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Agricultural Marketing Service

Dairy Programs

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**ANALYSIS OF MILK MOVEMENTS FROM DAIRY FARMS TO  
POOL DISTRIBUTING PLANTS: NOVEMBER 2016 & APRIL 2017**

**PACIFIC NORTHWEST ORDER**

*Staff Paper 18-01*

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Abstract

In the Pacific Northwest, milk is a particularly local agricultural commodity, i.e., it is processed close to where it is produced. The economics of milk, milk production, and milk processing reinforce the localness of milk. Fresh raw milk is very bulky and highly perishable and typically moves from a dairy farm to a milk processing plant on the same day it is produced. This study analyzes milk movements (distances) between dairy farms and pool distributing plants regulated under the Pacific Northwest Order in the fall and in the spring. The data represented in the analysis are based on handler records of milk movements from dairy farms which are producers associated with the Pacific Northwest (FO 124) Federal Milk Marketing Order during November 2016 and April 2017. This analysis examines various subsets of milk movements, including: 1) the milkshed of pool distributing plants regulated under the Pacific Northwest Order; 2) class of utilization at pool distributing plants; 3) region of source dairy farm; 4) State of receiving pool distributing plant; 5) size-range of average daily delivery of dairy farm; and 6) size-range of average daily receipt of distributing plant. Basic statistical measures are used to analyze how far raw milk moves from dairy farms to the distributing plant, including: weighted averages, medians, percentiles, and standard deviations.

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# ANALYSIS OF MILK MOVEMENTS FROM DAIRY FARMS TO POOL DISTRIBUTING PLANTS: NOVEMBER 2016 & APRIL 2017

## PACIFIC NORTHWEST ORDER

John Mykrantz <sup>1</sup>

### I. INTRODUCTION

Raw milk is a particularly local agricultural commodity. The economics of milk production and processing reinforce the localness of milk. Fresh raw milk is very bulky and highly perishable and typically moves from the dairy farm to a processing plant on the same day it is produced. In the case of smaller dairy farms which produce less than a typical load of milk per day, pickups may occur every other day. Once received at a plant, the raw milk is quickly processed into the dairy products consumers are demanding, which can vary considerably across the week and seasons. Milk production also varies significantly across the seasons and due to the bulky and perishable nature of milk, the marketing solution which optimizes milk's value changes from day to day, week to week, and season to season. In essence, the dairy industry is tasked with efficiently moving each day's milk production from the right farm to the right plant at the right time, where it can be made into fresh dairy products consumers want when they want them.

The seasonality of milk can be demonstrated graphically by comparing daily average utilization and production for each month to 12-month daily averages. Figure 1 shows daily average Class I and II utilizations at pool distributing plants regulated under the Pacific Northwest Order (FO 124) for May 2016 through April 2017 as a percent of the period daily average. <sup>2</sup> In addition, daily averages of National Agricultural Statistics Service (NASS) milk production for Oregon and Washington are shown as a percentage of the period daily average production. Figure 1 shows how the utilization of milk varies relative to the seasonality of milk production. Of particular note is the nature of Class I utilization which generally runs counter to the seasonality of milk production. The fall months are characterized by low daily average milk production while the spring months are characterized by high daily average production. Conversely, fall months are characterized by relatively higher Class I utilizations and the spring months are characterized by relatively lower Class I utilizations. <sup>3</sup> While Class II utilization is a relatively small percentage of the market, it represents an even starker contrast between utilization and the seasonality of milk production. Handlers who supply the Class I and II markets are also faced with the burden of deciding what more storable products the balance of the milk supply should be made into, whether cheese, butter, or nonfat dry milk. Storable dairy products have their own demand cycles and changing economics. In the end, handlers and processors are faced with figuring out what dairy products consumers want, when they want them, and coordinating the

