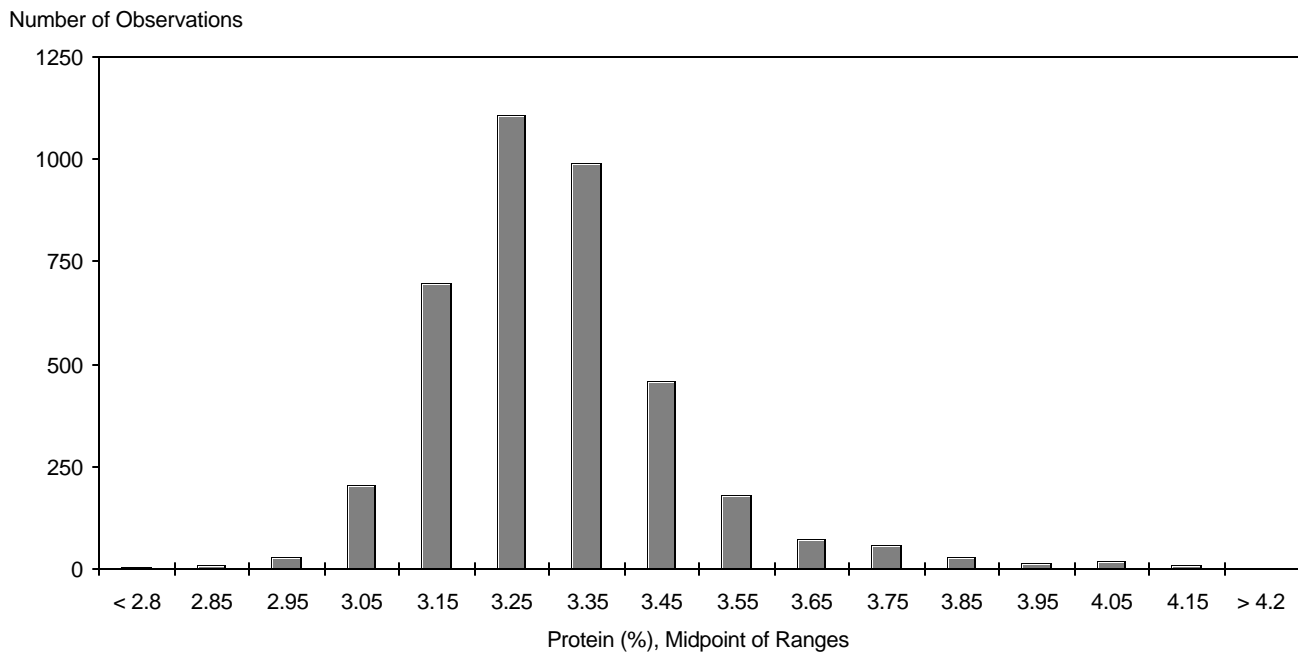


Figure A-6
SCATTER PLOT OF PROTEIN AND BUTTERFAT
MAY AND NOVEMBER 1999
Pacific Northwest Order

