

**MILK HAULING CHARGES IN THE
UPPER MIDWEST MARKETING AREA
MAY 2007**



Staff Paper 07-02

Prepared by:
Corey Freije

December 2007

Federal Milk Market Administrator's Office
4570 W. 77th Street, Suite 210
Minneapolis, MN 55435-5037

**MILK HAULING CHARGES IN THE UPPER MIDWEST MARKETING AREA
MAY 2007**

Corey Freije

"The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer."

ABSTRACT

This study investigated the milk hauling charges, to the first point of delivery, for the producers associated with the Upper Midwest Marketing Area for May 2007. There were 22,361 producers whose payroll information was received by the Upper Midwest Milk Market in May of 2007. The data for hauling charges and milk production were obtained from handlers who had submitted producer payrolls to the Market Administrator's office. Comparisons were made between the producer's milk volume and farm location using averages. For the purposes of this analysis, and unless otherwise specified, the "average" hauling rates and/or charges reflect weighted averages. Major findings and conclusions for the producers evaluated in this study are as follows:

- 1) The weighted average hauling charge for producers participating on the Upper Midwest Order was 25.00 cents per hundredweight.
- 2) For the states from which the producer milk was received into this market, Idaho, Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Montana, Nebraska, North Dakota, Ohio, Pennsylvania, South Dakota, Washington, and Wisconsin, the average state hauling charge ranged from 0.03 to 1.85 dollars per hundredweight.
- 3) In general, the average hauling rate per hundredweight charged decreased as the farm size and/or milk volume increased. However, hauling distances and competition between handlers were also found to be major factors.
- 4) Hauling rates, in counties located in the Upper Midwest Marketing Area, were noticeably higher than in most counties located outside fluid milkshed areas and in areas located the furthest distance from major Class I fluid markets. The highest average hauling charges were found in counties such as the North Dakota counties of Cass, La Moure, Barnes, and Nelson, the South Dakota counties of Edmunds and Brown and the Minnesota counties of Pennington, Clearwater, and Norman. The average hauling charges for each of those counties exceeded 63 cents per hundredweight.
- 5) For those counties located in the Upper Midwest Marketing Area, the lowest average hauling charges were found in the Minnesota county of Watonwan, and the Wisconsin counties of Eau Claire, Lincoln, Langlade, Marathon, Clark, Marquette, Wood, Milwaukee, and Forest. The average hauling charges for each of these counties was found to be 15 cents or less per hundredweight.
- 6) The majority of handlers in the Upper Midwest Order charged producers a flat hauling value regardless of the volume of milk being marketed. When handlers charge a flat rate, the actual hauling charge per hundredweight declines as the producer's milk volume increases. This study found that a specific county's average hauling charge was greatly influenced by its farm composition regarding farm sizes.
- 7) The data from this study showed producers from two states supplied approximately 81% of the total milk associated with this order. The Wisconsin producers supplied 60%; Minnesota producers supplied 21% of the order's producer milk.

TABLE OF CONTENTS

	<u>Page</u>
I. INTRODUCTION.....	1
II. AVERAGE MILK HAULING CHARGES - FOR THE MILK PROCUREMENT AREA AND BY STATE.....	1
III. AVERAGE PRODUCER MILK DELIVERIES - FOR THE REPORTED PAYROLL AND BY STATE.....	3
IV. PERCENTAGE OF PRODUCER MILK DELIVERIES BY STATE.....	4
V. PERCENT OF PRODUCERS ON THE MARKET BY STATE.....	6
VI. COMPARISON OF THE NUMBER OF PRODUCERS MAKING MILK DELIVERIES VERSUS TOTAL MILK DELIVERIES ON THE MARKET BY STATE.....	7
VII. AVERAGE MILK HAULING CHARGE BY SIZE RANGE OF PRODUCER DELIVERY.....	8
VIII. PERCENTAGE OF TOTAL PRODUCERS IN THE MARKET IN EACH SIZE RANGE OF PRODUCER DELIVERY.....	12
IX. AVERAGE MILK HAULING CHARGE BY STATE AND COUNTY.....	13
X. FACTORS CONTRIBUTING TO DIFFERENCES IN THE AMOUNT OF HAULING CHARGES.....	14
XI. REGRESSION ANALYSIS.....	17
XII. SUMMARY.....	19
APPENDIX.....	20

MILK HAULING CHARGES IN THE UPPER MIDWEST MARKETING AREA MAY 2007

Corey Freije¹

I. INTRODUCTION

For May 2007, Upper Midwest Marketing Order bulk milk hauling charges, to the first point of delivery, were examined for 22,361 dairy producers whose milk was associated with the market. This study included a number of producers whose milk was not associated with the market because of unusual price relationships and/or performance requirements, or partially pooled on a different Federal order. For feasibility purposes, most of the data pertaining to those producers was simply included in this study.

The hauling charges included in this study consisted of hauling deductions shown on the producer payrolls submitted, by reporting handlers, to this Market Administrator's office. The hauling charges do not necessarily reflect the actual cost of the hauling. In many cases, handlers or cooperatives have subsidized milk hauling costs or absorbed additional hauling costs as operating expenses. Additionally, some producers pay the hauling costs directly. This study broke down and categorized the hauling charges based on state, county, and producer size groups.

For this hauling study, the month of May 2007 was chosen because May historically represents a period with high supplies of producer milk and rather minimum Class I demands. The source of all data used for this study, including producer receipts and payroll information, was derived from pooling handler records for May 2007.

II. AVERAGE MILK HAULING CHARGES - FOR THE MILK PROCUREMENT AREA AND BY STATE

In May of 2007, the weighted average hauling charge for all producer milk reported to the Upper Midwest Market Administrator was 25.00 cents per hundredweight. This study revealed that of the States comprising the order, the State of Wisconsin had less than the

¹ Corey Freije is an Agricultural Economist with the Market Administrator's Office, Minneapolis, Minnesota. Assisting Dr. Freije was Rachel M. Benecke of the Upper Midwest Market Administrator's office.

market's average hauling charge. The average hauling charges for producers located in Wisconsin was 19.74 cents per hundredweight.

The study revealed that North Dakota had the highest average hauling charge of any state with producer milk consistently associated with the Upper Midwest Marketing Area. The average hauling rate for dairy producers associated with the Upper Midwest market for North Dakota was 97.00 cents per hundredweight. (See Table 1.)

Table 1

Average Hauling Charge, by State and for the Marketing Area for May 2007

<u>State</u>	<u>Average Hauling Charge</u> (per cwt.)
Illinois	\$.2699
Iowa	\$.2511
Michigan	\$.3966
Minnesota	\$.2476
North Dakota	\$.9700
South Dakota	\$.5656
Wisconsin	\$.1974
Other ²	\$.7007
Simple Average	\$.5611
Weighted Market Average	\$.2500

The average hauling charges, in cents per hundredweight and by state, for producers located in Wisconsin were the lowest average hauling charge of any of the states with producer milk consistently associated with the Upper Midwest Marketing Order. The average hauling charged to producers located in Wisconsin was only 19.74 cents per hundredweight, 36.37 cents below the market's simple average and 5.26 cents per hundredweight below the weighted average for May 2007.

