Brief History of CME Group

Began as Chicago Butter & Egg Board in 1898
Became Chicago Mercantile Exchange in 1919
Merged with Chicago Board of Trade in 2007, formed CME Group
Acquired New York Mercantile Exchange in 2008
Key Events in CME Dairy Markets

Chicago Butter & Egg Board
Trading in “spot” or “cash” (physical) butter (1898)

Chicago Mercantile Exchange
Introduced trading in butter futures (1919-1976)
Also traded “spot” or “cash” (physical) cheese (1929-1941)
Re-introduced butter futures (1996)
Launched milk futures (1996); became BFP (1997), then Class III (2000)
Began trading in “spot” or “cash” (physical) cheese (1997)
Continued expansion into all major dairy products
## Current CME Dairy Markets

<table>
<thead>
<tr>
<th>Futures &amp; Options</th>
<th>Spot (physical)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class III Milk</td>
<td>Cheese</td>
</tr>
<tr>
<td>Class IV Milk</td>
<td>Butter</td>
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<tr>
<td>Dry Whey</td>
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<tr>
<td>International Skimmed Milk Powder (new: May 2010)</td>
<td></td>
</tr>
<tr>
<td>Cheese (new: June 2010)</td>
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</tbody>
</table>
Spot, Futures and Options

Spot

Transaction results in immediate ("on the spot") payment and transfer of the product

Designed for trading small quantities to fill short-term needs or adjust inventories
Spot, Futures and Options

Futures

Transaction for a standardized contract; all details already established except the price

Obligation to make delivery (for a seller) or take delivery (for a buyer) at some date in the future

Contracts are identical and interchangeable, or “fungible”; can be offset

At final settlement, contract terms either call for the product (physical delivery), or call for money (cash settlement)

Designed to provide risk management (via hedging) and price discovery
Spot, Futures and Options

Options (on Futures)

Transaction for the right, but not the obligation, to receive a futures contract

Call = option to buy futures; Put = option to sell futures

Designed to provide risk management (via hedging) and price discovery
Spot, Futures and Options

Volume
Number of contracts traded

Open Interest
Number of contracts outstanding (i.e., that have not been offset, delivered or cash settled)

Does not apply to Spot contracts since each transaction results in immediate delivery
Volume & Open Interest

Volume
In 2009, Class III futures volume was 280,636 contracts (56 billion lbs)
Class III options volume was 153,513 contracts (31 billion lbs)
US milk production was 189 billion lbs

Open Interest
On Dec 31, 2009, Class III futures open interest was 27,773 contracts
Class III options open interest was 43,903 contracts
Hedging

Price Risk Exposure

Buyers (such as food manufacturers) are at risk if prices go up.

Sellers (such as producers) are at risk if prices go down.

Others (such as processors) are at risk if input prices go up and/or output prices go down.

Price risk can be managed by hedging

Hold offsetting positions in cash (physical) and futures/options.
## Hedging – Food Manufacturer

<table>
<thead>
<tr>
<th>Cash</th>
<th>Futures</th>
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<tr>
<td>June 1: Sold product based on Sep milk price of $15.50 but now expects price to continue rising</td>
<td>Buy Sep futures at $15.00</td>
</tr>
<tr>
<td>Sep 1: Price paid = $16.50</td>
<td>Sell (liquidate) Sep futures at $16.00</td>
</tr>
<tr>
<td>Profit: ($1.00)</td>
<td>$1.00</td>
</tr>
</tbody>
</table>

Net price paid for milk = $16.50 - $1.00 futures profit = $15.50
Hedging – Food Manufacturer

**Cash**

- **June 1:** Sold product based on Sep milk price of $15.50 but now expects price to continue rising
- **Sep 1:** Price paid = $14.50
- **Profit:** $1.00

**Futures**

- **Buy Sep futures at $15.00**
- **Sell (liquidate) Sep futures at $14.00**
- **(Profit):** ($1.00)

Net price paid for milk = $14.50 + $1.00 futures loss = $15.50
# Hedging - Producer

<table>
<thead>
<tr>
<th>Cash</th>
<th>Futures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>June 1:</strong> Expanded herd based on average milk price of $15.00 but now expects lower prices</td>
<td><strong>Sell 12-month strip of futures at average price of $14.75</strong></td>
</tr>
<tr>
<td><strong>Sep 1:</strong> Average price received = $14.00</td>
<td><strong>Buy (liquidate) futures at average price of $13.75</strong></td>
</tr>
<tr>
<td><strong>Profit:</strong> ($1.00)</td>
<td><strong>$1.00</strong></td>
</tr>
</tbody>
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Net price received for milk = $14.00 + $1.00 futures profit = $15.00
Hedging - Producer

Cash

June 1: Expanded herd based on average milk price of $15.00 but now expects lower prices

Sep 1: Average price received = $16.00

Profit: $1.00

Futures

Sell 12-month strip of futures at average price of $14.75

Buy (liquidate) futures at average price of $15.75

($1.00)

Net price received for milk = $16.00 - $1.00 futures loss = $15.00
Hedging

Futures

“Obligation to do something” means price is locked in, regardless of whether the hedge results in a profit or a loss.