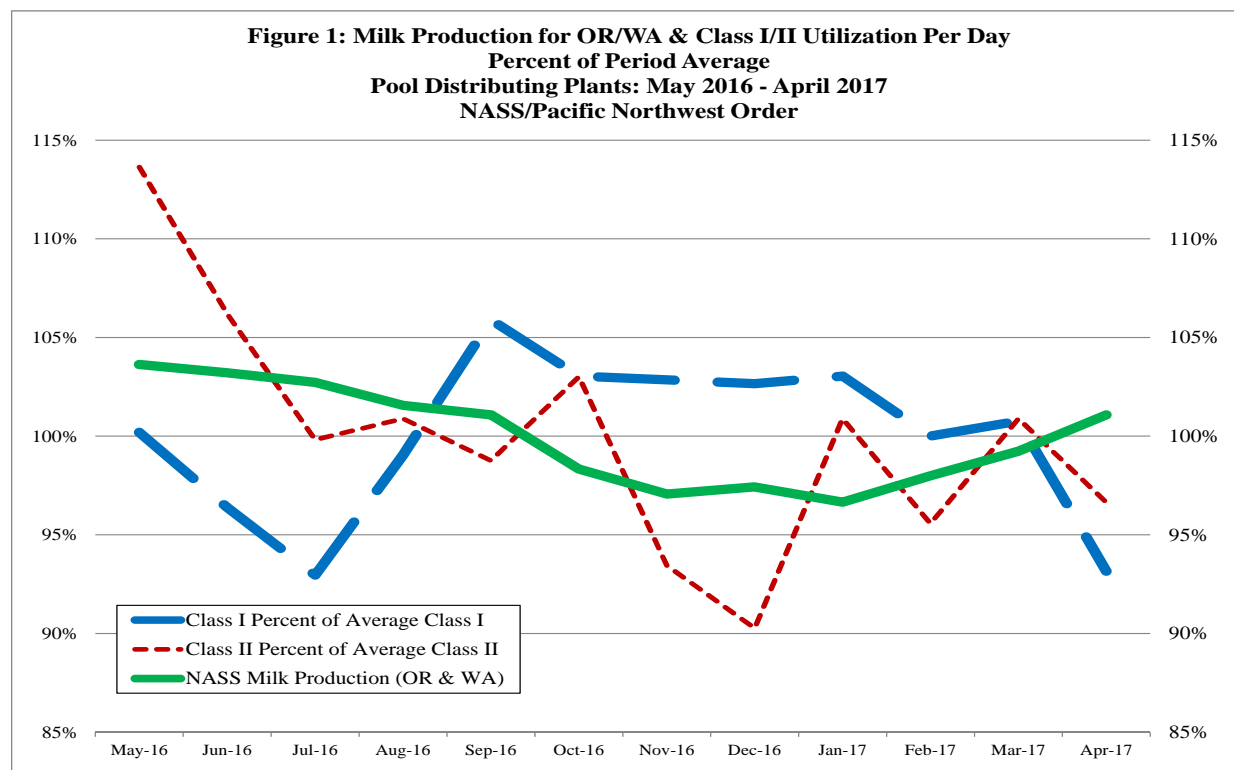
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<sup>1</sup> John Mykrantz is an Agricultural Economist with the Market Administrator's Office, Bothell, Washington. This research is a part of the MA offices mission to provide market information per 1000.25 (c)(8).

<sup>2</sup> For more information on Federal milk marketing orders, their role, and classes of utilization, see: <http://www.fmmaseattle.com/statistics/UnderstandingFMOs.pdf>.

<sup>3</sup> Calendar composition can affect dairy product sales as well since consumer shopping patterns are different for each day of the week and the number of prime shopping days in a month changes depending upon how the calendar falls. The demand for milk at distributing plants varies significantly from one day to the next based on consumer shopping patterns and the type of accounts that a plant services.

delivery of milk for processing to the right plants where it is made into the right product mix to match the demand each day, week, month and season.



This study analyzes milk movements (distances) between dairy farms and pool distributing plants regulated under the Pacific Northwest Order in the fall and in the spring. The data represented in the analysis are based on handler records of milk movements from dairy farms which are producers associated with the Pacific Northwest (FO 124) Federal Milk Marketing Order during November 2016 and April 2017 to pool distributing plants.<sup>4</sup> This analysis examines various subsets of milk movements, including: 1) the milkshed of pool distributing plants regulated under the Pacific Northwest Order; 2) class of utilization at pool distributing plants; 3) region of source dairy farm; 4) State of receiving pool distributing plant; 5) size-range of average daily delivery of dairy farm; and 6) size-range of average daily receipt of pool distributing plant. Basic statistical measures are used to analyze how far raw milk moves from dairy farms to pool distributing plants, including: weighted averages, medians, percentiles, and standard deviations.

## II. DATA

The data set includes the milk of Grade A dairy farms located in Oregon and Washington, associated with pool distributing plants, and pooled on the Pacific Northwest Order for November 2016 and April 2017.<sup>5</sup> The data set consists of over 12,000 electronic handler records of daily farm pickups which identify the location of each dairy farm (source), the pool distributing plant of first receipt (destination), and the quantity of milk delivered. The mileage

<sup>4</sup> The criteria by which plants qualify as pool distributing plants can be found at: <http://www.fmmaseattle.com/orderlanguage/fo124lang.pdf>, under §1124.7(a/b).

<sup>5</sup> Milk received at pool distributing plants and pooled on the Pacific Northwest Order is a subset of all milk pooled on the order.

associated with each farm’s delivery is estimated as the distance via the shortest hard surface highway between the farm and the receiving plant. Deliveries of milk from dairy farms to distributing plants vary depending upon the size and location of each dairy farm in relation to its proximity to other dairy farms and the size of the dairy farm’s bulk tank. Milk production of some of the smallest dairy farms may be delivered to processing plants every other day. The vast majority of milk deliveries from dairy farms occur daily, sometimes with multiple farms’ milk on the same tanker. Some farms deliver full or multiple full and/or partial loads of milk daily. This analysis does not measure the exact mileage each milk tanker may travel from dairy farm to plant, but mileage measurements may be relatively more precise in the case where a dairy farm’s milk production is the only milk on a load. And while this analysis uses estimates of miles between farm and plant, the estimated distances are sometimes referred to as “miles traveled” as short hand. Excluded from this analysis are subsequent movements (bulk transfers) of milk, standardized milk, skim milk, cream, and concentrated milk from the plant of first receipt to other plants for further processing.

General characteristics of the data set are shown in the table below. The data demonstrate the counter-seasonality of demand and supply of milk associated with pool distributing plants. In April, producers associated with the Pacific Northwest Order delivered more milk to the market than in November.<sup>6</sup> In contrast, about 11 million pounds less was demanded at pool distributing plants in April than in November. On average, half of the milk produced by dairy farms associated with pool distributing plants is delivered to pool distributing plants, but more milk from more producers was needed at pool distributing plants in November versus April. Additionally, the data show that the greater number of dairy farms delivering to the market in November include proportionally larger farms than those farms delivering to pool distributing in April.

