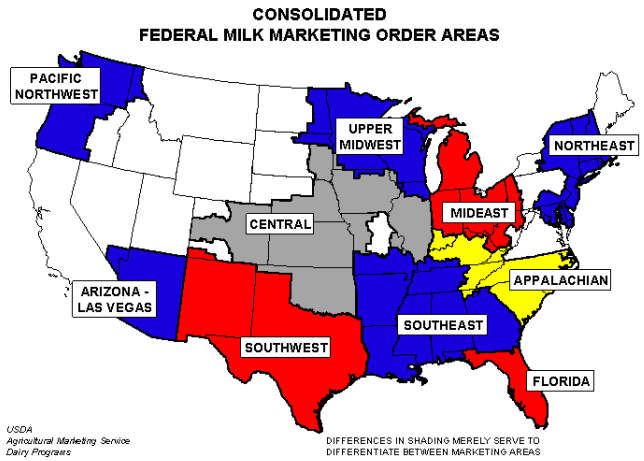
Determining U.S. Milk Quality Using Bulk Tank Somatic Cell Counts, 2006

The USDA's Animal and Plant Health Inspection Service's Centers for Epidemiology and Animal Health (CEAH), in conjunction with USDA's Agricultural Marketing Service and the NMC's (formerly the National Mastitis Council) Milk Quality Monitoring Committee, monitor U.S. milk quality using bulk tank somatic cell count (BTSCC) data provided by 4 of the Nation's 10 Federal Milk Marketing Orders (FMOs[1]) (figure 1).

Figure 1.

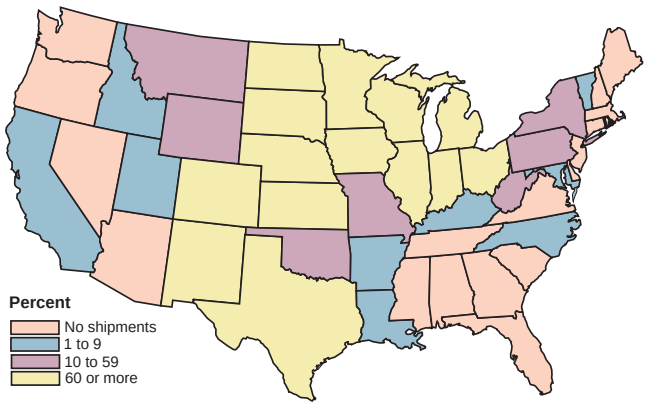


BTSCC refers to the number of white blood cells (leukocytes) and secretory cells per milliliter of raw milk. BTSCCs are used as a measure of milk quality and as indicators of overall udder health. High BTSCCs can negatively impact cheese yield and reduce the quality and shelf life of pasteurized fluid milk. To ensure high-quality dairy products, BTSCCs are monitored in milk shipments from producers, using minimum standards outlined in the U.S. Pasteurized Milk Ordinance. The legal maximum BTSCC for milk shipments from Grade A producers is 750,000 cells/ml. Producers with two out of four shipments that test above the 750,000 limit (usually tested 30 to 45 days apart) receive a written notice and must have an additional sample tested within 21 days. If three of the last five counts exceed the maximum, then regulatory action is required. Regulatory actions include one of the following: 1) producer permit is suspended; 2) milk in violation is not sold as Grade "A"; or 3) a monetary penalty is assessed.

Monitored FMOs

In 2006, four FMOs were monitored: Central, Mideast, Southwest, and Upper Midwest. These FMOs monitored milk from 37,737 producers located in 30 States, and accounted for 83.4 billion pounds or 45.9 percent of the 181.8 billion pounds of pooled and nonpooled milk produced in the United States in 2006. Each of the 30 States marketed at least one shipment through the monitored FMOs during 2006 (figure 2). Fourteen States (Colorado, Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Nebraska, New Mexico, North Dakota, Ohio, South Dakota, Texas, and Wisconsin) marketed 60 percent or more of the milk produced in their States through the monitored FMOs.