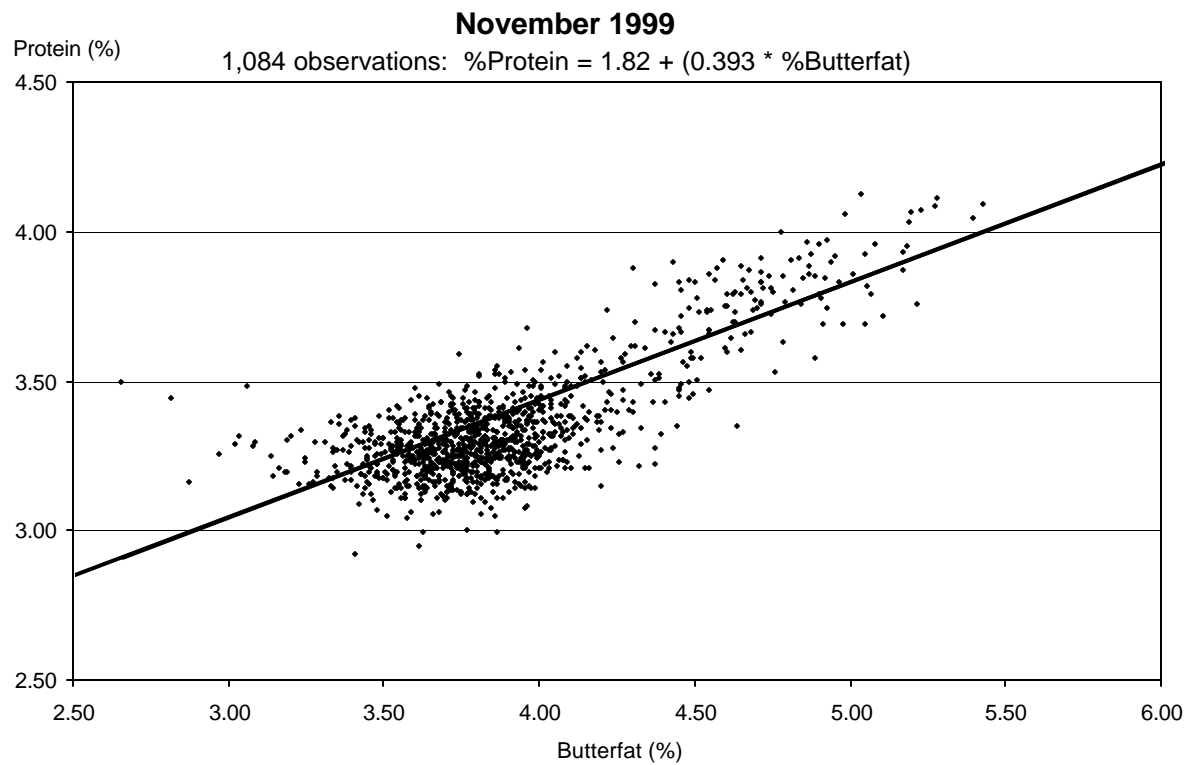
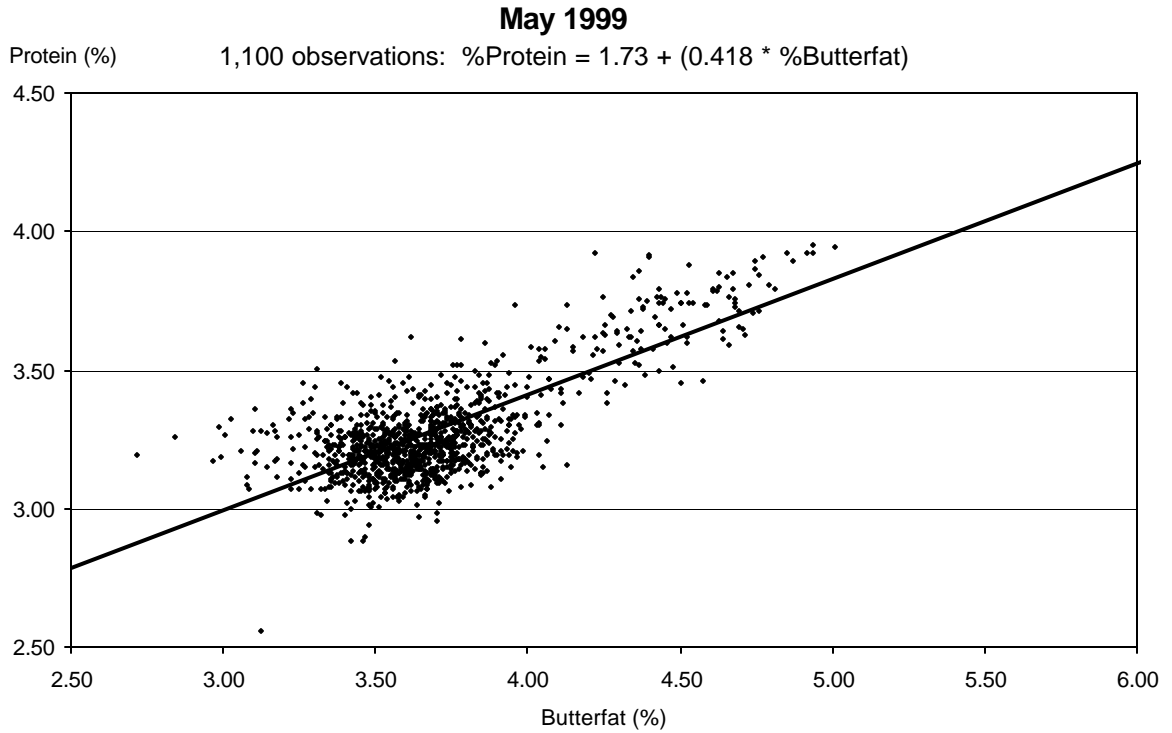


Figure A-7
SCATTER PLOT OF PROTEIN AND BUTTERFAT
MAY AND NOVEMBER 1999