**General Characteristics of Dataset: November 2016 and April 2017 1/**

Month	Pounds of Milk (Million)	Average Deliveries Per Day (Million)	Number of Producers	Daily Delivery Per Producer 3/ 4/			
				Average	Median	Smallest 10%	Largest 10%
<b>November 2016</b>							
Total 2/	556.0	18.53	444	41,742	19,807	3,407	105,734
Deliveries 3/	392.9	13.10	305	42,943	17,491	3,208	122,475
Receipts 4/	194.3	6.48	305	21,238	5,649	890	66,112
Rec./Del.	49%						
<b>April 2017</b>							
Total 2/	609.6	20.32	446	45,562	22,315	3,928	114,940
Deliveries 3/	364.7	12.16	291	41,780	17,274	3,426	119,825
Receipts 4/	183.5	6.12	291	21,020	7,179	846	63,983
Rec./Del.	50%						
<b>Differences (April - November)</b>							
Total 2/	53.6			3,820	2,508	521	9,206
Deliveries 3/	-28.2			-1,164	-217	218	-2,650
Receipts 4/	-10.8			-218	1,530	-44	-2,129

1/ Data represents partially audited producer payrolls. Does not include milk of dairy farmers who are not producers under the Pacific Northwest Order.

2/ Includes all milk of producers associated with and pooled on the Pacific Northwest Order.

3/ Total deliveries by producers associated with pool distributing plants, not just deliveries to distributing plants.

4/ Total producer receipts at pool distributing plants.

<sup>6</sup> It should be noted that historically eligible milk was not pooled in both November and April. Proportionally more milk was depooled in November than April somewhat exaggerating the normal increase in milk production between the fall and the spring. Deliveries by producers associated with pool distributing plants and receipts at pool distributing plants are unaffected by this depooling.

### III. METHODOLOGY

Mileages used in this analysis are not actual mileages as driven by the hauler but estimated mileages as measured from each dairy farm to the plant of first receipt using two computer programs: *Maptitude*<sup>®</sup> and *MileCharter*<sup>®</sup>.<sup>7</sup> Mileages are measured from each dairy farm to the plant of first receipt via the shortest hard surface highway distance. Weighted average mileages (distances) are calculated as:

$$\text{Weighted Average Mileage} = (\sum_{i=1}^n \sum_{t=1}^{30} \sum_{j=1}^p x_{it} m_{ij}) / \sum_{i=1}^n x_i,$$

where:  $n$  is the number of delivery observations in the data set;  $t$  is the delivery day;  $x$  is the pounds of milk of farm  $i$  delivered on day  $t$ ;  $m$  is a measurement of miles from farm  $i$  to plant  $j$ ; and  $p$  is the number of plants at which a farm's milk may be received.

In this analysis, several different subsets of milk movements are used to examine the data set from different perspectives. The various subsets are as follows:

- 1) Milkshed of pool distributing plants regulated under the Pacific Northwest Order;
- 2) Class of utilization at pool distributing plants;
- 3) Region of dairy farm;
- 4) State of pool distributing plant;
- 5) Size-range of average daily delivery of dairy farm; and
- 6) Size-range of average daily receipt of pool distributing plant.

#### **Milkshed**

For November 2016 and April 2017, the milkshed of the Pacific Northwest Order's pool distributing plants consists of Grade A dairy farms located across Oregon and Washington. Each dairy farm qualifies as a "producer" under the order with producer milk pooled on the order. All Grade A milk commercially marketed by each dairy farm to pool distributing plants is represented in the data set.

#### **Class of Utilization**

Federal orders classify the use of producer milk at each plant based on what dairy products are made at the plant.<sup>8</sup> Federal orders have four classes of utilization of milk, which are as follows:

Class I: Fluid milk products (Beverage milk), Buttermilk, Eggnog;

Class II: Cream, Half&Half, Cottage Cheese, Ice Cream, Sour Cream, Yogurt;

Class III: Cheese/Whey;

Class IV: Butter, Nonfat dry milk and other dry milk products.

Class I and II represent the fresh milk market and products which are generally more perishable. Class III and IV represent manufacturing milk uses and products that are, by design, less perishable. Milk not needed for the fresh market is sent to plants that manufacture milk into storable products. Pool distributing plants, by the qualification criteria defined in §1124.7 (a/b)

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<sup>7</sup> *Maptitude*<sup>®</sup>, Caliper Corporation (<http://www.caliper.com/Maptitude/MappingSoftware.htm>). *MileCharter*<sup>®</sup>, (<http://www.milecharter.com/>)

<sup>8</sup> The classification of producer milk and other source receipts can be affected by certain accounting procedures defined in Federal order language.

have relatively high utilizations of Class I products but also have Class II uses. Pool distributing plants typically have small amounts of Class III and IV utilizations due to pool accounting factors such as shrinkage, product returns disposed of as animal feed, and bulk inventory. In addition, distributing plants often ship surplus bulk milk products, typically cream, to other plants for other than Class I use.

### **Regions of the Milkshed – Source and Destination**

The Pacific Northwest Order's milkshed is divided into four regions defining source regions. These subregions are used to aggregate the data on the location of the dairy farms delivering milk to the market. The four farm regions are: 1) Western Washington; 2) Eastern Washington; 3) Western Oregon; and 4) Eastern Oregon. The Pacific Northwest Order is also divided by state to aggregate the data based on destination, that is, the location of the plant receiving milk from farms. The two plant regions are Oregon and Washington. Smaller regions by location of plant were not possible due to the small number of distributing plants in the Eastern portions of Oregon and Washington.