The producers located in North Dakota, on the other hand, had the highest average hauling charge of any state continuously on the market. The average hauling charge to producers

² Other is comprised of the states Idaho, Indiana, Kansas, Missouri, Montana, Nebraska, Ohio, Pennsylvania, and Washington.

located in North Dakota was 97.00 cents per hundredweight of milk marketed and was 40.89 cents above the simple market average for that same year. The study found that the North Dakota producers associated with the market were physically spread-out and were located in 28 individual North Dakota counties for May 2007. The study acknowledges that in many cases, the North Dakota producer milk was moved long distances in order to be marketed in the nearest dairy manufacturing plant. The data analyzed, in this study, indicates that the North Dakota average hauling charges are strongly influenced by the longer hauling distances and by the lack of local competing dairy manufacturing operations or handlers. The study also acknowledges that most of North Dakota's producers are distantly located from major Class I markets. The study finds that the actual cost of hauling the longer distances and a simple lack of market competition explain the higher hauling rates being charged in North Dakota.

III. AVERAGE PRODUCER MILK DELIVERIES - FOR THE REPORTED PAYROLL AND BY STATE

This study found that the individual producer's milk volume actually becomes an important factor in the producer's average hauling charge on a per hundredweight basis. In May of 2007, the Upper Midwest monthly market average producer milk delivery was 144,259 pounds, or about 4,654 pounds per day. Excluding Nebraska, Michigan, Idaho and Montana reduces this average to 140,215 pounds while the median falls to 77,147 pounds. The significantly lower median compared to the mean indicates that there are a considerable number of producers with monthly average production below the mean, while there are relatively few very large producers. The average producer in the States of Minnesota, Illinois, and Wisconsin had less than the market's average producer monthly milk deliveries. The average delivery of milk for producers located in these three states was 136,000, 125,000 and 138,000 pounds, respectively. This study also revealed that the State of Michigan and the States in the Other category had by far the highest average producer milk deliveries associated with the Upper Midwest Marketing Area. The average delivery for these states was 672,000 and 939,000 pounds, respectively. The May 2007 average producer milk volume, by state, is detailed in Table 2.

Table 2

Average Producer Delivery, by State and for the Marketing Area for May 2007

<u>State</u>	<u>Producer Average Monthly Delivery</u> (1,000 pounds)
Illinois	125
Iowa	147
Michigan	672
Minnesota	136
North Dakota	161
South Dakota	314
Wisconsin	138
Other	<u>939</u>
State	
Simple Average³	634
Median	154
Producer	
Average	144
Median	73

As shown above, this study revealed that the Upper Midwest state median producer milk delivery was 154,304 pounds. In this scenario, the median falls roughly 479,587 pounds below the state average of 633,891 pounds. This difference reflects the fact that the milk production of a large number of small farmers is offset by the production of only a few large farms.

IV. PERCENTAGE OF PRODUCER MILK DELIVERIES BY STATE

In May 2007, dairy producers from three states delivered the majority of the milk associated with the Upper Midwest Order. The State of Wisconsin producers delivered the most milk of any of the states, by supplying 60.2 percent of the total milk volume associated with the market. Producers from the States of Minnesota and Iowa were second and third in milk volume supplied to the order, respectively. The volume of producer milk delivered by any of the remaining states (individually) was 3.7 percent or less. (See Table 3 and Chart 1.)

³ The simple average is calculated on the disaggregated state data for "Other", this practice puts comparatively less weight on the states with smaller delivery volumes.

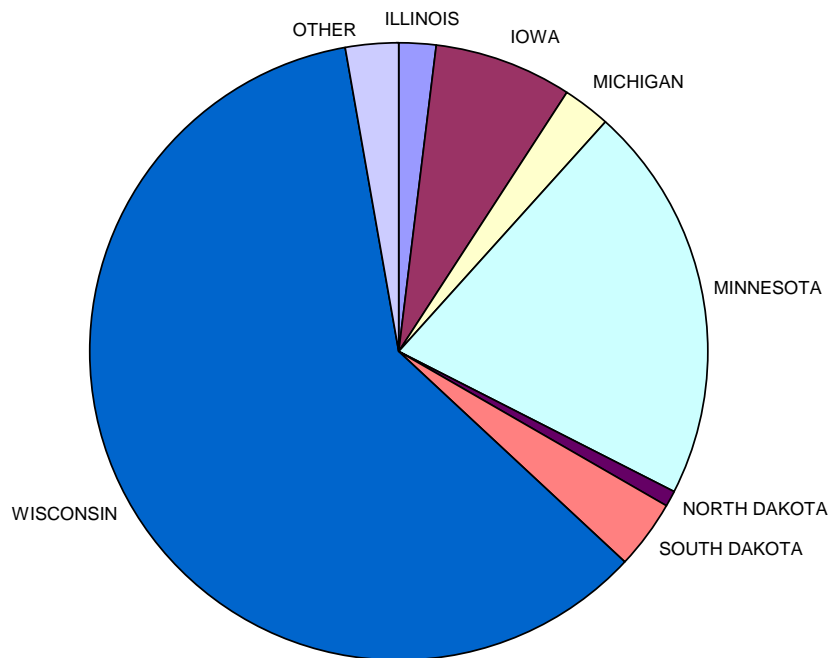
Table 3

Producer Milk Deliveries, by State and for the Marketing Area for May 2007

<u>State</u>	<u>Producer Deliveries (Market Share)</u>
Illinois	2.0%
Iowa	7.0%
Michigan	2.5%
Minnesota	20.9%
North Dakota	0.8%
South Dakota	3.7%
Wisconsin	60.2%
Other	2.9%

Chart 1

Percentage of Producer Milk Deliveries by State for May 2007



Other - Idaho, Indiana, Kansas, Missouri, Montana, Nebraska, Ohio, Pennsylvania, and Washington.

V. PERCENT OF PRODUCERS ON THE MARKET BY STATE

In this study, producer numbers were used to calculate the average producer farm size, regarding milk volumes, and the total market share of producers for each state. In May of 2007, there were 22,361 producers associated with the Upper Midwest Marketing Order. The State of Wisconsin had the most producers of any state, with 62.9 percent of the total producers delivering to the market. The State of Minnesota had the second highest number of producers with 22.2 percent. The study found that each of the remaining states had only a minimum number or percentage of producers on the market. (See Table 4 and Chart 2.)

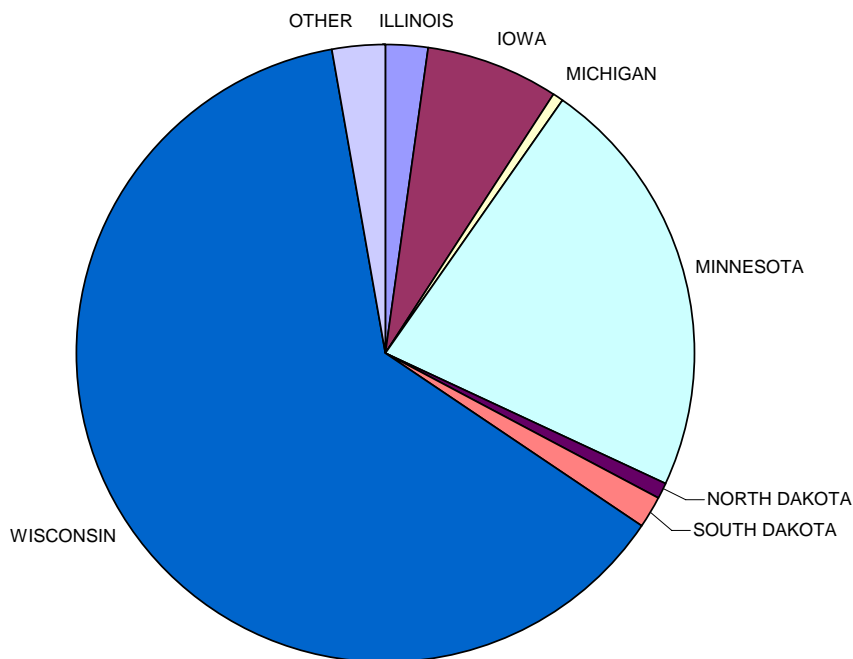
Table 4

**Percent of Producers Making Deliveries, by State and for the Marketing Area
for May 2007**

<u>State</u>	<u>Producers Making Deliveries</u> (Market Share)
Illinois	2.3%
Iowa	6.9%
Michigan	0.5%
Minnesota	22.2%
North Dakota	0.7%
South Dakota	1.7%
Wisconsin	62.9%
Other	2.7%