Figure 2. Percentage of Total Milk Production Shipped Through Monitored FMOs by State, 2006



[1] Federal milk marketing orders are administrative units made up of groups of States and were established under the authority of the Agricultural Marketing Agreement Act of 1937, as amended. Their purpose is to stabilize markets by placing requirements on the handling of milk; data are collected to provide accurate information on milk supplies, utilization, and sales. Monitored orders were Central, Mideast, Southwest, and Upper Midwest.

There were 406,177 milk shipments monitored in 2006 (table 1). The upper Midwest FMO accounted for 43.7 percent of the milk monitored and 20.1 percent of all milk shipped in the United States. The Upper Midwest and Mideast FMOs had a higher percentage of shipments relative to the amount of milk. The reverse was true for the Southwest FMO, where 2.6 percent of the shipments accounted for 17.2 percent of the monitored milk, which reflects the larger herd sizes in the Southwest FMO.

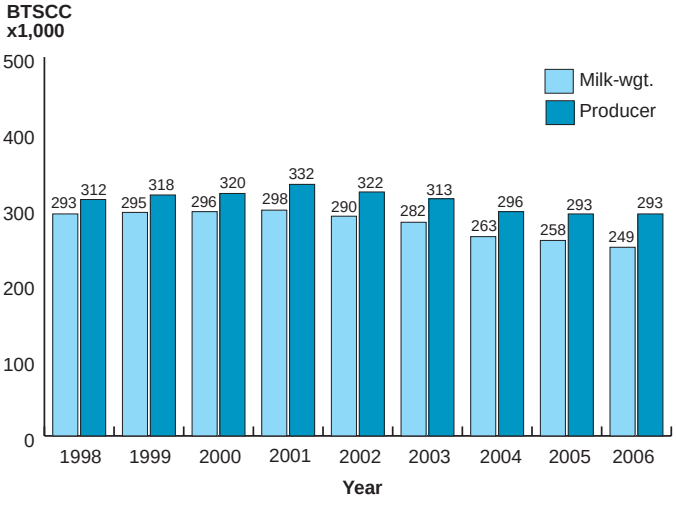
Table 1. Pounds of Milk and Shipments Monitored During 2006

	Milk			Shipments	
FMO	Pounds (billions)	Pct.	Pct. U.S.	Number (1,000)	Pct.
Upper Midwest	36.5	43.7	20.1	230.2	56.7
Central	14.8	17.7	8.2	62.4	15.4
Mideast	17.8	21.4	9.8	102.9	25.3
Southwest	14.3	17.2	7.9	10.7	2.6
Total	83.4	100.0	45.9	406.2	100.0

2006 BTSCC Trends

The milk-weighted geometric BTSCC mean in 2006 was 249,000 compared to 258,000 in 2005 (figure 2). The milk-weighted BTSCC takes into account the amount of milk shipped by a producer, resulting in an overall BTSCC mean of monitored milk. The producer shipment BTSCC—which is a geometric, nonmilk-weighted mean of all shipments—was 293,000 in 2006, the same as 2005.

Figure 3. Milk-weighted and Producer BTSCCs, 1998-2006



Evaluating BTSCC Levels

Table 2 shows the accumulative percentage of milk, shipments, and producers by five BTSCC levels during 2006. More than 99 percent of milk and 97 percent of monitored shipments met the current Pasteurized Milk Ordinance limit of 750,000 cells/ml. Of 37,737 producers, 89.1 percent (all but 3,736 producers) shipped milk with BTSCCs below 750,000 cells/ml during all months monitored.