### **Size-Range of Average Daily Delivery of Dairy Farm**

The average daily delivery is defined as the pounds of milk delivered by a dairy farm during the entire month divided by 30, i.e., the number of days in November and April. Fourteen categories of size-ranges are defined, ranging from dairy farms with less than 2,500 pounds delivered per day to dairy farms delivering 200,000 pounds or more per day. Smaller dairy farms' milk production may be picked up every other day or every day. Larger dairy farms' milk production is typically picked up one or more times per day.

### **Size-Range of Average Daily Receipt of Distributing Plant**

The average daily receipt is defined as the pounds of milk received by a distributing plant during the entire month to all plants divided by 30, i.e., the number of days in November and April. Pool distributing plants are divided into three categories: 1) small plants receiving less than 300,000 pounds per day on average; 2) medium-sized plants, receiving 300,000 to 600,000 pounds per day; 3) large plants, receiving more than 600,000 pounds per day.

## **IV. RESULTS**

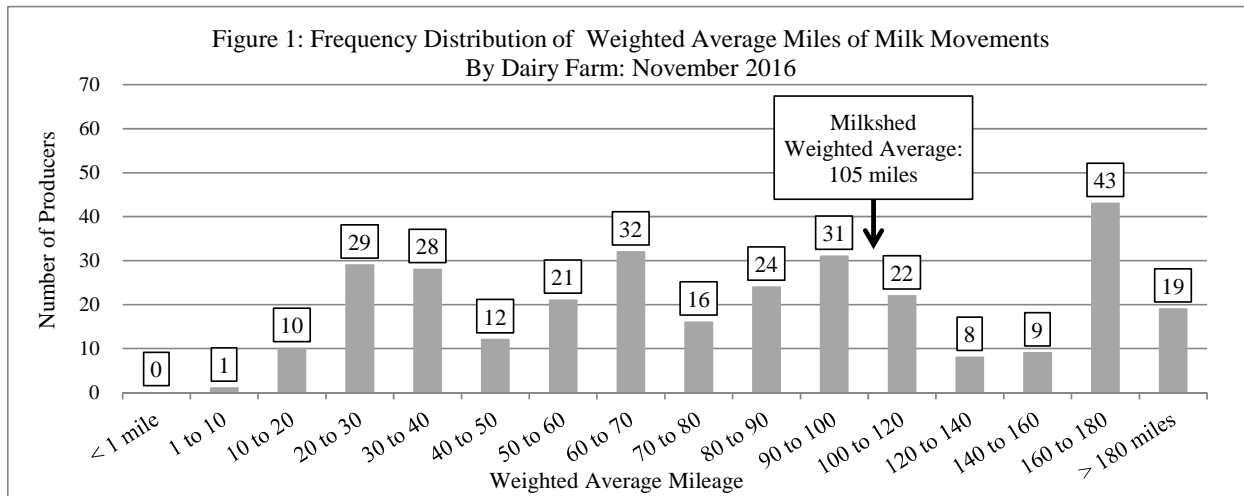
This analysis provides a breakdown of the market from a variety of perspectives relating to characteristics of dairy farms, pool distributing plants and estimates of how far milk moves to those plants. Results for November and April can be found in Appendix Table 1 and Table 2, respectively. Differences between November and April can be found in Appendix Table 3. Some caution should be used in interpreting the results in Table 3 due to slight changes in the farms represented, and farms and plants moving between size-range categories between November 2016 and April 2017.

### **Milkshed**

In November 2016 and April 2017, 377.8 million pounds of producer milk pooled under the Pacific Northwest order was received at 12 pool distributing plants. Approximately 10.8 million more pounds of milk (+6 percent) were delivered to pool distributing plants in November than in April. At the same time, milk production in Oregon and Washington was 30 million pounds of milk less (-4 percent) in November than in April. On average, each pound of milk traveled about 105 miles from farm to plant in November but only 97 miles in April. The median mileage was 17 miles lower in April (68 miles) than in November (85 miles). The shortest 10 percent of



mileages from farm to plant were less than 25 miles while the largest 10 percent of mileages were about 180 miles. Overall, more milk traveled further in November than in April. Figure 1 shows a frequency distribution of the weighted average miles each dairy farm’s milk traveled for November. The frequency distribution for April was not substantively different from November other than the resulting statistics.



### Class of Utilization

The Pacific Northwest Order categorizes milk uses into four classes: Class I, Class II, Class III, and Class IV. Pool distributing plant milk utilizations are characterized primarily by Class I uses, but often have Class II uses as well. Some distributing plants may also have small amounts of Class III and Class IV.<sup>9</sup> Utilization at distributing plants averaged about 84 percent Class I, 13 percent Class II, and about 3 percent Class III/IV in November 2016. The percentage utilization at distributing plants by Class in April was roughly similar to November. Utilizations in November 2016 versus April 2017 demonstrate the counter-seasonality of demand/supply. Class I receipts decreased from 162.3 million pounds in November to 147.0 million pounds in April, while milk production in Oregon/Washington increased from a seasonal low of 727 million pounds in November to a near peak production of 757 million pounds in April. In addition, the higher utilization relative to the lower production was associated with an increase in average miles traveled from 97 to 105 miles. Lastly, milk from 305 dairy farms was needed to supply pool distributing plants in November, while milk from only 291 dairy farms was needed in April.