Chart 2

Percent of Producers Making Deliveries by State for May 2007



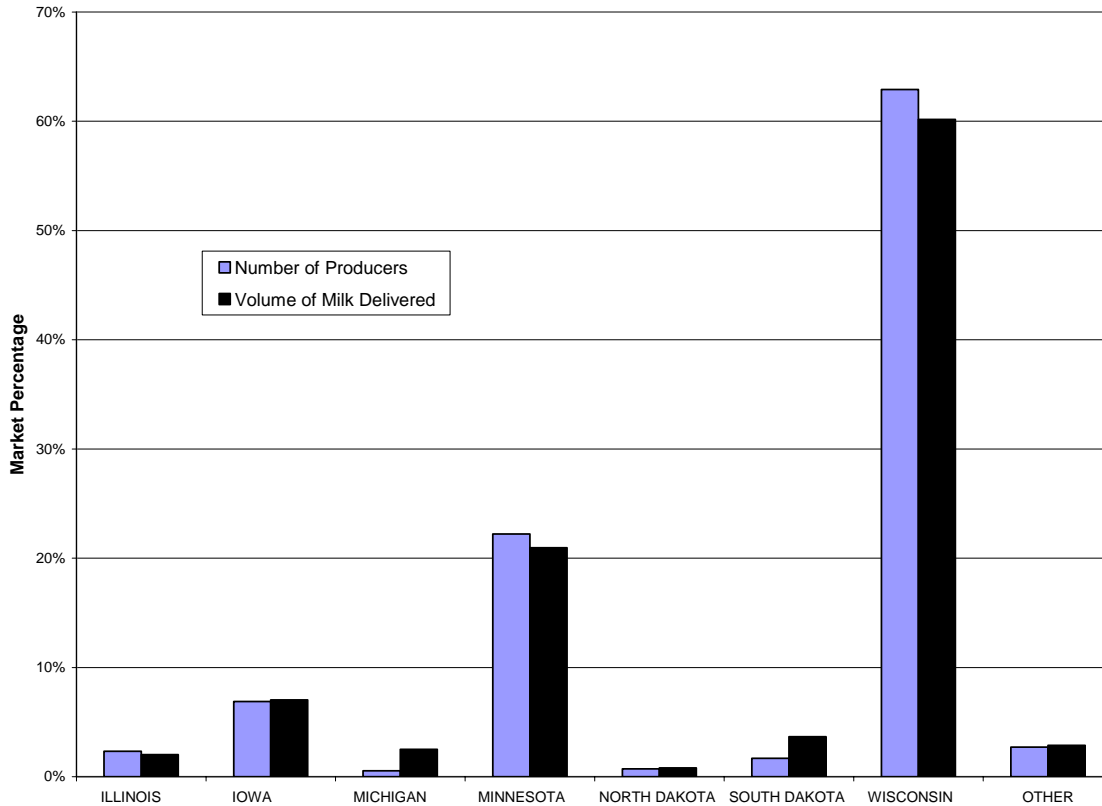
VI. COMPARISON OF THE NUMBER OF PRODUCERS MAKING MILK DELIVERIES VERSUS TOTAL MILK DELIVERIES ON THE MARKET BY STATE

The following chart compares the volume percentage of producer milk deliveries with the percentage of producers on the market, for May of 2007. The data in this chart shows that the percentage of producer milk deliveries from the Other states drastically exceeds Other's percentage of producers associated with the market. This is the result of a strong representation of much larger than market average dairy producers from the Other states. The average producer milk volume for producers located in the Other states was 938,650 pounds. Michigan and South Dakota also had a strong percentage of these larger than market average dairy producers on the market. This representation of larger than average producer sizes is demonstrated in the chart below. The very opposite is observed when examining the data representing the States of Minnesota and Wisconsin. For each of these

two states, the percentage of total producers, associated with the market, noticeably exceeds the percentage of producer milk deliveries. The study concludes that these two states had below market average producer sizes.

Chart 3

Producer Numbers versus Milk Volume for May 2007



VII. AVERAGE MILK HAULING CHARGE BY SIZE RANGE OF PRODUCER DELIVERY

The data shown in Table 5 indicates that there are several other factors that contribute to fluctuating hauling charges. The study simply acknowledges that the aforementioned relationship between farm location and distances to competing dairy plant manufacturing operations simply does not explain all of the variation in average hauling charges. This study found that even though a specific dairy producer may be located a very long distance from the Upper Midwest market’s largest fluid milk disposition area; it does not necessarily mean that this specific producer will pay the market’s highest rate per hundredweight for

hauling. This study recognizes that other factors exist; including the fact that a dairy producer's herd size or milk volume usually influences the producer's cost of hauling.

The data in Table 5 breaks down the market's dairy producers into eight evenly proportioned producer milk volume categories or size ranges. The table compares the weighted average milk hauling charges for these separate size ranges for the eight highest producing states involved in the market's pool for May 2007. The eight individual size ranges each originally represented approximately 12.5 percent of the total milk on the entire Upper Midwest market in 2001. Since 2001, producer milk has migrated from the lower size categories to the larger categories. The data presented in Table 5 show a strong indication that as the producer's milk volume tends to increase, the average hauling charge per hundredweight has the tendency to decrease.

Table 5

**Average Hauling Charge, by Size Range of Monthly Producer Deliveries,
by State, for May 2007
(per cwt.)**

Size	IL	IA	MI	MN	ND	SD	WI	Other	Average
less than 60,000	\$0.3873	\$0.3313	\$0.4780	\$0.3228	\$1.1274	\$0.7118	\$0.2726	\$0.7671	\$0.6071
60,000 to 90,000	\$0.2318	\$0.2257	\$0.3989	\$0.2641	\$1.0276	\$0.6111	\$0.1910	\$0.6621	\$0.5150
90,000 to 125,000	\$0.1845	\$0.1867	\$0.4198	\$0.2130	\$0.9181	\$0.5769	\$0.1533	\$0.6191	\$0.4134
125,000 to 190,000	\$0.1566	\$0.1705	\$0.4046	\$0.1694	\$0.8142	\$0.5166	\$0.1304	\$0.6343	\$0.5193
190,000 to 370,000	\$0.1644	\$0.1596	\$0.3827	\$0.1362	\$0.7770	\$0.4894	\$0.1031	\$0.5747	\$0.4035
370,000 to 850,000	\$0.0699	\$0.1587	\$0.3980	\$0.1044	\$0.9576	\$0.3385	\$0.0690	\$0.6298	\$0.5034
850,000 to 2 million	\$0.2000	\$0.1665	\$0.3182	\$0.0842	\$0.2842	\$0.3358	\$0.0565	\$0.4486	\$0.2484
2 million or more	\$0.5000	\$0.2211	\$0.2500	\$0.0805	\$0.0624	\$0.1692	\$0.0371	\$0.5516	\$0.3461
Average⁴	\$0.2368	\$0.2025	\$0.3813	\$0.1718	\$0.7460	\$0.4687	\$0.1266	\$0.6109	