For the past several years, proposals to lower the BTSCC regulatory limit have been submitted to the National Conference on Interstate Milk Shipments. However, to date no rule changes have been made. The most recent NMC proposal (2005) called for a gradual, step-by-step lowering of the BTSCC limit from 750,000 to 400,000 cells/ml over an 8-year period. Ninety-eight percent of the milk and almost 95 percent of shipments monitored in 2006 would have met the NMC proposal's first-year reduction of 650,000 cells/ml, and 81.6 percent of producers would have met the first-year reduction requirements during all months monitored. In 2006, 85.8 percent of the milk would have met the final reduction goal of 400,000 cell/ml, but only 44.5 percent of producers would have done so during all monitored months.

Table 2. Percentage of Milk, Shipments, and Producers Meeting BTSCC Levels During 2006

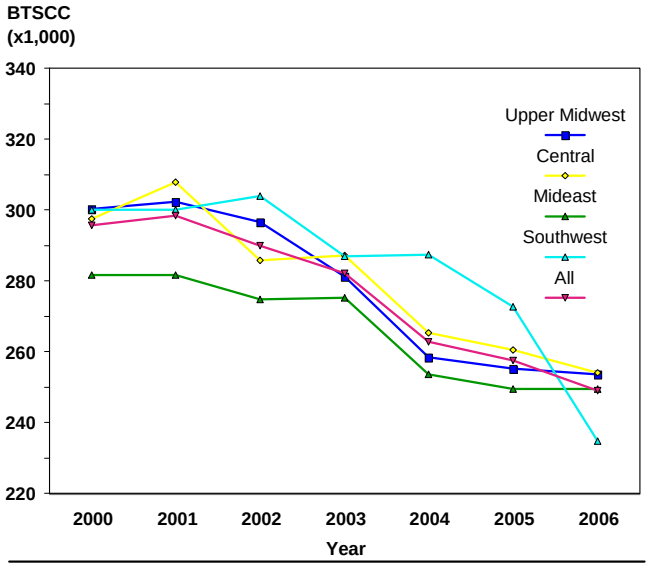
BTSCC (x1,000)	Milk (83.5 billion Pounds)	Shipments (406,177)	Producers* (37,737)
Less than 100	1.8	2.6	0.4
Less than 200	30.9	22.2	6.8
Less than 400	85.8	71.5	44.5
Less than 650	98.4	94.9	81.6
Less than 750	99.4	97.6	89.1

*Producers shipped all monitored months below set level.

FMO and State BTSCC Trends

Figure 4 shows milk-weighted BTSCCs for monitored FMOs during the last 7 years. Only the last 7 years are displayed because U.S. FMOs were reorganized in 2000. Overall, milk shipments in 2006 from monitored FMOs showed a downward trend in milk-weighted BTSCC levels. The Southwest FMO showed the largest decrease in BTSCCs during both 2005 and 2006. The majority of milk marketed through the Southwest FMO comes from Texas and New Mexico, and milk shipments from these States had shown little change in BTSCC levels during the 3 years previous to 2005. Minnesota and Wisconsin make up the upper Midwest FMO and accounted for 40.8 percent of all monitored milk.

Figure 4. Milk-Weighted BTSCC by FMO and by Year



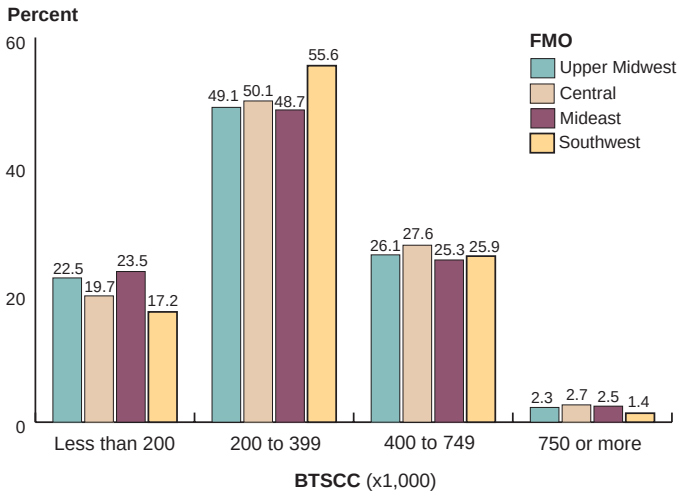
Fourteen States shipped 60 percent or more of their total milk production through the four monitored FMOs. These States accounted for 94.3 percent of the total monitored milk (table 3). BTSCCs increased slightly from 2005 to 2006 in Illinois, Indiana, and Wisconsin. The remaining 11 States showed a decrease in BTSCCs from 2005 to 2006.