### Region of the Milkshed - Source and Destination

Milk delivery patterns can change across the month with milk of a particular dairy farm being received by two or more different plants during the month which may be in two or more different regions. To discern these types of movements, the Pacific Northwest Order milkshed was divided into regions based on the location of dairy farms delivering milk to plants and also based on the location of plants receiving milk from dairy farms. Over 50 percent of milk supplying the 12 distributing plants came from dairy farms in Western Oregon and Washington. The milk of these farms traveled the least distance on average, about 50 miles. Milk supplied by dairy farms in Eastern Washington traveled a little under 160 miles, representing 45 percent of distributing

<sup>9</sup> The small amounts of Class III and IV utilizations are primarily due to pool accounting factors including: 1) shrinkage and product returns sold as animal feed, which are assigned to the lowest priced Class for the month; 2) bulk inventory; and 3) surplus bulk milk product movements to plants with Class III/IV uses.

plant receipts in November and 39 percent in April. Milk from dairy farms in Eastern Oregon represented only about four percent of all milk at distributing plants but traveled the furthest on average, about 170 miles. Also, a comparison of the amount of milk delivered from each region in November and April shows that milk from dairy farms in Eastern Washington was the primary source that balanced the fluctuating demand of pool distributing plants. It should be noted that changes in milk receipts by the State in which a plant is located in can result from: differences in demand patterns of accounts serviced by plants between regions, differences in the types of accounts serviced by plants between regions, and by shifts in accounts from plants in one region to plants in another region.

### **Size-Range of Average Daily Delivery of Dairy Farm**

Milk delivery patterns can also be examined by the distribution of dairy farms by size-range of average daily deliveries between the high distributing plant demand month of November versus the low demand month of April. Dairy farms with less than 25,000 pounds average deliveries per day were a stable source of supply for distributing plants, representing about 14 percent of producer milk receipts in both months. Milk from these smaller farms traveled the least of the three size groupings. Between November and April, there was a shift in how medium and larger sized farms supplied pool distributing plants. Medium-sized and large farms each delivered about 43 percent of all milk delivered to pool distributing plants in November. In April, medium sized farms delivered 45 percent of the milk received by pool distributing plants, while larger farms delivered a little over 40 percent. There was a decrease in miles traveled in April versus November for the three groupings defined above, in addition to the proportions that each group represented of the milk supply of pool distributing plants. This framing of the dataset parallels the regional framing above, suggesting that the larger farms of Eastern Washington are the primary source of milk that balances the shifts in demand by pool distributing plants.

### **Size-Range of Average Daily Receipt of Distributing Plant**

One last way to examine milk delivery patterns is by the distribution of plants by size-range of average daily receipt between the two months. Between November and April, all plants showed a decrease in receipts. In contrast, while milk supplies of small and medium-sized plants traveled roughly the same distance on average between the two months, milk delivered to large plants traveled about 10 miles further on average in November than in April. Similar to the caveat noted in discussion of the source and destination of milk supplies, it should be noted that changes in milk receipts by the plant size can result from: differences in demand patterns of accounts serviced by smaller versus larger plants, differences in the types of accounts serviced by smaller versus larger plants, and by shifts in accounts among plants.

## **V. CONCLUSION**

In the Pacific Northwest, milk is a particularly local agricultural commodity, i.e., it is processed close to where it is produced. The economics of milk production and processing reinforce the localness of milk. Fresh raw milk is very bulky and highly perishable and typically moves from the dairy farm to the processing plant on the same day it is produced but the demand for milk at pool distributing plants changes significantly across the seasons and contrary to seasonal changes in production.

Fluctuations in demand for milk by distributing plants result in shifting supply patterns. On average, milk of dairy farms in the Pacific Northwest region traveled about 100 miles to supply

pool distributing plants that process the majority of milk sold as fluid milk in the region during November 2016 and April 2017. Milk moving to distributing plants traveled a little further on average in the fall (105 miles), when milk production is at its low point and demand is at its peak, than in the spring (97 miles), when milk production is at or near its peak and demand is at a low point.

A comparison of average farm-to-distributing plant miles based on farm origin (source region) and farm size reveals that the larger farms of Eastern Washington are the primary source of milk that balances demand and supply in Western Oregon and Western Washington. The primary source of additional milk needed at pool distributing plants to meet higher product demand in the fall came from farms with average daily deliveries greater than 100,000 pounds. Lastly, all distributing plants, no matter what size, experience dramatic changes in demand between the fall and the spring and across the year.