Southwestern Idaho-Eastern Oregon Order

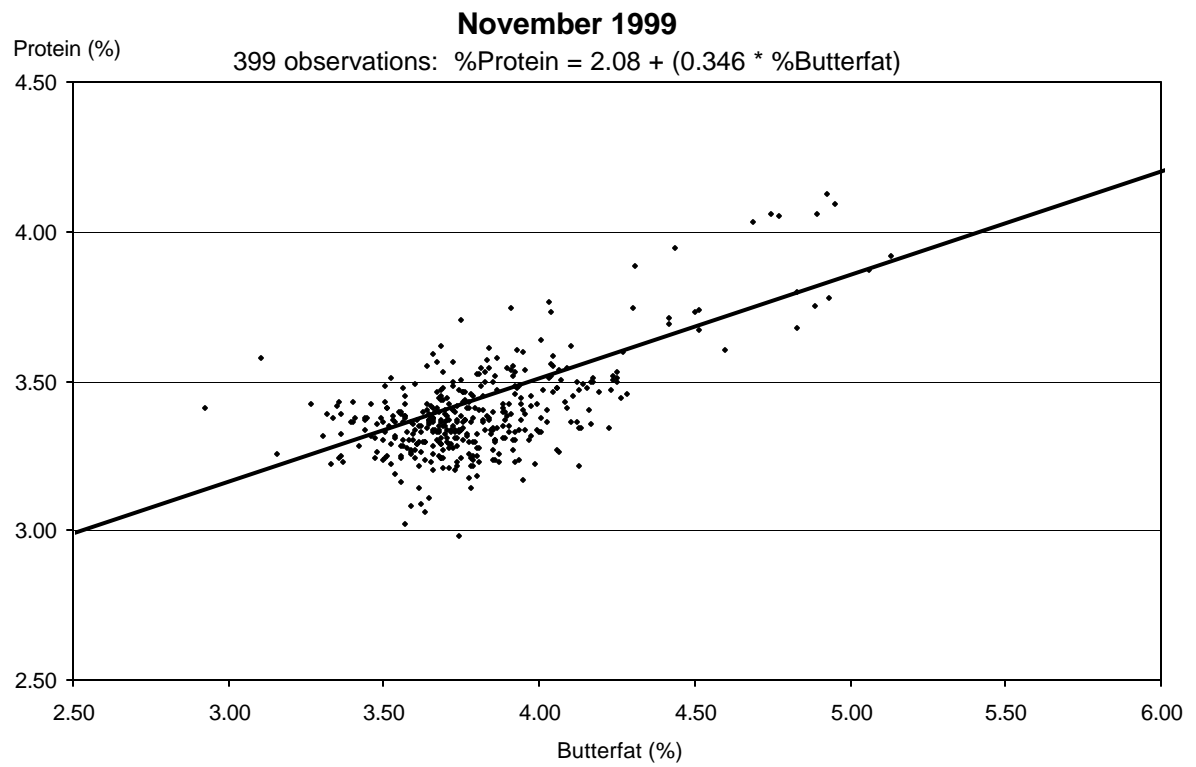
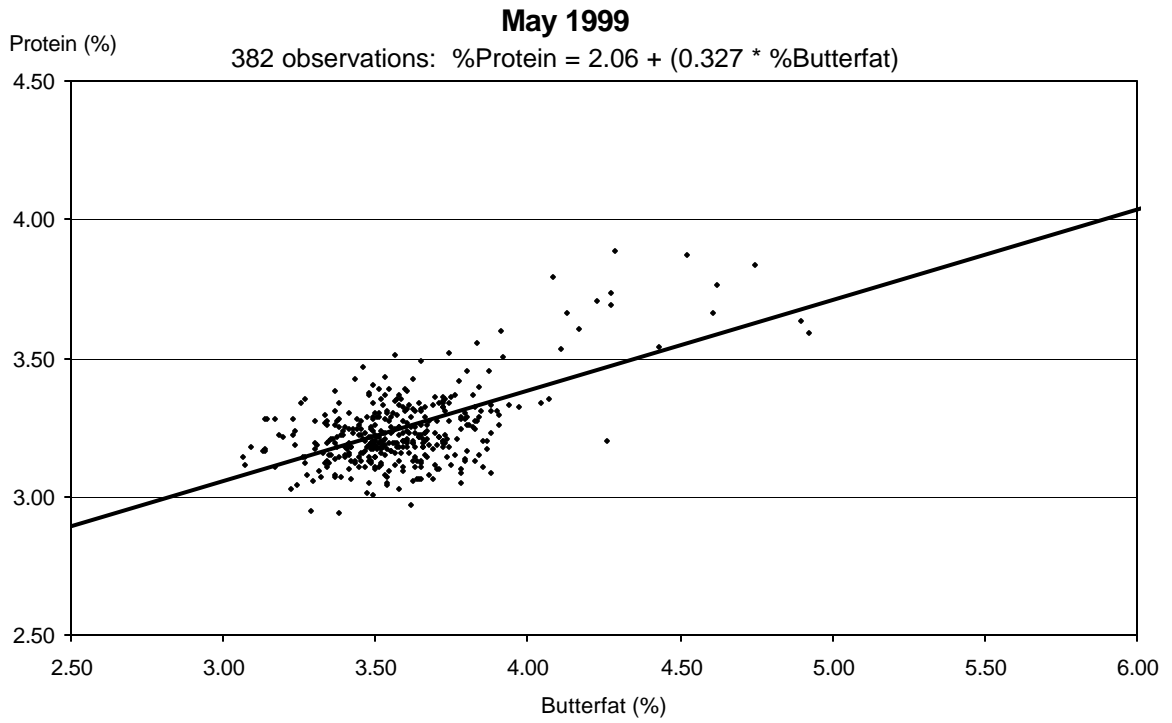


Figure A-8