Table 3. BTSCCs for States Shipping 60 Percent or More of Total Milk Production Through FMOs

State	Pct. Total Monitored Milk	BTSCC (x1,000) 2001	2002	2003	2004	2005	2006
CO	2.9	279	263	259	244	231	224
IL	2.3	323	312	314	299	289	320
IN	3.7	319	303	296	276	278	285
IA	6.0	353	335	326	312	305	304
KS	1.8	381	328	332	325	342	321
MI	9.1	309	299	294	278	271	267
MN	10.2	389	382	345	321	316	301
NE	1.4	403	344	350	331	336	322
NM	9.9	279	291	274	282	264	229
ND	0.4	327	301	312	285	287	269
OH	5.1	322	311	320	294	294	292
SD	2.5	393	351	354	332	313	311
TX	8.4	386	396	386	371	361	325
WI	30.6	310	304	295	281	279	285
14 States	94.3	341	323	318	302	298	290

Figure 5 shows the relationship between percentage of shipments at various BTSCC levels and FMO. Almost 50 percent of shipments in all FMOs had BTSCCs between 200,000 and 399,000. Less than 2.8 percent of shipments from each FMO had BTSCCs above 750,000.

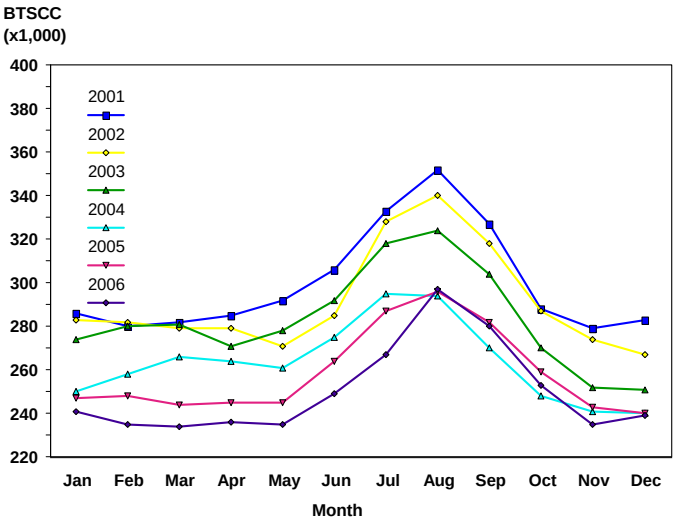
Figure 5. Percentage of Shipments by BTSCC Levels, 2006



Seasonal BTSCC Trends

Monthly monitoring of BTSCCs continues to show that BTSCCs peak during July through September (figure 6). In 2006, monthly milk-weighted BTSCCs were highest in August (297,000 cells/ml) and lowest in March (234,000 cells/ml).

Figure 6. Milk-Weighted BTSCC by Year and by Month



Summary

BTSCCs from monitored FMOs are a measure of the quality of the Nation's milk supply. The overall average BTSCCs from the four FMOs declined during each of the past 5 years, and each FMO showed stable or declining BTSCCs since 2003. Of the four monitored FMOs, the Mideast FMO had the lowest milk-weighted BTSCCs for 2000-05, while the Southwest FMO had the lowest BTSCCs in 2006. BTSCCs tend to peak during July and August and are lowest during the winter and spring months. The downward trend of BTSCCs during the last 5 years suggests that producers are actively working to improve milk quality.

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