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**Appendix**

**Table 1: NASS Data and Characteristics of Various Subsets of the Dataset: November 2016**

NASS Milk Production (OR/WA) 1/ 727,000,000

Aggregation Criteria	Number of Plants Receiving Producer Milk	Pounds Delivered to Pool Distributing Plants 2/	Percent of Total Pounds 3/	Average Daily Delivery of Farm to Pool Distributing Plants	Number of Producers	Percent of Total Producers 3/	Mileage From Farm to Plant 4/ 5/				
							Weighted Average	Median	Shortest 10%	Longest 10%	Standard Deviation
<b>Distributing Plants *</b>	12	194,331,268	100.0%	21,238	305	100.0%	104.5	85	23	181	61
<b>Class of Utilization</b>											
Class I	12	162,285,348	83.5%	17,736	305	100.0%	107.0	85	23	181	61
Class II	12	26,178,458	13.5%	2,861	305	100.0%	89.8	85	23	181	61
Class III/IV	10	5,867,461	3.0%	652	300	98.4%	100.6	84	25	181	60
<b>Region of Dairy Farm</b>											
Western Washington	9	45,263,374	23.3%	10,933	138	45.2%	50.1	44	14	107	36
Eastern Washington	10	88,003,048	45.3%	37,608	78	25.6%	157.4	163	96	184	41
Western Oregon	9	54,191,379	27.9%	21,764	83	27.2%	55.5	47	25	92	35
Eastern Oregon	4	6,873,467	3.5%	38,186	6	2.0%	171.3	168	13	193	64
<b>State of Receiving Plant</b>											
Oregon	7	88,172,867	45.4%	16,699	176	57.7%	95.0	63	26	177	61
Washington	5	106,158,401	54.6%	18,624	190	62.3%	112.4	107	21	182	60

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Appendix (Continued)

Table 1: NASS Data and Characteristics of Various Subsets of the Dataset: November 2016 (Continued)

Aggregation Criteria	Number of Plants Receiving Producer Milk	Pounds Delivered to Pool Distributing Plants 2/	Percent of Total Pounds 3/	Average Daily Delivery of Farm to Pool Distributing Plants	Number of Producers	Percent of Total Producers 3/	Mileage From Farm to Plant 4/ 5/				
							Weighted Average	Median	Shortest 10%	Longest 10%	Standard Deviation

**Size-Range of Average Daily Delivery of Dairy Farm 4/**

Less than 2,500	7	548,836	0.3%	762	24	7.9%	73.6	67	23	114	39
2,500 to 4,999	9	2,415,697	1.2%	2,065	39	12.8%	72.0	66	16	118	48
5,000 to 9,999	7	5,330,643	2.7%	3,291	54	17.7%	58.8	53	20	101	39
10,000 to 14,999	9	5,908,923	3.0%	7,034	28	9.2%	56.8	52	20	118	38
15,000 to 19,999	9	5,978,753	3.1%	9,965	20	6.6%	58.1	47	10	101	41
20,000 to 24,999	11	7,113,302	3.7%	12,479	19	6.2%	70.4	54	17	175	53
25,000 to 49,999	12	27,226,359	14.0%	22,135	41	13.4%	98.1	67	27	176	61
50,000 to 74,999	12	39,382,823	20.3%	45,268	29	9.5%	91.6	72	10	181	63
75,000 to 99,999	9	18,228,310	9.4%	55,237	11	3.6%	108.3	107	31	161	47
100,000 to 124,999	12	19,925,574	10.3%	66,419	10	3.3%	128.7	163	45	184	53
125,000 to 149,999	11	26,010,868	13.4%	96,337	9	3.0%	116.2	161	49	183	60
150,000 to 174,999	10	23,470,768	12.1%	111,766	7	2.3%	114.9	161	27	185	67
175,000 to 199,999	4	651,613	0.3%	7,240	3	1.0%	170.6	170	162	178	7
200,000 and greater	6	12,138,799	6.2%	36,784	11	3.6%	160.6	158	150	174	10

Less than 25,000 pounds	12	27,296,154	14.0%	4,945	184	60.3%	62.7				
25,000 to 99,999	12	84,837,492	43.7%	34,913	81	26.6%	97.2				
100,000 and greater	12	82,197,622	42.3%	68,498	40	13.1%	125.9				

**Size-Range of Average Daily Receipt of Distributing Plant 5/**

Size-Range of Average Daily Receipt of Distributing Plant 5/	Number of Plants Receiving Producer Milk	Pounds Delivered to Pool Distributing Plants 2/	Percent of Total Pounds 3/	Average Daily Receipt of Distributing Plant	Number of Producers 6/	Percent of Total Producers 3/	Weighted Average	Median	Shortest 10%	Longest 10%	Standard Deviation
Less than 300,000 Pounds	4	23,358,306	12.0%	194,653	37	12.1%	100.4	72	10	184	71
300,000 to 600,000	4	53,845,295	27.7%	448,711	117	38.4%	82.8	84	27	164	46
600,000 and greater	4	117,127,667	60.3%	976,064	264	86.6%	115.3	89	31	182	63

\* Includes a pool supply plant that qualifies as a pool distributing plant in certain months.

1/ National Agricultural Statistics Service (NASS) - Milk Production.

2/ Partially audited payroll information. May differ slightly from pool totals. Pounds often do not reflect entire production of counted producers.

3/ May not add due to rounding.

4/ Size-Range category of each farm is based on its total monthly production pooled on the order, no matter the destination.

5/ Size-Range category of each plant is based on its total producer milk receipts.

6/ Producer counts do not add to total for other groupings due to certain farms' milk being received at multiple plants.

