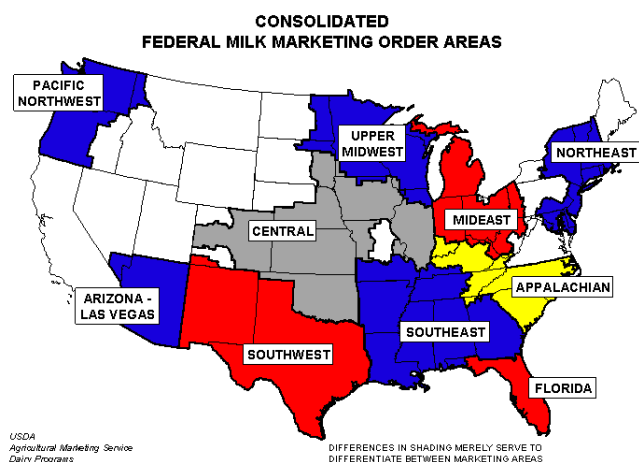


## Determining U.S. Milk Quality Using Bulk-tank Somatic Cell Counts, 2008

The USDA's Animal and Plant Health Inspection Service's Centers for Epidemiology and Animal Health, in conjunction with USDA's Agricultural Marketing Service and the NMC's 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)<sup>1</sup> [figure. 1].

Figure 1.



BTSCC refers to the number of white blood cells (primarily macrophages and leukocytes), secretory cells, and squamous 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. Numerous studies have also shown that operations with increased BTSCCs are more likely to have milk that violates antibiotic residue standards. The most frequently cited reason for antibiotic residues in milk are placing cows treated with antibiotics

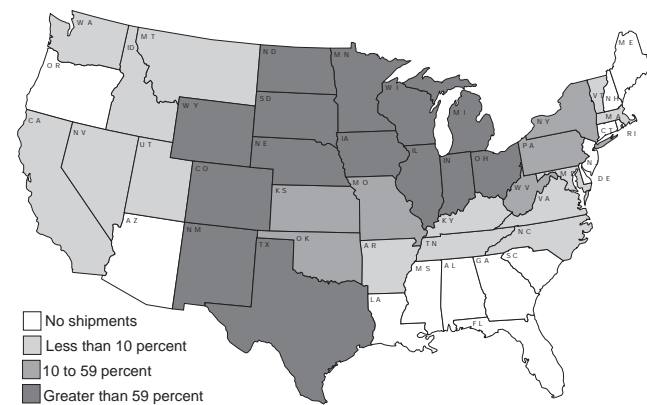
<sup>1</sup> FMOs are administrative units made up of groups of States and were established under the authority of the Agricultural Marketing Agreement Act of 1937, as amended. Their purpose is to stabilize markets by placing requirements on the handling of milk; data are collected to provide accurate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

in the milking string before the recommended withdrawal period. To ensure high-quality dairy products, BTSCCs are monitored in milk shipments using standards outlined in the U.S. Pasteurized Milk Ordinance. The legal maximum BTSCC for "Grade A" milk shipments is 750,000 cells/mL.<sup>2</sup> If a producer has two out of four shipments that test above the maximum (usually tested 30 to 45 days apart) a written notice is issued and an additional sample is tested within 21 days. If three of the last five counts exceed the maximum, regulatory action is required, which includes: 1) suspension of the producer's permit; 2) milk in violation not being sold as Grade A product; and/or 3) monetary penalties.

### Monitored FMOs

In 2008, four FMOs were monitored: Central, Mideast, Southwest, and Upper Midwest. These FMOs monitored milk from 34,327 producers located in 35 States and accounted for 82.3 billion pounds or 43.3 percent of the 190.0 billion pounds of pooled and nonpooled milk produced in the United States in 2008. Each of the 35 States marketed at least 1 shipment through the monitored FMOs during 2008 (figure. 2).

Figure 2. Percentage of Total Milk Production Shipped Through Monitored FMOs, by State, 2008



Fourteen States<sup>3</sup> marketed 60 percent or more of the milk produced in their States through the monitored FMOs.

<sup>2</sup> Maximum BTSCC levels for other countries include 400,000 cells/mL in the European Union, Australia and New Zealand; 500,000 cells/mL in Canada; and 1,000,000 cells/mL in Brazil.

<sup>3</sup> Colorado, Illinois, Indiana, Iowa, Michigan, Minnesota, Nebraska, New Mexico, North Dakota, Ohio, South Dakota, Texas, Wisconsin, and Wyoming)

In 2008, 364,820 milk shipments were monitored (table 1). The upper Midwest FMO accounted for 45.8 percent of the milk monitored and 19.9 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 opposite was true for the Southwest FMO, where 2.6 percent of the shipments accounted for 18.0 percent of the monitored milk, which reflects the larger herd sizes in the Southwest FMO.