If market doesn’t move in the expected direction, hedger may feel that he/she would have been better off by not hedging.

Options

“Right, but not the obligation, to do something” means hedger can choose whether to maintain or abandon the hedge.

At worst, hedger will lose the premium paid for the option.

Useful for establishing floor prices, ceiling prices, other strategies.
CME dairy futures/options are cash settled to USDA prices

Cash settlement = no physical delivery

- Can hold positions through final expiration (the day before USDA announcement)
- Options expire the same date and time as futures

Settlement to USDA prices means futures/options prices align with class prices (Class III and Class IV) and component prices (butter, powder, cheese, whey)
### Announcement of Class and Component Prices for April 2010

**Release date:** April 30, 2010

<table>
<thead>
<tr>
<th>Price Category</th>
<th>Price</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class II Price</td>
<td>13.78</td>
<td>(per hundredweight)</td>
</tr>
<tr>
<td>Class II Butterfat Price</td>
<td>1.5883</td>
<td>(per pound)</td>
</tr>
<tr>
<td><strong>Class III Price</strong></td>
<td><strong>12.92</strong></td>
<td>(per hundredweight)</td>
</tr>
<tr>
<td>Class III Skim Milk Price</td>
<td>7.65</td>
<td>(per hundredweight)</td>
</tr>
<tr>
<td><strong>Class IV Price</strong></td>
<td><strong>13.73</strong></td>
<td>(per hundredweight)</td>
</tr>
<tr>
<td>Class IV Skim Milk Price</td>
<td>8.49</td>
<td>(per hundredweight)</td>
</tr>
<tr>
<td>Butterfat Price</td>
<td>1.5813</td>
<td>(per pound)</td>
</tr>
<tr>
<td>Nonfat Solids Price</td>
<td>0.9435</td>
<td>(per pound)</td>
</tr>
<tr>
<td>Protein Price</td>
<td>2.1449</td>
<td>(per pound)</td>
</tr>
<tr>
<td>Other Solids Price</td>
<td>0.1702</td>
<td>(per pound)</td>
</tr>
<tr>
<td>Somatic Cell Adjustment Rate</td>
<td>0.00069</td>
<td>(per 1,000 somatic cell count)</td>
</tr>
<tr>
<td><strong>Product Price Averages:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Butter</td>
<td>1.4773</td>
<td>(per pound)</td>
</tr>
<tr>
<td>Nonfat Dry Milk</td>
<td>1.1208</td>
<td>(per pound)</td>
</tr>
<tr>
<td>Cheese</td>
<td>1.3827</td>
<td>(per pound)</td>
</tr>
<tr>
<td>Dry Whey</td>
<td>0.3643</td>
<td>(per pound)</td>
</tr>
</tbody>
</table>

Class Formulas

Class III:

Class III Price = (Class III skim milk price x 0.965) + (Butterfat price x 3.5)

where:

Class III Skim Milk Price = (Protein price x 3.1) + (Other solids price x 5.9)

Protein Price = ((Cheese price – 0.2003) x 1.383) + (((Cheese price – 0.2003) x 1.572) – Butterfat price x 0.9) x 1.17)

Other Solids Price = (Dry whey price – 0.1991) x 1.03

Butterfat Price = (Butter price – 0.1715) x 1.211

which can be simplified to:

Class III Price = (Cheese price x 9.6398) + (Butter price x 0.4238) + (Dry whey price x 5.8643) – 3.1681
Class Formulas

Class IV:

Class IV Price = (Class IV Skim Milk price x 0.965) + (Butterfat price x 3.5)

where:

Class IV Skim Milk Price = Nonfat Solids price x 9
Nonfat Solids Price = (Nonfat Dry Milk price - 0.1678) x 0.99
Butterfat Price = (Butter price – 0.1715) x 1.211

which can be simplified to:

Class IV Price = (Nonfat Dry Milk price x 8.5982) + (Butter price x 4.2385) - 2.1697
Class Formulas

Class III Price = (Cheese price x 9.6398) + (Butter price x 0.4238) + (Dry whey price x 5.8643) – 3.1681

Class IV Price = (Nonfat Dry Milk price x 8.5982) + (Butter price x 4.2385) - 2.1697

- Dairy industry relies on CME Spot prices to establish wholesale Cheese and Butter prices

- Periodically, there are allegations that various large entities use the Spot Cheese and Spot Butter prices to move the wholesale Cheese and Butter prices that are captured in the USDA surveys, and thereby manipulate Milk prices

- California’s milk pricing formulas directly reference CME Spot Cheese and Spot Butter prices
Class 4a Price Formula (butter and dry milk products)

(1) Price of Class 4a fat = (Butter price – $0.0168 – $0.1560) x 1.2

- The difference between the Chicago Mercantile Exchange butter price and the price received by California butter processors.
- Butter yield: can produce 1.2 lbs. of butter from one pound of fat.
- The average market price per pound of Grade AA butter at the Chicago Mercantile Exchange.
- Manufacturing cost allowance: the amount deducted from the product price to compensate for the processor's costs.