Appendix (Continued)

Table 2: NASS Data and Characteristics of Various Subsets of the Dataset: April 2017

NASS Milk Production (OR/WA) 1/ 757,000,000

Aggregation Criteria	Number of Plants Receiving Producer Milk	Pounds Delivered to Pool Distributing Plants 2/	Percent of Total Pounds 3/	Average Daily Delivery of Farm to Pool Distributing Plants	Number of Producers	Percent of Total Producers 3/	Mileage From Farm to Plant 4/ 5/				
							Weighted Average	Median	Shortest 10%	Longest 10%	Standard Deviation
<b>Distributing Plants *</b>	12	183,507,211	100.0%	21,020	291	100.0%	96.5	68	23	179	59
<b>Class of Utilization</b>											
Class I	12	147,028,472	80.1%	16,842	291	100.0%	98.7	68	23	179	59
Class II	12	26,953,016	14.7%	3,087	291	100.0%	83.7	68	23	179	59
Class III/IV	11	9,525,724	5.2%	1,180	269	92.4%	100.5	73	23	181	61
<b>Region of Dairy Farm</b>											
Western Washington	9	49,862,557	27.2%	11,957	139	47.8%	47.9	48	16	101	31
Eastern Washington	10	71,320,161	38.9%	34,454	69	23.7%	156.0	163	72	184	44
Western Oregon	8	55,418,992	30.2%	23,991	77	26.5%	54.8	49	27	92	31
Eastern Oregon	4	6,905,501	3.8%	38,364	6	2.1%	169.0	168	13	193	67
<b>State of Receiving Plant</b>											
Oregon	7	84,364,505	46.0%	17,467	161	55.3%	90.4	63	27	177	60
Washington	5	99,142,706	54.0%	20,400	162	55.7%	101.8	72	20	181	59

Appendix (Continued)

Table 2: NASS Data and Characteristics of Various Subsets of the Dataset: April 2017 (Continued)

Aggregation Criteria	Number of Plants Receiving Producer Milk	Pounds Delivered to Pool Distributing Plants 2/	Percent of Total Pounds 3/	Average Daily Delivery of Farm to Pool Distributing Plants	Number of Producers	Percent of Total Producers 3/	Mileage From Farm to Plant 4/ 5/					
							Weighted Average	Median	Shortest 10%	Longest 10%	Standard Deviation	
<b>Size-Range of Average Daily Delivery of Dairy Farm 4/</b>												
Less than 2,500	5	304,375	0.2%	780	13	4.5%	62.3	63	22	95	30	
2,500 to 4,999	8	2,353,507	1.3%	1,783	44	15.1%	71.9	72	15	113	35	
5,000 to 9,999	7	5,135,692	2.8%	3,230	53	18.2%	58.7	53	20	109	46	
10,000 to 14,999	9	5,037,073	2.7%	6,996	24	8.2%	50.6	49	10	94	37	
15,000 to 19,999	8	5,743,297	3.1%	10,076	19	6.5%	47.4	41	26	64	22	
20,000 to 24,999	8	8,395,135	4.6%	14,728	19	6.5%	70.5	60	23	175	45	
25,000 to 49,999	11	30,997,666	16.9%	21,984	47	16.2%	89.6	63	23	174	60	
50,000 to 74,999	9	34,364,649	18.7%	45,820	25	8.6%	90.8	104	10	181	60	
75,000 to 99,999	10	17,414,237	9.5%	52,770	11	3.8%	94.5	92	33	162	54	
100,000 to 124,999	11	18,038,351	9.8%	54,662	11	3.8%	116.1	159	45	184	59	
125,000 to 149,999	9	11,809,094	6.4%	78,727	5	1.7%	94.1	67	51	193	52	
150,000 to 174,999	10	23,307,469	12.7%	110,988	7	2.4%	112.9	165	27	179	68	
175,000 to 199,999	5	15,724,284	8.6%	131,036	4	1.4%	123.0	158	40	184	63	
200,000 and greater	5	4,882,382	2.7%	18,083	9	3.1%	163.2	168	144	175	13	
Less than 25,000 pounds	11	26,969,079	14.7%	5,227	172	59.1%	59.6					
25,000 to 99,999	12	82,776,552	45.1%	33,244	83	28.5%	91.1					
100,000 and greater	11	73,761,580	40.2%	68,298	36	12.4%	116.1					

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<b>Size-Range of Average Daily Receipt of Distributing Plant 5/</b>							Average Daily Receipt of Distributing Plant	Number of Producers 6/				
Less than 300,000 Pounds	4	22,324,171	12.2%	186,035	33	11.3%	100.0	73	10	184	72	
300,000 to 600,000	4	52,318,878	28.5%	435,991	95	32.6%	81.5	73	27	127	46	
600,000 and greater	4	108,864,162	59.3%	907,201	232	79.7%	103.1	64	30	181	62	

\* Includes a pool supply plant that qualifies as a pool distributing plant in certain months.

1/ National Agricultural Statistics Service (NASS) - Milk Production.

2/ Partially audited payroll information. May differ slightly from pool totals. Pounds often do not reflect entire production of counted producers.

3/ May not add due to rounding.

4/ Size-Range category of each farm is based on its total monthly production pooled on the order, no matter the destination.

5/ Size-Range category of each plant is based on its total producer milk receipts.

6/ Producer counts do not add to total for other groupings due to certain farms' milk being received at multiple plants.