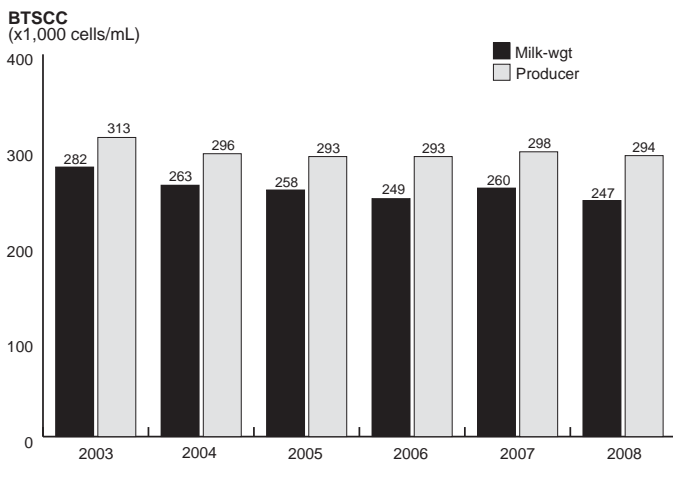
**Table 1. Percentage of Milk and Shipments Marketed Through Monitored FMOs during 2008**

FMO	Milk			Shipments	
	Billion Pounds	Pct.	Pct. U.S.	Number (x1,000)	Pct.
Upper Midwest	37.7	45.8	19.9	217.5	59.6
Central	13.0	15.8	6.8	47.7	13.1
Mideast	16.8	20.4	8.8	90.1	24.7
Southwest	14.8	18.0	7.8	9.5	2.6
Total	82.3	100.0	43.3	364.8	100.0

**2008 BTSCC trends**

The milk-weighted geometric BTSCC mean in 2008 was 247,000 cells/mL compared with 260,000 cells/mL in 2007 (figure. 3). 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—decreased from 298,000 cells/mL in 2007 to 294,000 cells/mL in 2008.

**Figure 3. Milk-weighted and Producer BTSCC, 2003-08**



**Evaluating BTSCC levels**

Table 2 shows the cumulative percentage of milk, shipments, and producers by five BTSCC levels during 2008. More than 99 percent of milk and 97 percent of shipments monitored met the current Pasteurized Milk Ordinance limit of 750,000 cells/mL. Of the 34,327 producers, 88.9 percent (all but 3,810 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. More than 98 percent of milk and almost 95 percent of shipments monitored in 2008 would have met the first-year reduction to 650,000 cells/mL, and 81.0 percent of producers would have met the first-year reduction requirements during all months monitored if no management changes were implemented. In 2008, 85.6 percent of milk would have met the final reduction goal of 400,000 cell/mL, but only 45.8 percent of producers would have done so during all monitored months.

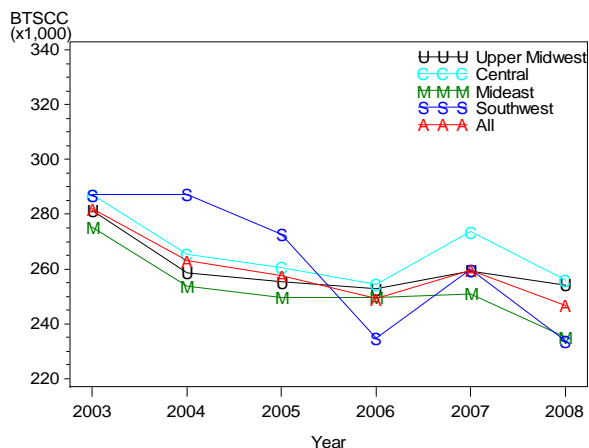
**Table 2. Percentage of Milk, Shipments, and Producers Meeting BTSCC Levels During 2008**

BTSCC (x1,000 cells/mL)	Milk (82.3 billion pounds)	Shipments (364,820)	Producers (34,327)
Less than 100	1.8	2.4	0.5
Less than 200	32.7	22.2	7.6
Less than 400	85.6	71.1	45.8
Less than 650	98.3	94.5	81.0
Less than 750	99.3	97.5	88.9

## FMO and State BTSCC trends

Figure 4 shows milk-weighted BTSCCs for monitored FMOs during the last 6 years. The Southwest FMO, which had shown the largest decrease in BTSCCs during 2005 and 2006, had the largest increase from 2006 to 2007 (235,000 to 260,000 cells/ml) and the largest decrease from 2007 to 2008 (260,000 to 234,000 cells/ml). The majority of milk marketed through the Southwest FMO comes from Texas and New Mexico, and milk shipments from these States have shown little change in BTSCC levels during previous years.