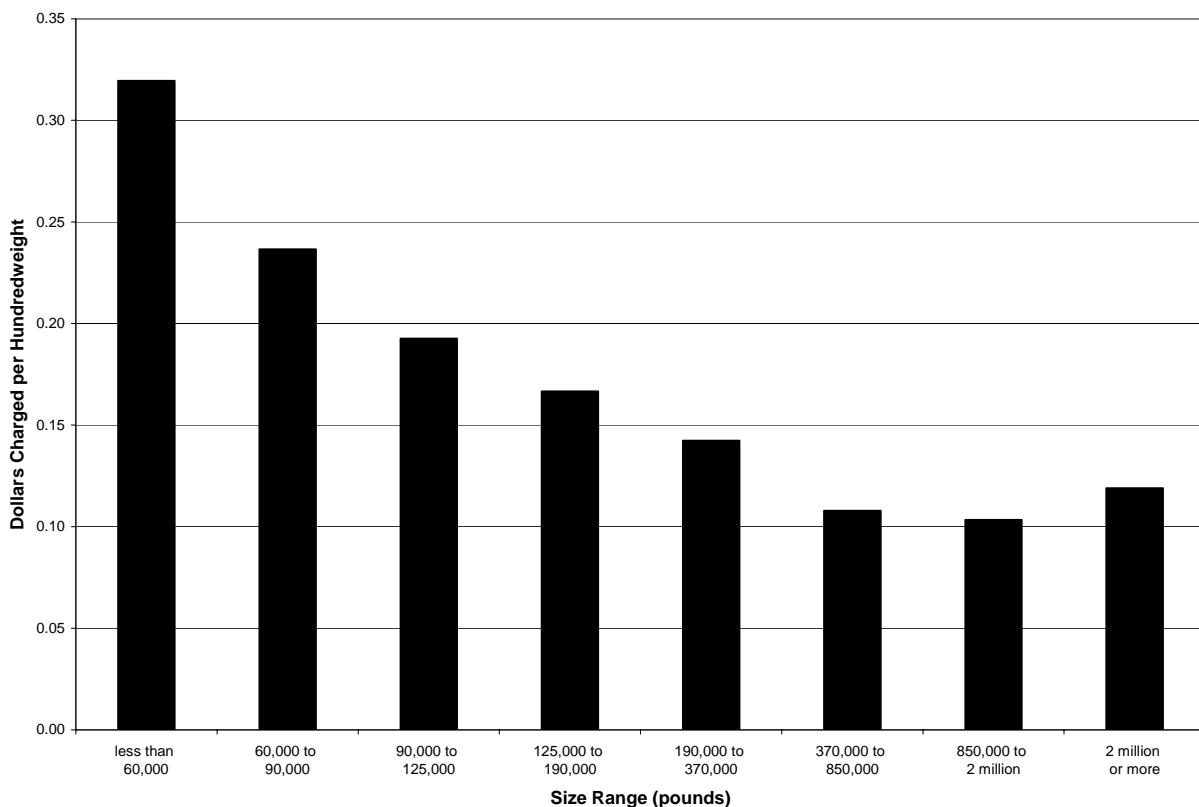
The study acknowledges that there are several major factors causing differences in hauling charges between individual producer sizes. The most obvious factor responsible for influencing the producer's hauling rate per hundredweight, by herd size range, is that most Upper Midwest handlers charge a fixed hauling dollar value to dairy producers, regardless of volume of milk the particular producer is marketing. Therefore, as one of these producer's production increases, his or her hauling charge per hundredweight will

⁴ The column averages for each State in Table 5 are weighted differently than the State averages in Table 1. Table 5 averages the hauling charge over the entire distribution of producer size ranges while Table 1 is weighted according to volume.

automatically decrease. This increase/decrease situation is noticeably apparent when examining most of the data shown in Table 5. Further, this study finds that nearly 80 percent of the producer milk is procured from the States of Minnesota and Wisconsin. The study also finds that these two states have more small dairy producers. Many of these producers are generally located within the vicinity of multiple milk processors. Therefore, these producers will apparently pay for shorter hauling distances, and therefore their hauling charges on a per hundredweight basis is going to be less than similar size producers located in other parts of the market's procurement area. The detail in Chart 4 shows the average hauling charge, by size range, for all producer milk associated with the market, for May 2007.

Chart 4

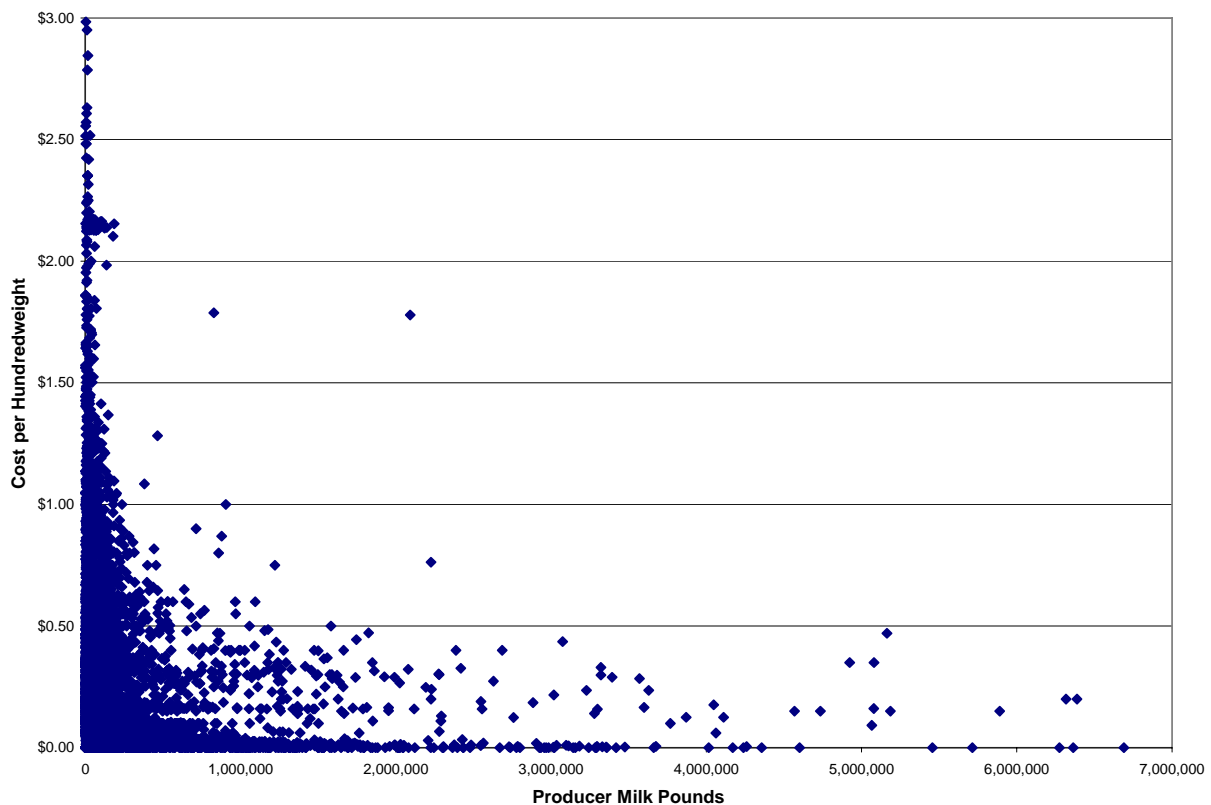
Average Hauling Charge, by Size Range, of Monthly Producer Deliveries for May 2007



The detail for each state, size categories, and the influence of the aforementioned volume factor is reflected in the producer data plotted on the chart below. In Chart 5, all producers associated with the Upper Midwest milk marketing order during May 2007 have been plotted. This study found that 98 percent of the dairy producers were charged 97 cents or less per hundredweight for their hauling charges and had marketed less than 1 million pounds of milk.