Appendix (Continued)

Table 3: NASS Data and Characteristics of Various Subsets of the Dataset: April 2017 Minus November 2016

NASS Milk Production (OR/WA) 1/ 30,000,000

Aggregation Criteria	Number of Plants Receiving Producer Milk	Pounds Delivered to Pool Distributing Plants 2/	Total Pounds, % Point Change	Average Daily Delivery of Farm to Pool Distributing Plants	Number of Producers	Total Producers, % Point Change	Mileage From Farm to Plant 4/ 5/				
							Weighted Average	Median	Shortest 10%	Longest 10%	Standard Deviation
<b>Distributing Plants *</b>	0	-10,824,057	0.0	-218	-14	0.0	-7.9	-17	0	-2	-2
<b>Class of Utilization</b>											
Class I	0	-15,256,877	-3.4	-894	-14	0.0	-8.4	-17	0	-2	-2
Class II	0	774,557	1.2	226	-14	0.0	-6.1	-17	0	-2	-2
Class III/IV	1	3,658,262	2.2	528	-31	-5.9	-0.2	-11	-2	0	1
<b>Region of Dairy Farm</b>											
Western Washington	0	4,599,183	3.9	1,024	1	2.5	-2.2	4	2	-6	-5
Eastern Washington	0	-16,682,887	-6.4	-3,154	-9	-1.9	-1.4	0	-24	0	3
Western Oregon	-1	1,227,613	2.3	2,227	-6	-0.8	-0.8	2	2	0	-4
Eastern Oregon	0	32,034	0.2	178	0	0.1	-2.3	0	0	0	3
<b>State of Receiving Plant</b>											
Oregon	0	-3,808,362	0.6	767	-15	-2.4	-4.6	0	1	0	-1
Washington	0	-7,015,695	-0.6	1,775	-28	-6.6	-10.6	-35	-1	-1	-2

Appendix (Continued)

Table 3: NASS Data and Characteristics of Various Subsets of the Dataset: April 2017 Minus November 2016 (Continued)

Aggregation Criteria	Number of Plants Receiving Producer Milk	Pounds Delivered to Pool Distributing Plants 2/	Total Pounds, % Point Change	Average Daily Delivery of Farm to Pool Distributing Plants	Number of Producers	Total Producers, % Point Change	Mileage From Farm to Plant 4/ 5/					
							Weighted Average	Median	Shortest 10%	Longest 10%	Standard Deviation	
<b>Size-Range of Average Daily Delivery of Dairy Farm 4/</b>												
Less than 2,500	-2	-244,461	-0.1	18	-11	-3.4	-11.3	-4	-1	-19	-8	
2,500 to 4,999	-1	-62,190	0.0	-282	5	2.3	0.0	6	-1	-5	-13	
5,000 to 9,999	0	-194,951	0.1	-61	-1	0.5	-0.1	0	0	8	7	
10,000 to 14,999	0	-871,850	-0.3	-38	-4	-0.9	-6.2	-3	-10	-24	0	
15,000 to 19,999	-1	-235,456	0.1	111	-1	0.0	-10.7	-6	16	-37	-19	
20,000 to 24,999	-3	1,281,833	0.9	2,249	0	0.3	0.1	6	6	0	-7	
25,000 to 49,999	-1	3,771,307	2.9	-151	6	2.7	-8.4	-4	-4	-2	-1	
50,000 to 74,999	-3	-5,018,174	-1.5	552	-4	-0.9	-0.8	32	0	0	-3	
75,000 to 99,999	1	-814,073	0.1	-2,467	0	0.2	-13.8	-15	2	1	7	
100,000 to 124,999	-1	-1,887,223	-0.4	-11,757	1	0.5	-12.6	-4	0	0	6	
125,000 to 149,999	-2	-14,201,774	-6.9	-17,609	-4	-1.2	-22.2	-94	2	10	-8	
150,000 to 174,999	0	-163,299	0.6	-778	0	0.1	-2.0	4	0	-6	1	
175,000 to 199,999	1	15,072,671	8.2	123,796	1	0.4	-47.6	-12	-122	6	56	
200,000 and greater	-1	-7,256,417	-3.6	-18,701	-2	-0.5	2.6	10	-6	1	2	
<b>Size-Range of Average Daily Receipt of Distributing Plant 5/</b>												
Less than 25,000 pounds	-1	-327,075	0.7	282	-12	-1.2	-3.0					
25,000 to 99,999	0	-2,060,940	1.5	-1,669	2	2.0	-6.1					
100,000 and greater	-1	-8,436,042	-2.1	-200	-4	-0.7	-9.7					

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Aggregation Criteria	Number of Plants Receiving Producer Milk	Pounds Delivered to Pool Distributing Plants 2/	Total Pounds, % Point Change	Average Daily Receipt of Distributing Plant	Number of Producers	Total Producers, % Point Change	Weighted Average	Median	Shortest 10%	Longest 10%	Standard Deviation	
				5/	6/							
<b>Size-Range of Average Daily Receipt of Distributing Plant 5/</b>												
Less than 300,000 Pounds	0	-1,034,135	0.1	-8,618	-4	-0.8	-0.4	1	0	0	1	
300,000 to 600,000	0	-1,526,417	0.8	-12,720	-22	-5.7	-1.3	-11	0	-37	-1	
600,000 and greater	0	-8,263,505	-0.9	-68,863	-32	-6.8	-12.2	-25	-1	-1	-2	

\* Includes a pool supply plant that qualifies as a pool distributing plant in certain months.

1/ National Agricultural Statistics Service (NASS) - Milk Production.

2/ Partially audited payroll information. May differ slightly from pool totals. Pounds often do not reflect entire production of counted producers.

3/ May not add due to rounding.

4/ Size-Range category of each farm is based on its total monthly production pooled on the order, no matter the destination.

5/ Size-Range category of each plant is based on its total producer milk receipts.

6/ Producer counts do not add to total for other groupings due to certain farms' milk being received at multiple plants.