

The Dairy Industry from an Economist's Perspective

Kevin C. Dhuyvetter
Extension Agricultural Economist
Kansas State University

Presented at FCBT Dairy Conference
Holiday Inn Park Plaza – Lubbock, TX. November 2-3, 2004



Other Dairy Team Members

- John Smith, Animal Science
- Mike Brouk, Animal Science
- Joe Harner, Agriculture Engineering



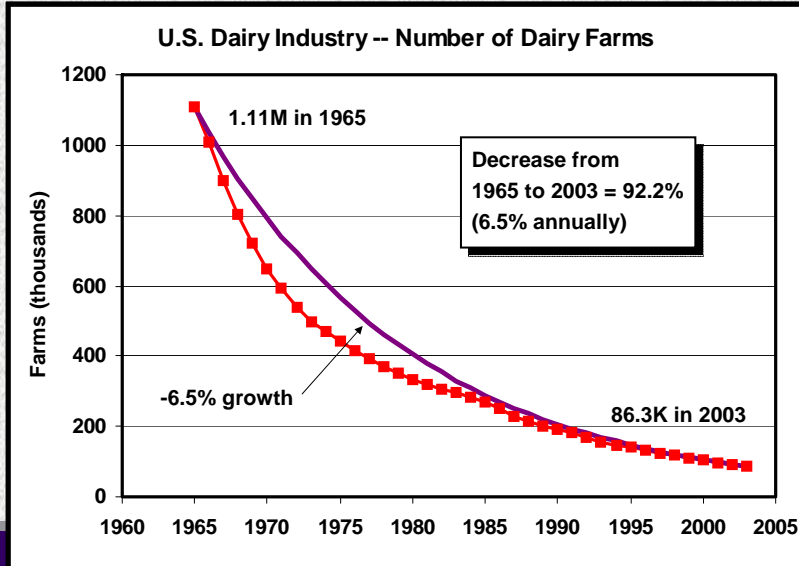
Outline

- National trends / U.S. dairy statistics
- Regional / state trends
- Prices
- Costs of production
- Miscellaneous thoughts

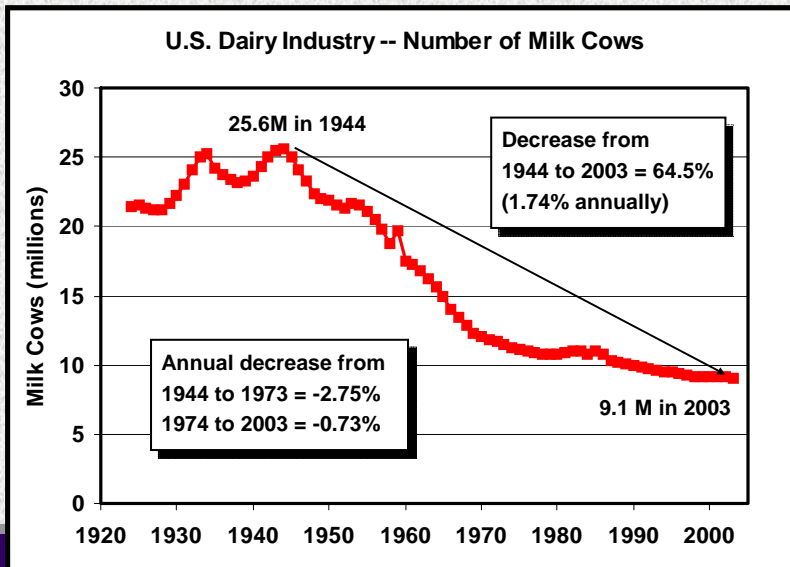


National Trends – The big picture!