Chart 5

Upper Midwest Marketing Area Producer Hauling Charges for May 2007



As mentioned above, one factor that contributes to varying hauling rate charges is the dairy producer's location to the market, or those areas possessing strong procurement competition among fluid dairy processors and/or cheese manufacturing plants. This factor is quite noticeable in the milkshed areas found in Minnesota and Wisconsin. The study finds that lower hauling charges in these areas reflect strong procurement competition

accompanied by shorter hauling distances between dairy farm operations and dairy manufacturing plants.

VIII. PERCENTAGE OF TOTAL PRODUCERS IN THE MARKET IN EACH SIZE RANGE OF PRODUCER DELIVERY

Table 6 represents all producers associated with the Upper Midwest market during May 2007. The producers are, as was the case in Table 5, categorized into eight evenly proportioned size groups or size ranges. The size ranges each represent about 12.5 percent of the total producer milk associated with the Upper Midwest Marketing Order. The right hand column in Table 6 represents the actual percentage of producers representing each size range. The data in Table 6 shows that about 50 percent of the producer milk associated with this marketing order was actually produced by the smallest 85.7 percent of producers and/or by the largest 14.3 percent of producers.

Table 6

Percent of Producers, by Size Range, in the Upper Midwest Marketing Area for May 2007

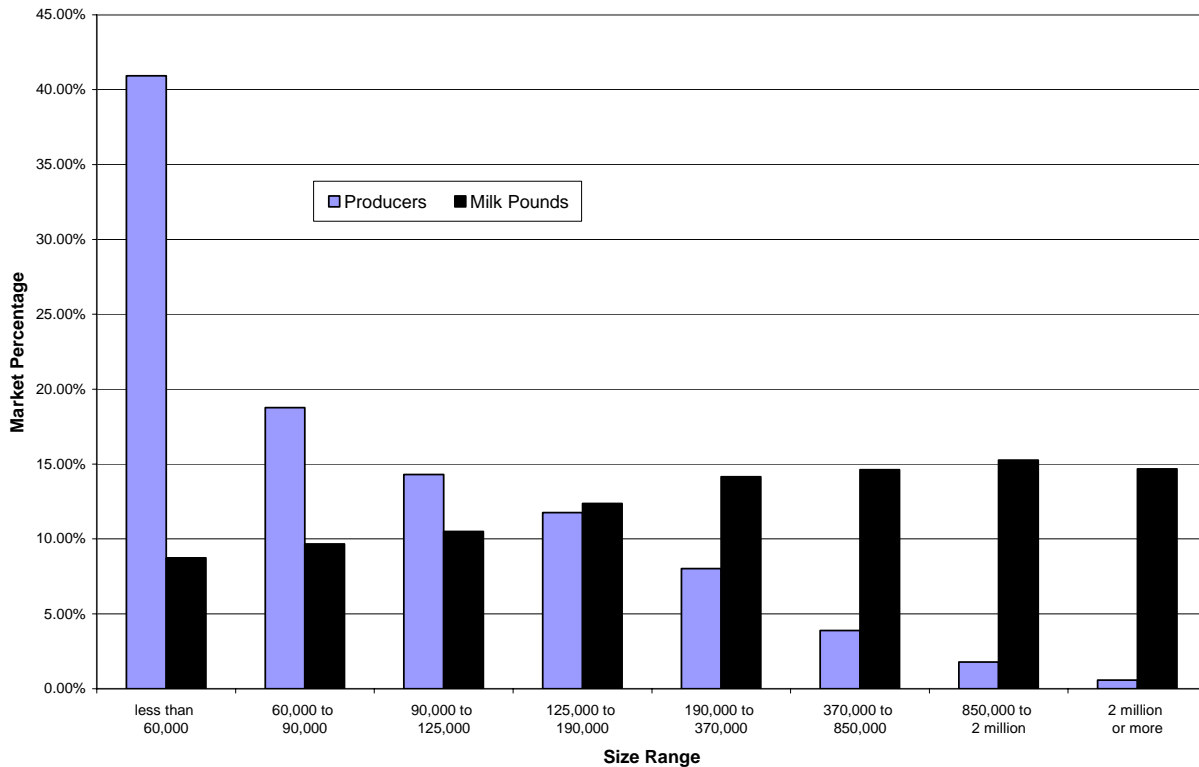
<u>Size Range</u>		<u>Percent of Producers on the Market</u>
<u>Equal to or More than</u> ----- (Pounds) -----	<u>Less Than</u> -----	<u>Order 30</u> ----- (Market Percentage) -----
-	60,000	40.92%
60,000	90,000	18.76%
90,000	125,000	14.30%
125,000	190,000	11.76%
190,000	370,000	8.02%
370,000	850,000	3.89%
850,000	2,000,000	1.78%
2,000,000	-	0.57%
Total		100%

The data in Chart 6 categorizes all Upper Midwest producers into eight evenly proportioned size ranges. Each size range represents about 403 million pounds of producer milk, or 12.5 percent of the nearly 3.2 billion pounds of milk reported on producer payrolls submitted to

the Upper Midwest market for May 2007. This chart displays the percentage of producers that makes up each of these individual, evenly proportioned size ranges. This chart shows that roughly 41 percent of the market's producers make up the first of the eight evenly proportioned size ranges, and a little more than 1/2 of one percent, the largest producers, make up the last of the eight evenly proportioned size ranges.

Chart 6

Percent of Producer Milk, by Size Range for May 2007



IX. AVERAGE MILK HAULING CHARGE BY STATE AND COUNTY

The Appendix details the average milk hauling charge, per hundredweight, by state and county for the Upper Midwest Marketing Area for May 2007. The data in the Appendix represents dairy producers located in over four hundred and thirty-three counties and sixteen states. The highest average hauling charges were found in counties such as the North Dakota counties of Cass, La Moure, Barnes, and Nelson, the South Dakota counties of

Edmunds and Brown and the Minnesota counties of Pennington, Clearwater, and Norman. The average hauling charges for each of those counties exceeded 0.63 cents per hundredweight. On the other hand, the lowest average hauling charges were found in the Minnesota county of Watonwan, and the Wisconsin counties of Eau Claire, Lincoln, Langlade, Marathon, Clark, Marquette, Wood, Milwaukee, and Forest. The average hauling charges for each of these counties was found to be 15 cents or less per hundredweight.