SCATTER PLOT OF OTHER SOLIDS AND BUTTERFAT
MAY AND NOVEMBER 1999
Pacific Northwest Order

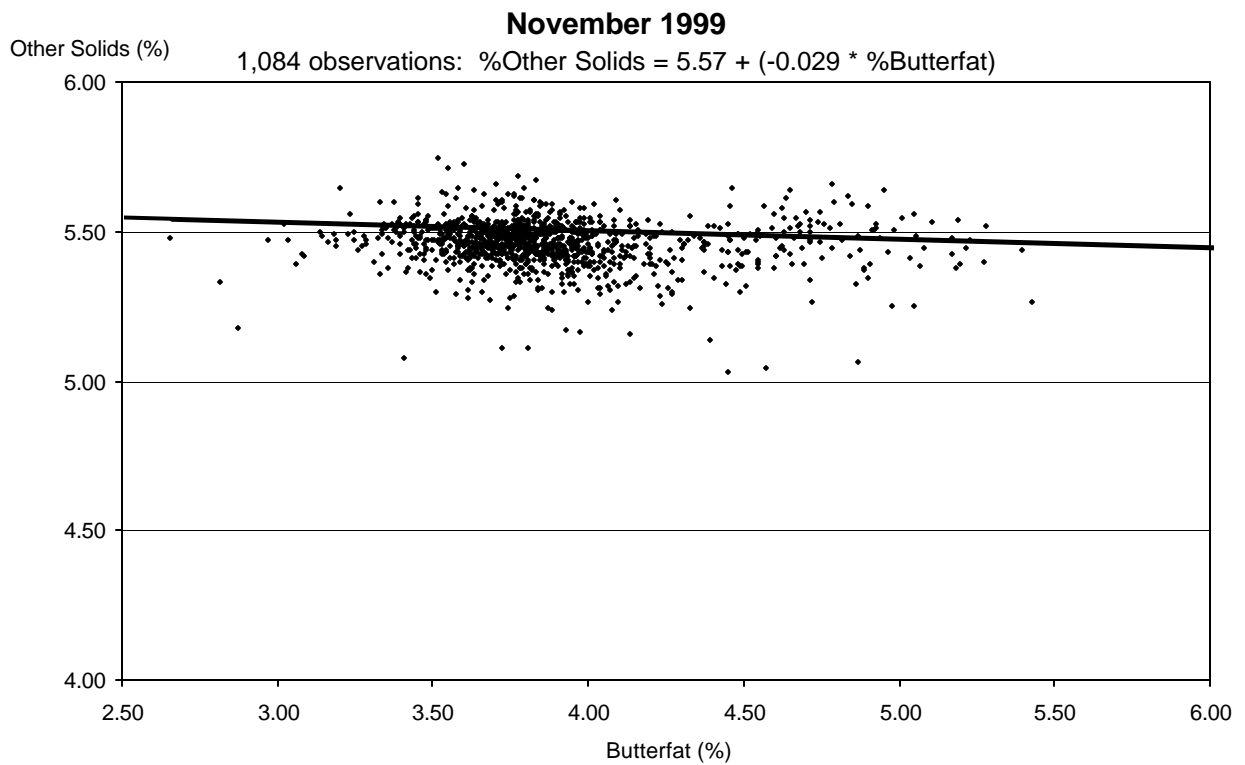