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



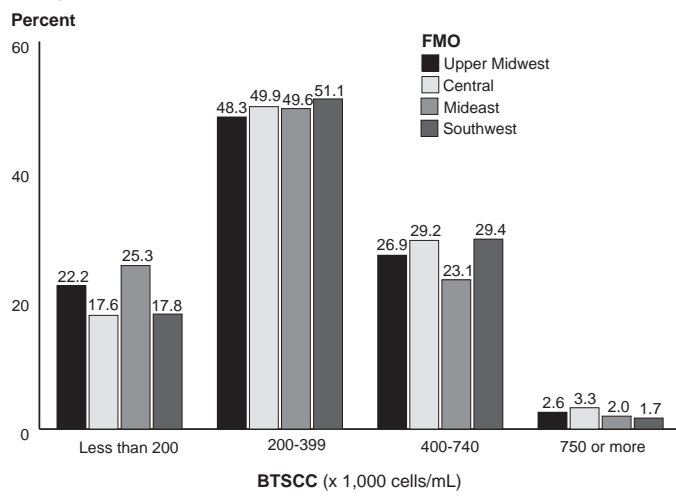
The 14 States shipped 60 percent or more of their total milk production through the 4 monitored FMOs and accounted for 93.4 percent of the total monitored milk (table 3). Minnesota, New Mexico, and Wisconsin accounted for 50.4 percent of all FMO-monitored milk. Overall, milk shipments in 2008 from monitored FMOs showed a downward trend in milk-weighted BTSCC levels. Only 1 of the 14 States that shipped 60 percent or more of total milk production (Wyoming) had increased BTSCCs in 2008 compared with 2007.

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

State	Percent Total Monitored Milk—2008	BTSCC (x1,000 cells/mL)					
		2003	2004	2005	2006	2007	2008
CO	3.2	250	225	215	207	237	208
IL	2.2	298	276	260	282	272	262
IN	2.8	268	254	247	248	272	261
IA	6.6	306	284	272	269	282	281
MI	9.4	258	247	239	233	237	211
MN	10.5	317	287	276	261	270	266
NE	1.2	317	286	285	264	274	266
NM	10.0	260	264	250	217	236	216
ND	0.3	293	276	277	245	276	269
OH	5.2	296	267	269	270	267	253
SD	2.4	351	306	282	267	292	275
TX	9.6	326	318	305	258	285	254
WI	29.9	269	249	246	246	249	247
WY	0.1	301	369	296	234	335	356
14 States	93.4	283	265	257	247	258	245

Figure 5 shows the percentages of shipments at various BTSCC levels for each FMO. Almost 50 percent of shipments in all FMOs were between 200,000 and 399,000 cells/mL BTSCC. Of all shipments, 2.5 percent had BTSCCs above 750,000 cells/mL.

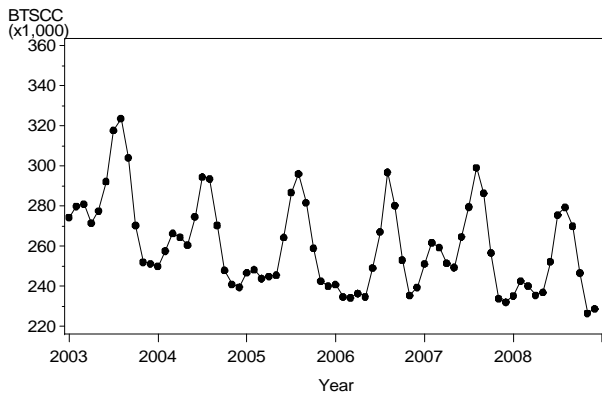
Figure 5. Percentage of Shipments by BTSCC Levels and by FMO, 2008



## Seasonal BTSCC trends

Monthly monitoring of BTSCCs continues to show that BTSCCs peak during the summer months (July through September) [figure. 6]. In 2008, monthly milk-weighted BTSCCs were highest during August (279,000 cells/ml) and lowest in November (227,000 cells/mL).

Figure 6. Monthly Milk-Weighted BTSCC, 2003-2008



## Summary

BTSCCs from monitored FMOs is one measure of the quality of the Nation's milk supply. Data from 2008 show a decrease of 13,000 cells/mL in the milk-weighted geometric mean BTSCC. The largest decrease was observed in the BTSCCs in the Southwest FMO, which decreased from 260,000 cells/mL in 2007 to 234,000 cells/mL in 2008. Decreases in BTSCCs were widespread, as 13 of 14 States shipping 60 percent or more of their milk through the four FMOs had lower BTSCCs in 2008 compared with 2007.

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