X. FACTORS CONTRIBUTING TO DIFFERENCES IN THE AMOUNT OF HAULING CHARGES

In the Appendix, the counties with the highest average hauling charges were mainly located in “semi-remote” areas such as found in northern Minnesota and North Dakota. The study acknowledges that many of these counties simply lack multiple dairy plant operators and/or ample local competition for milk procurement. The dairy producers and plant operations found in these semi-remote areas are simply geographically more spread-out compared to many dairy producers and plant operations in other counties within the marketing area. The added distance between these farms and plants simply raises the actual transportation cost for moving their milk to market. Another factor that is noticeably absent from many of these semi-remote counties, and included in many of the other counties, is the existence of one or more large-scale dairy farm operations. As mentioned above, the vast majority of handlers on this market charge producers a flat hauling value regardless of the size or volume of milk being marketed. Therefore, the lower the producer’s milk production, the higher his or her average hauling charge on a per hundredweight basis. This study finds that many of these semi-remote counties do in fact lack a couple of these “large dairy farm” operations that would otherwise have decreased the county’s average hauling rate considerably. The average milk volume for dairy producers charged in excess of 50 cents per hundredweight was only 72,663 pounds. This figure of 72,663 pounds is actually 71,597 pounds less than the market’s average of 144,260 pounds. Many of these smaller farms were located in these semi-remote counties possessing lower human populations.

Many of the counties that had the lowest average hauling charges are geographically located in close proximity to the so called “large Class I fluid markets”. Most of the counties with the lowest average hauling charges were found in areas with large numbers of dairy farm operations and/or within close proximity to multiple competing dairy manufacturers.

Most of the counties with the lowest average hauling charges had several large dairy farm operations that helped to reduce the county's average hauling rate considerably. The average milk volume for dairy producers who were charged less than 8 cents per hundredweight was 292,486 pounds, or 148,226 pounds more than the market average of 144,260 pounds and 219,823 more than those producers charged more than 50 cents per hundredweight.

This study further investigated the hauling charges to identify other common factors responsible for the disparity between the individual counties' average hauling rates. The study especially analyzed inconsistencies in hauling rates of seemingly similar counties possessing common milk marketing characteristics. In one scenario, the average hauling rate disparity in the Wisconsin counties of Fond du Lac, Green Lake, Marquette, Waushara, and Winnebago is especially noticeable. These five counties appear very similar in location and market conditions. The five counties each had a large number of dairy farmers associated with the market and similar county averages regarding the farm sizes and volumes of milk marketed. The five counties averaged more than 100 dairy producers per county. The study found that of the five counties, each were physically located a similar distance from major Class I markets. Each of the five counties either housed or was surrounded by ample competing dairy manufacturing plants. In fact, all five of these central Wisconsin counties virtually bordered one another. The only obvious difference between the aforementioned five counties was in their average county hauling rates. The five county average hauling rates varied from as little as 13 cents per hundredweight to as much as 22 cents per hundredweight. The hauling charge disparity appears to be in part due to the rates handlers charge in relationship to the county's dairy farm size of operation. The variation in hauling charges, or lack thereof, clearly reflects a competitive premium structure (i.e. hauling subsidy) being applied by the competing handlers.

This study analyzes the above five counties and their hauling charge disparity by identifying and examining the influence of large dairy farm operators. This influence is in fact noticeable when we examined and analyzed the data shown in Table 7. In this table, the dairy producers from each of the five counties are categorized into two additional size groups. The first column in Table 7 shows the average hauling charge for each of the five listed counties. The second column shows only those producers with smaller than average

milk deliveries and the third column shows only those producers with larger than average milk deliveries. The data in this table helps to explain the impact that the larger dairy producers have on any county's average hauling rate.

Table 7

Comparison of Smaller Verses Larger Than Market Average Dairy Farms for Five Wisconsin Counties and Their Average Hauling Rates for May 2007

County	Average Hauling Charge (Dollars Per Cwt.)		
County	All Producers	Less Than 182,612	Greater Than 182,612
Fond du Lac	\$0.18	\$0.21	\$0.09
Green Lake	\$0.22	\$0.23	\$0.11
Marquette	\$0.13	\$0.15	\$0.07
Waushara	\$0.21	\$0.23	\$0.11
Winnebago	\$0.22	\$0.25	\$0.09
Simple Average	\$0.19	\$0.21	\$0.09

The data in Table 7 helps to demonstrate the impact that the composition of the dairy producer herd size has on their respective county. This research reveals that when the pounds and hauling rates are removed regarding the larger than market average dairy producer operators, leaving only those farms with less than 182,612 pounds, the county average hauling rates will increase substantially. The table also reveals that the opposite reaction takes place when the smaller dairy producer operators are removed from the county averages. This study finds that the case study regarding the five counties in Table 7 clearly shows major differences in producers' hauling charges. The researcher also acknowledges that if the same type of analysis were completed for each of the more than 433 counties located in sixteen states, the study would find that each of the county hauling rates would react differently. This is mainly true because a wide variation of costing mechanisms are being applied for producer hauling charges by the different handlers located in various regions of the market. The county composition regarding the producer's size and volume does most likely impact each of the counties supplying milk into the Upper Midwest Marketing Area.

XI. REGRESSION ANALYSIS

A number of factors appear to influence the hauling costs for producers. One is their distance to a major fluid milk market. Two is their scale of production. Three is the composition of the county in which they reside. Four is the level of competition for their milk or the number of handlers available to bid to buy their milk.

Using the available data, proxies were constructed to estimate a stochastic model based on the above factors. Specifically, hauling charges data for 22,361 producers were regressed against their producer pounds, two discrete variables to indicate whether a supply or distributing plant was in their county, a variable indicating the number of plants in their county and lastly the number of producers in the county.

Variable	Type	Definition
Hauling Charges	Quantitative	Dependent(y) variable
Constant	Quantitative	Intercept term
Production(Q)	Quantitative	Milk production in cwt.
Squared Production	Quantitative	Milk production in cwt. squared
Cluster	Quantitative	Number of farms in county
Competition	Quantitative	Number of Plants in county
DistanceS	Discrete	1 if county contains a supply plant, 0 otherwise
DistanceD	Discrete	1 if county contains a distributing plant, 0 otherwise

The Model

$$HC = c + \beta_1 Q + \beta_2 Q^2 + \beta_3 \text{Cluster} + \beta_4 \text{Competition} + \beta_5 \text{DistS} + \beta_6 \text{DistD} + \varepsilon$$

The overall F for the above model is 3854 a value significant at beyond the 99% level. This statistic indicates that the hypothesis the beta values equal zero is rejected.

Table 8

Regression Results for the Hauling Charges Model May 2007

Variable	Coefficient	t-statistic
(Constant)	246.57	30.39
Production(Q)	0.05	24.39
Squared Q	0.00 ⁵	50.21
Cluster	-0.33	-12.67
Competition	10.32	1.80
DistanceD	16.34	1.25
DistanceS	-69.89	-5.18
Diagnostics		
R-squared	0.42	
Global F	2709	

For May of 2007, the model coefficients indicate a positive constant term somewhat less than the common flat fee hauling charge, a small positive beta value for producer pounds, anticipated negative coefficients for clusters of farms, and the discrete variable of whether a supply plant is in the same county as the dairy farm. The small positive coefficient value in the discrete variable for the presence of a distributing plant in the same county as the dairy farm and the positive coefficient for the competition among supply plants variable is unanticipated. This result could be due to the fact that in Federal Order 30 a number of distributing plants are some distance from population centers, consistent with the notion that hauling charges increase as this distance increases and the general increase in hauling charges such that competition allows for price leadership among handlers. These unanticipated results are mitigated somewhat by the fact that the t-statistic for the distributing plant and competition coefficients are not significant at normal confidence levels whereas the others are.