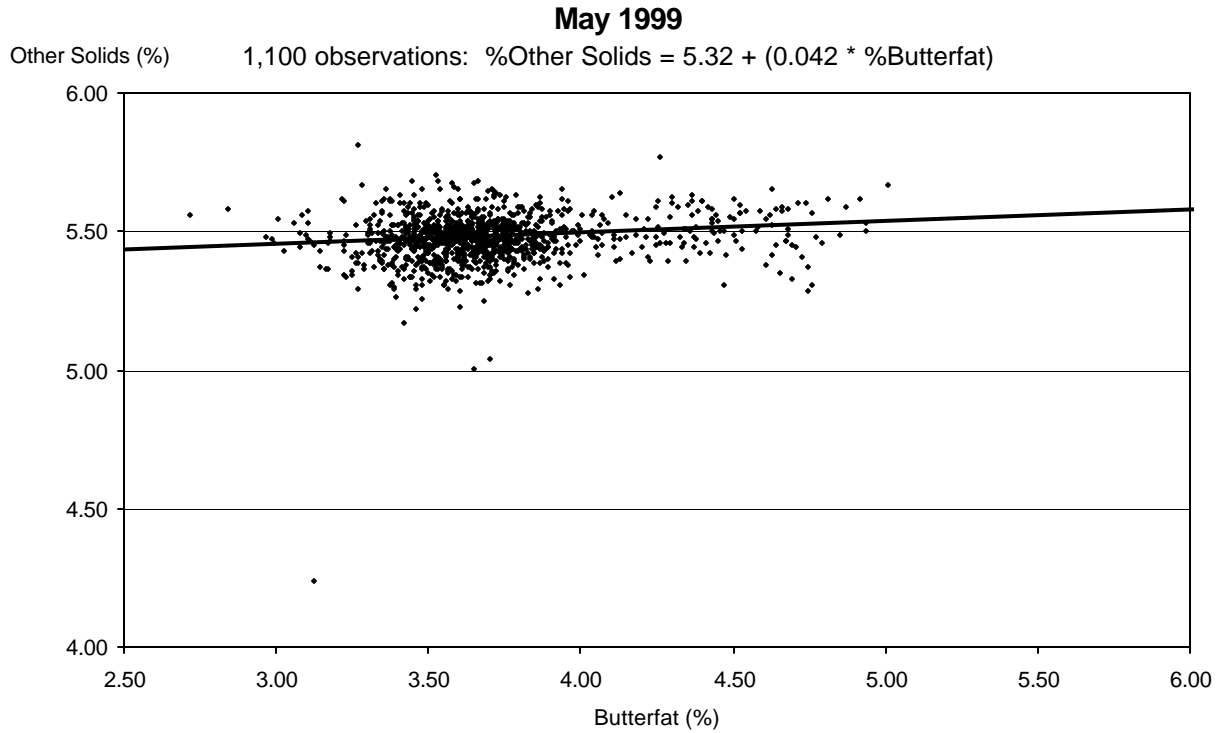


Figure A-9
SCATTER PLOT OF OTHER SOLIDS AND PROTEIN
MAY AND NOVEMBER 1999
Pacific Northwest Order