Class 4b Price Formula (cheese)

Step 2: Product value = (Cheddar price – $0.0252 – $0.1780) x 10.2

- The difference between the CME block Cheddar cheese price and the price that California processors receive.
- Cheese yield: can produce 10.2 lbs. of cheese from 100 pounds of milk.
- Market price per pound of Grade AA butter at the Chicago Mercantile Exchange.
- Market price per pound of dry whey using the Western (mostly) prices.
- Adjustment to reflect the value of whey butter relative to CME Grade AA butter price.
- Manufacturing cost allowances: the amounts deducted from the product price to compensate for the processor's costs.
- Whey butter yield: can produce 0.27 lbs of whey butter from 100 pounds of milk.
- Dry skim whey yield: can produce 5.8 lbs. of dry whey from 100 pounds of milk.
Class 1 Price Formula for Fluid Milk Products

Step 1: Price of Class 1 fat = (CME butter - $0.118) × 1.2

- Market price per pound of Grade AA butter at the Chicago Mercantile Exchange
- Butter yield: can produce 1.2 lbs of butter from one pound of fat

Step 2: Commodity Reference Price = the higher of two price calculations:

- Market price per pound of Cheddar cheese at the Chicago Mercantile Exchange
- Cheese yield: can produce 9.8 lbs of cheese from 100 pounds of milk

   = (CME Cheddar × 9.8)

- Market price per pound of Grade AA butter at the Chicago Mercantile Exchange
- Adjustment to reflect the value of whey butter relative to CME Grade AA butter price

   + (CME AA butter - $0.10) × 0.27

- Market price per pound of Dry Whey using the Western Dry Whey (mostly) prices

   + (Dry Whey Price × 5.8) - $0.85

- Western Dry Whey yield: can produce 5.8 lbs of Dry Whey from 100 pounds of milk
- Dry Whey Adjuster

- Market price per pound of butter at the Chicago Mercantile Exchange
- Fat content of whole milk

   + (CME butter × 1.2) × 3.5

- Butter yield: can produce 1.2 lbs of butter from 1 pound of fat
- California weighted average of prices received by plants for nonfat dry milk

   + (CA NFDM × 0.99) × 8.7

- NFDM yield: can produce 0.99 lbs of NFDM from one pound of SNF
- SNF content of whole milk

   + (CA NFDM × 0.99) × 8.7

- Market price per pound of butter at the Chicago Mercantile Exchange
- Fat content of whole milk

   + (CME butter × 1.2) × 3.5

- Butter yield: can produce 1.2 lbs of butter from 1 pound of fat
- California weighted average of prices received by plants for nonfat dry milk

   + (CA NFDM × 0.99) × 8.7

- NFDM yield: can produce 0.99 lbs of NFDM from one pound of SNF
- SNF content of whole milk

   + (CA NFDM × 0.99) × 8.7
• From earlier in this presentation, recall that Spot markets are designed for trading small quantities to fill short-term needs or adjust inventories.

• CME has never condoned the use of its markets or prices for anything other than their stated purpose. Furthermore, it is unclear whether Spot prices reflect the equilibrium prices in the overall markets for these products.

• From the Class Formulas, notice that input prices (milk) are directly determined by final product prices (cheese, butter, dry whey, nonfat dry milk) – not the other way around, as is typically the case.

• Both CME Market Regulation and the Commodity Futures Trading Commission (CFTC) Division of Market Oversight monitor trading activity in the Spot dairy markets for any potential impact on CME’s dairy futures markets.

Concluding Comments

• CME Group is proud to be an integral part of the dynamic US dairy industry. Our dairy markets have experienced rapid growth since we launched our first Milk contract in 1996, and we look forward to many new opportunities as we expand into the international arena.

• For over a century, the dairy markets have been an essential part of CME’s product offerings. We will continue to provide the industry with world-class price discovery and risk management tools as part of our longstanding commitment to the agricultural sector.
Questions?
CME Dairy Markets

USDA Dairy Industry Advisory Committee
June 3, 2010

Paul E. Peterson
Director, Commodity Research & Product Development