⁵ The magnitude of the Q-squared data makes the coefficient which is significant quite small but nonzero the actual value is 0.00000173. For an average producer at 1443 cwt, this means an additional \$3.60 in hauling charges.

XII. SUMMARY

When examining the average hauling charge at the state level, it appears that average hauling charges, for producers in the Upper Midwest Marketing Area, have the tendency to increase as the producer's distance from Chicago, Illinois increases. However, this relationship between the producer's average hauling charge rate and the producer's location to Class I market is not nearly as noticeable when analyzing the producer data at the county level. Although there may be some merit to producers having a lower hauling charge based on their relationship to Class I markets, this factor is not always apparent, nor indicative of many of the counties within the Upper Midwest Marketing Area.

The average hauling distance to the point of delivery is normally highest in perimeter, remote and/or isolated counties. In many instances, the added cost required for hauling milk in these areas combined with a lack of competition among milk procuring handlers, usually results in an increase in the average hauling charges. On the other hand, counties with the lowest average hauling charges tend to be located in areas with relatively high concentrations of dairy farm operations combined with an adequate supply of milk procuring handlers.

This study found that for May 2007, the market average producer milk delivery was 144,259 pounds. The median producer milk delivery was only 73,305 pounds. This study found that 76 percent of the producers on this market shipped less than the weighted average producer milk delivery of 144,259 pounds. This study also found that about 50 percent of the producer milk reported to the Market Administrator was actually produced by the largest 14.3 percent of producers.

This study revealed that a majority of handlers participating in the Upper Midwest Marketing Area charge their producers a flat hauling value regardless of the producer's size or volume of milk being marketed. In each of these cases, where the handler charges a flat rate, the hauling charge per hundredweight declines as the producer's milk volume increases. A specific county's average hauling cost can be greatly influenced by the county's composition of farm sizes.

Appendix

Upper Midwest Order Reported Payroll Average Hauling Charge, by State and County for May 2007

State	County	Average Hauling Charge (Dollars Per Cwt.)
Idaho	Bear Lake	0.10
	Franklin	0.08
	Jerome	R
Illinois	Adams	R
	Boone	0.16
	Bureau	R
	Carroll	0.18
	De Kalb	0.18
	Fulton	R
	Grundy	R
	Iroquois	1.04
	Jo Daviess	0.18
	Kane	0.21
	Kankakee	0.99
	Kendall	R
	Knox	R
	La Salle	R
	Lake	0.28
	Lee	R
	Livingston	0.92
	McHenry	0.22
	Mclean	1.24
	Ogle	0.19
	Piatt	R
Rock Island	0.24	
Stephenson	0.16	
Washington	R	
Whiteside	0.28	
Will	0.63	
Winnebago	0.26	
Indiana	Adams	R
	Bartholomew	1.26
	Benton	R
	Boone	R
	Carroll	R
	Cass	0.59
	Clay	0.91
	Daviess	1.18
Decatur	0.94	

Appendix

Upper Midwest Order Reported Payroll Average Hauling Charge, by State and County for May 2007

State	County	Average Hauling Charge (Dollars Per Cwt.)
Indiana (continued)	Delaware	0.59
	Elkhart	0.62
	Fayette	R
	Fulton	0.61
	Grant	R
	Greene	R
	Hamilton	R
	Hendricks	R
	Henry	R
	Howard	R
	Jackson	0.86
	Jasper	R
	Jay	0.53
	Jefferson	0.80
	Johnson	R
	Kosciusko	0.61
	La Porte	0.77
	Lagrange	0.58
	Lake	0.66
	Marshall	0.61
	Miami	0.66
	Montgomery	R
	Morgan	0.91
	Newton	R
	Noble	0.55
	Owen	R
	Porter	0.67
	Pulaski	0.51
	Rush	0.95
	Shelby	0.75
	St. Joseph	0.56
	Tippecanoe	2.02
	Tipton	R
	Vigo	R
	Wabash	0.63
	Wayne	R
Wells	R	
White	0.67	
Whitley	0.60	

Appendix

Upper Midwest Order Reported Payroll Average Hauling Charge, by State and County for May 2007

State	County	Average Hauling Charge (Dollars Per Cwt.)
Iowa	Allamakee	0.25
	Appanoose	0.54
	Benton	0.23
	Bremer	0.23
	Buchanan	0.22
	Butler	0.27
	Carroll	R
	Cedar	0.13
	Cerro Gordo	R
	Cherokee	R
	Chickasaw	0.28
	Clarke	R
	Clay	R
	Clayton	0.23
	Clinton	0.19
	Davis	0.41
	Decatur	0.35
	Delaware	0.23
	Des Moines	0.27
	Dickinson	R
	Dubuque	0.19
	Fayette	0.21
	Floyd	0.18
	Franklin	R
	Grundy	0.33
	Hancock	R
	Hardin	0.38
	Henry	0.36
	Howard	0.23
	Ida	R
	Iowa	0.23
	Jackson	0.21
	Jasper	0.38
	Jefferson	R
Johnson	0.26	
Jones	0.19	
Keokuk	R	
Kossuth	R	
Lee	0.30	
Linn	0.25	
Louisa	R	

Appendix

Upper Midwest Order Reported Payroll Average Hauling Charge, by State and County for May 2007

State	County	Average Hauling Charge (Dollars Per Cwt.)
Iowa (continued)	Lucas	R
	Lyon	0.35
	Mahaska	0.22
	Marion	0.20
	Marshall	0.40
	Mitchell	0.21
	Monroe	R
	Montgomery	R
	Muscatine	0.38
	O'Brien	R
	Osceola	0.37
	Plymouth	0.49
	Pocahontas	R
	Polk	0.74
	Poweshiek	0.24
	Sac	R
	Scott	0.27
	Sioux	0.49
	Story	0.27
	Tama	0.27
	Van Buren	0.33
	Wapello	R
	Warren	0.22
	Washington	0.27
Wayne	0.44	
Winneshiek	0.22	
Woodbury	R	
Worth	0.61	
Kansas	Nemaha	R
Michigan	Allegan	0.41
	Barry	0.32
	Berrien	0.59
	Clinton	R
	Delta	0.20
	Dickinson	R
	Genesee	R
	Gratiot	0.25
Hillsdale	0.52	

Appendix

Upper Midwest Order Reported Payroll Average Hauling Charge, by State and County for May 2007

State	County	Average Hauling Charge (Dollars Per Cwt.)
Michigan (continued)	Huron	0.52
	Ingham	R
	Ionia	R
	Jackson	R
	Lenawee	0.26
	Marquette	R
	Menominee	0.30
	Montcalm	0.46
	Ogemaw	0.60
	Ottawa	0.10
	Saginaw	R
	Sanilac	0.55
	Shiawassee	0.50
	St. Joseph	R
Tuscola	R	
Minnesota	Aitkin	0.61
	Anoka	0.26
	Becker	0.25
	Beltrami	0.37
	Benton	0.22
	Big Stone	0.49
	Blue Earth	0.41
	Brown	0.21
	Carlton	0.26
	Carver	0.20
	Cass	0.26
	Chippewa	0.24
	Chisago	0.22
	Clay	0.36
	Clearwater	0.77
	Cottonwood	0.27
	Crow Wing	0.21
	Dakota	0.31
	Dodge	0.20
	Douglas	0.22
	Faribault	0.21
	Fillmore	0.30
	Freeborn	0.40
	Goodhue	0.25
	Grant	0.21