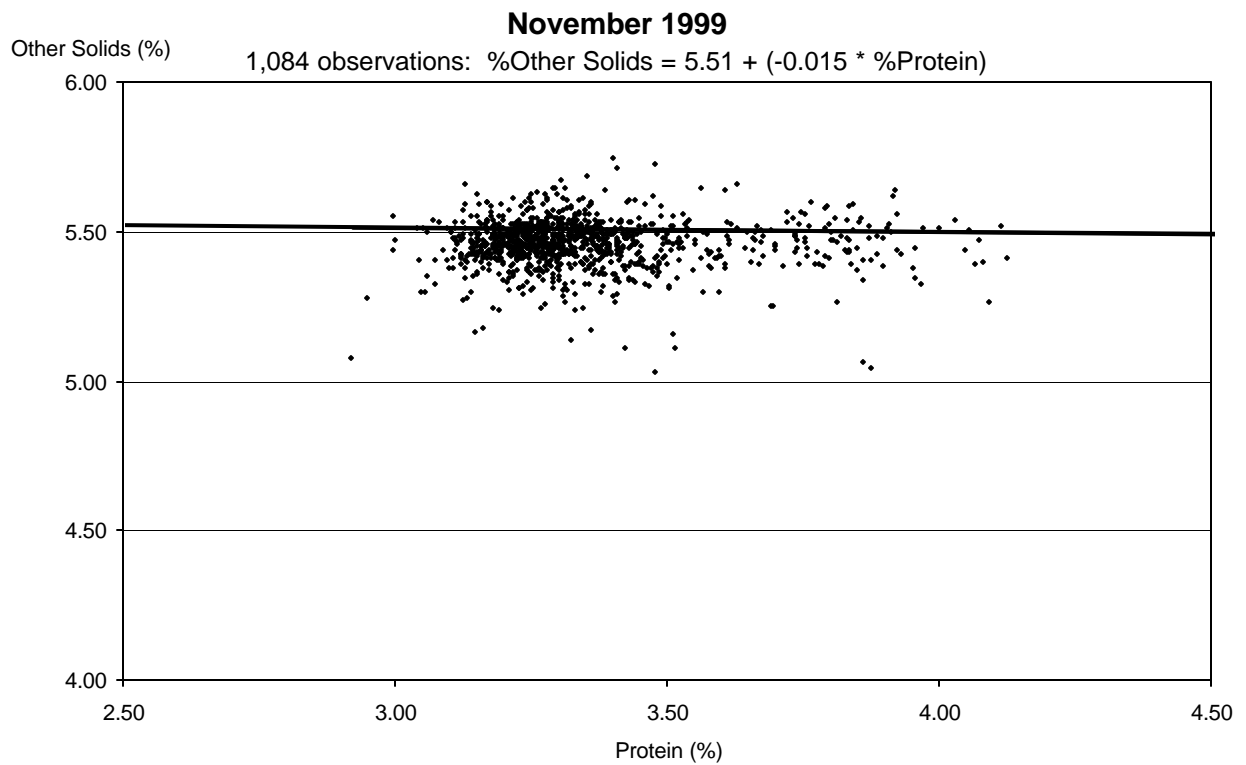
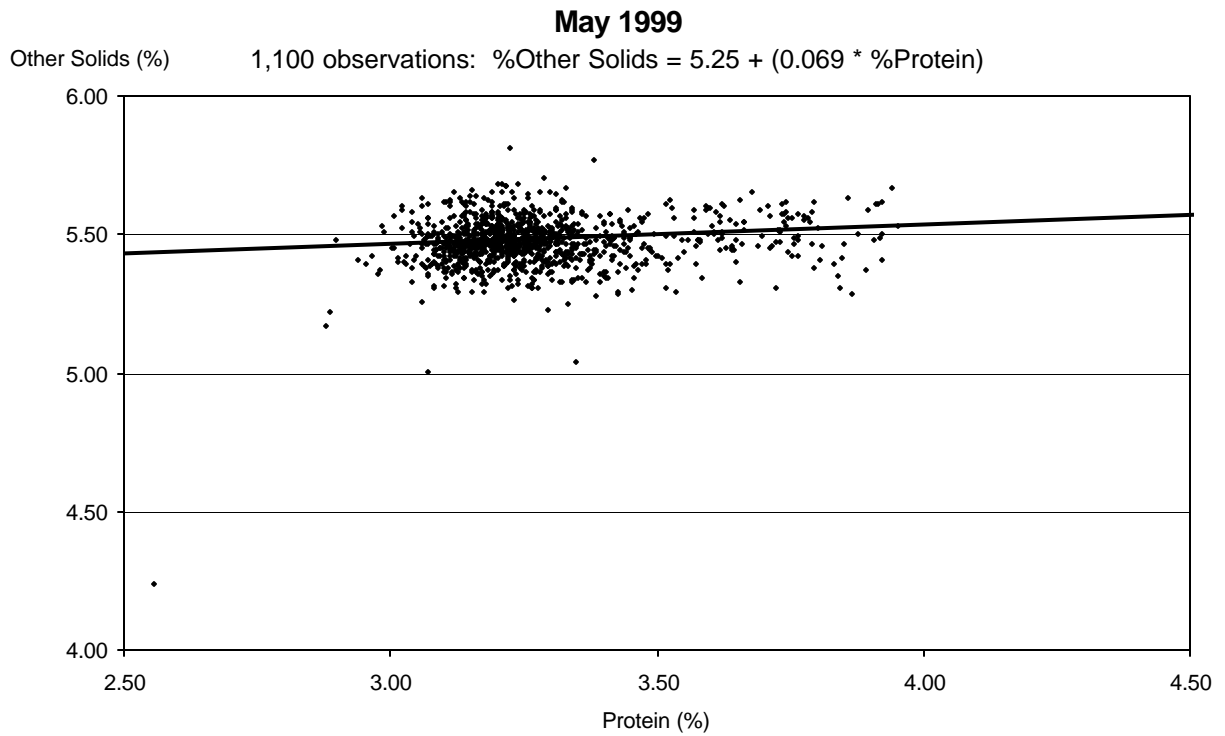
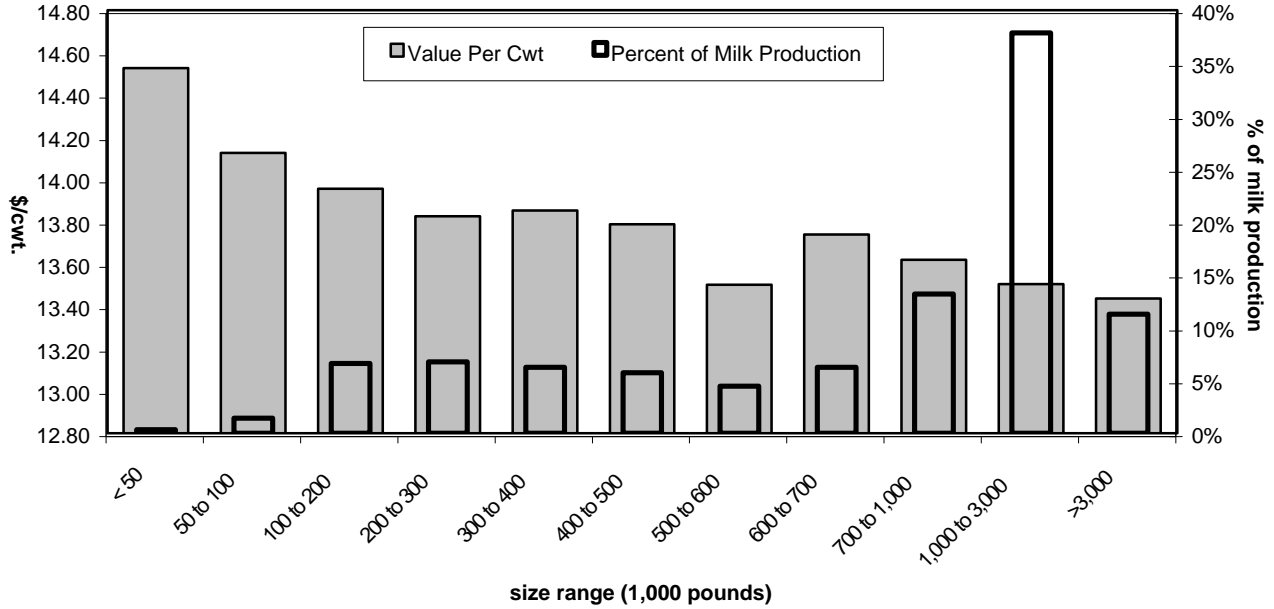


Figure A-10
WEIGHTED AVERAGE VALUES AND PERCENT OF PRODUCER MILK
BY SIZE RANGE PRODUCER MILK DELIVERIES
1999

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