Appendix

Upper Midwest Order Reported Payroll Average Hauling Charge, by State and County for May 2007

State	County	Average Hauling Charge (Dollars Per Cwt.)
Minnesota (continued)		
	Hennepin	0.19
	Houston	0.26
	Hubbard	0.42
	Isanti	0.18
	Itasca	1.16
	Jackson	0.36
	Kanabec	0.28
	Kandiyohi	0.20
	Kittson	R
	Koochiching	0.41
	Lac Qui Parle	0.33
	Le Sueur	0.21
	Lincoln	0.38
	Lyon	0.45
	Mahnomen	0.54
	Marshall	0.39
	Martin	0.31
	McLeod	0.24
	Meeker	0.21
	Mille Lacs	0.23
	Morrison	0.22
	Mower	0.27
	Murray	0.42
	Nicollet	0.21
	Nobles	0.38
	Norman	0.74
	Olmsted	0.24
	Otter Tail	0.26
	Pennington	0.63
	Pine	0.19
	Pipestone	0.47
	Polk	0.38
	Pope	0.22
	Ramsey	R
	Red Lake	0.21
	Redwood	0.28
	Renville	0.22
	Rice	0.33
	Rock	0.53
	Roseau	0.54

Appendix

Upper Midwest Order Reported Payroll Average Hauling Charge, by State and County for May 2007

State	County	Average Hauling Charge (Dollars Per Cwt.)
Minnesota (continued)		
	Scott	0.23
	Sherburne	0.17
	Sibley	0.20
	St. Louis	0.41
	Stearns	0.21
	Steele	0.22
	Stevens	0.20
	Swift	0.20
	Todd	0.26
	Wabasha	0.23
	Wadena	0.23
	Waseca	0.30
	Washington	0.24
	Watonwan	0.12
	Wilkin	R
	Winona	0.23
	Wright	0.18
	Yellow Medicine	0.29
Missouri		
	Andrew	0.83
	Buchanan	0.84
	Caldwell	R
	Carroll	0.85
	Clinton	R
	Daviess	1.03
	De Kalb	0.92
	Franklin	R
	Greene	R
	Grundy	0.97
	Harrison	R
	Hickory	R
	Knox	R
	Linn	1.00
	Livingston	1.04
	Macon	R
	Marion	R
	McDonald	R
	Mercer	R
	Nodaway	0.98
	Putnam	R

Appendix

Upper Midwest Order Reported Payroll Average Hauling Charge, by State and County for May 2007

State	County	Average Hauling Charge (Dollars Per Cwt.)
Missouri (continued)	Ray	R
	Sullivan	R
Montana	Dawson	R
	Richland	R
Nebraska	Lancaster	R
	Madison	R
	Polk	R
North Dakota	Adams	R
	Barnes	0.69
	Benson	R
	Burleigh	R
	Cass	0.90
	Dickey	0.60
	Dunn	R
	Emmons	0.71
	Grand Forks	R
	Grant	R
	Hettinger	R
	Kidder	R
	La Moure	0.73
	Logan	0.73
	McIntosh	0.88
	McLean	1.72
	Mercer	R
	Morton	1.12
	Nelson	0.67
	Oliver	1.14
	Pierce	2.05
Ransom	R	
Richland	R	
Rolette	R	
Sargent	R	
Stark	1.21	
Stutsman	0.70	
Walsh	R	

Appendix

Upper Midwest Order Reported Payroll Average Hauling Charge, by State and County for May 2007

State	County	Average Hauling Charge (Dollars Per Cwt.)
Ohio	Auglaize	0.39
	Darke	R
	Fulton	R
	Mercer	0.26
	Van Wert	R
	Williams	0.60
Pennsylvania	Armstrong	R
	Clearfield	1.12
	Delaware	R
	Indiana	R
South Dakota	Aurora	R
	Beadle	0.59
	Bon Homme	0.60
	Brookings	0.61
	Brown	0.78
	Butte	0.88
	Campbell	0.55
	Charles Mix	0.83
	Clark	0.70
	Codington	0.53
	Custer	R
	Davison	1.10
	Day	0.58
	Deuel	0.45
	Douglas	R
	Edmunds	0.84
	Faulk	R
	Grant	0.35
	Hamlin	0.55
	Hand	0.78
	Hanson	0.75
	Hutchinson	0.78
	Kingsbury	0.56
	Lake	0.27
	Lawrence	R
	Lincoln	0.33
Marshall	0.19	
McCook	0.65	
McPherson	0.51	

Appendix

Upper Midwest Order Reported Payroll Average Hauling Charge, by State and County for May 2007

State	County	Average Hauling Charge (Dollars Per Cwt.)
South Dakota (continued)		
	Meade	0.84
	Miner	R
	Minnehaha	0.52
	Moody	0.44
	Pennington	R
	Potter	R
	Roberts	0.34
	Sanborn	R
	Spink	0.70
	Turner	0.58
	Union	0.60
	Yankton	R
Washington	King	R
Wisconsin	Adams	0.20
	Ashland	0.23
	Barron	0.18
	Bayfield	0.31
	Brown	0.22
	Buffalo	0.22
	Burnett	0.19
	Calumet	0.21
	Chippewa	0.18
	Clark	0.14
	Columbia	0.24
	Crawford	0.26
	Dane	0.25
	Dodge	0.23
	Door	0.28
	Douglas	0.54
	Dunn	0.18
	Eau Claire	0.15
	Florence	0.44
	Fond du Lac	0.18
	Forest	0.11
	Grant	0.19
	Green	0.18
	Green Lake	0.22
	Iowa	0.18

Appendix

Upper Midwest Order Reported Payroll Average Hauling Charge, by State and County for May 2007

State	County	Average Hauling Charge (Dollars Per Cwt.)
Wisconsin (continued)		
	Iron	0.32
	Jackson	0.16
	Jefferson	0.27
	Juneau	0.20
	Kenosha	0.33
	Kewaunee	0.27
	La Crosse	0.17
	Lafayette	0.18
	Langlade	0.14
	Lincoln	0.15
	Manitowoc	0.23
	Marathon	0.14
	Marinette	0.25
	Marquette	0.13
	Milwaukee	0.12
	Monroe	0.20
	Oconto	0.25
	Oneida	R
	Outagamie	0.19
	Ozaukee	0.18
	Pepin	0.18
	Pierce	0.18
	Polk	0.20
	Portage	0.16
	Price	0.26
	Racine	0.30
	Richland	0.23
	Rock	0.32
	Rusk	0.20
	Sauk	0.20
	Sawyer	0.16
	Shawano	0.21
	Sheboygan	0.16
	St. Croix	0.19
	Taylor	0.17
	Trempealeau	0.23
	Vernon	0.22
	Walworth	0.22
	Washburn	0.19
	Washington	0.20

Appendix

Upper Midwest Order Reported Payroll Average Hauling Charge, by State and County for May 2007

State	County	Average Hauling Charge (Dollars Per Cwt.)
Wisconsin (continued)		
	Waukesha	0.29
	Waupaca	0.20
	Waushara	0.21
	Winnebago	0.22
	Wood	0.12

R = Restricted data, counties with fewer than 3 producers delivering to the market.