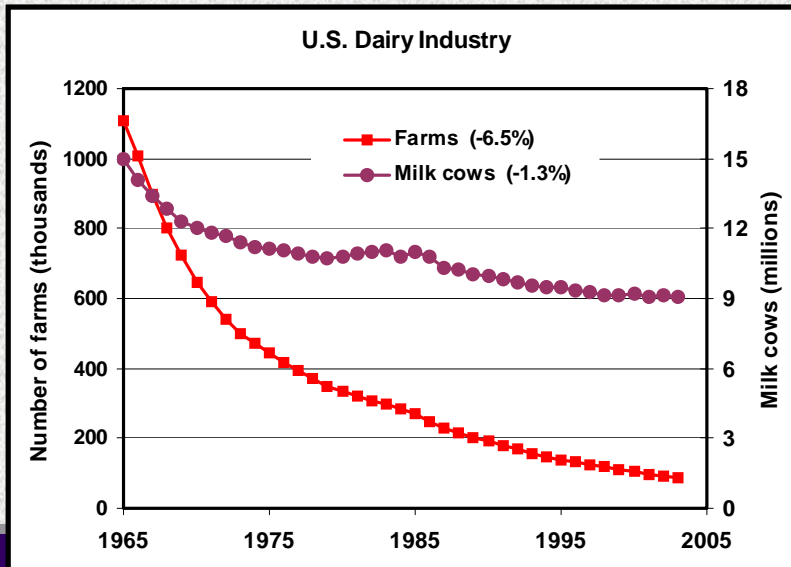
National Trends – Operations



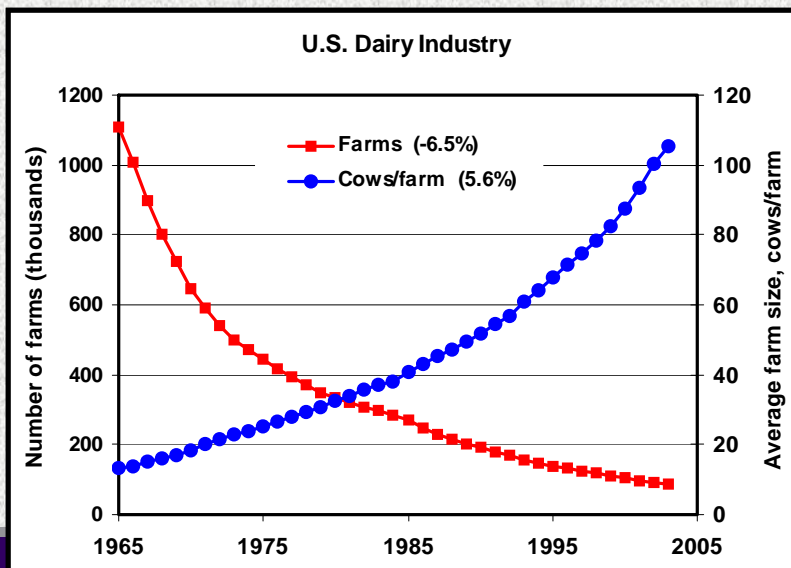
National Trends – Cows



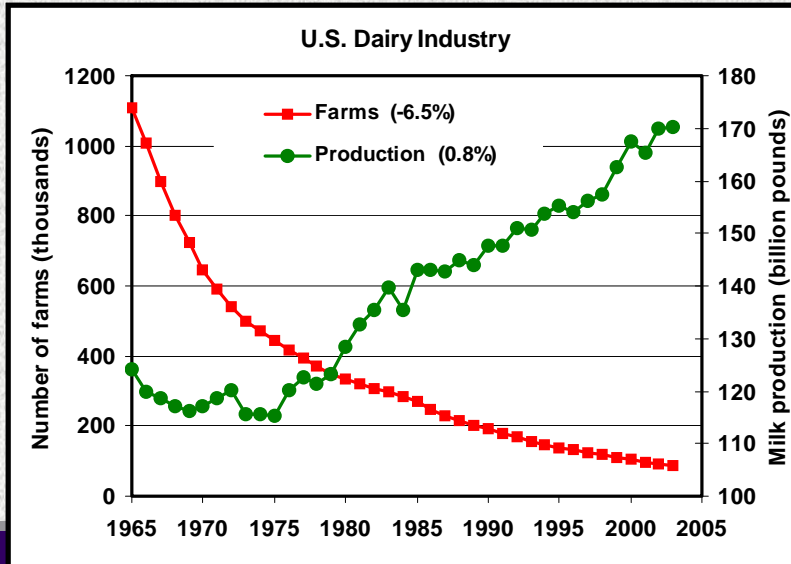
National Trends – Operations and cows



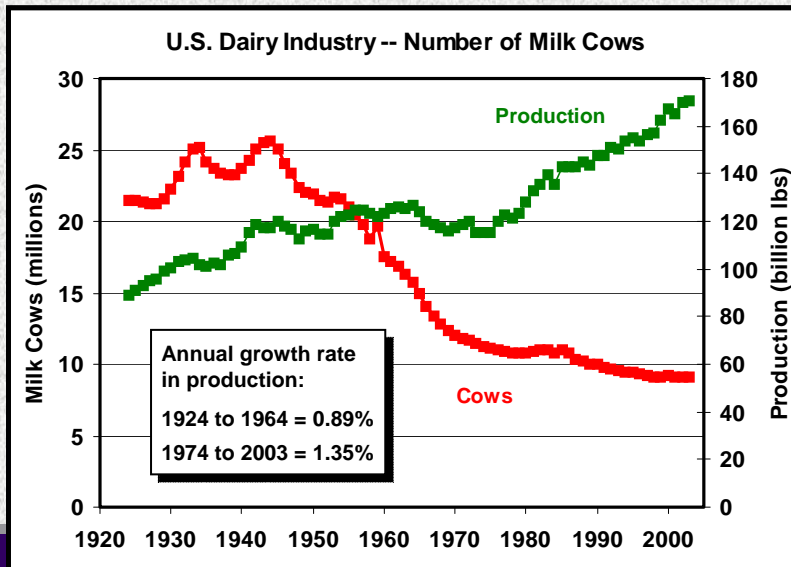
National Trends – Operations



National Trends – Farms & production

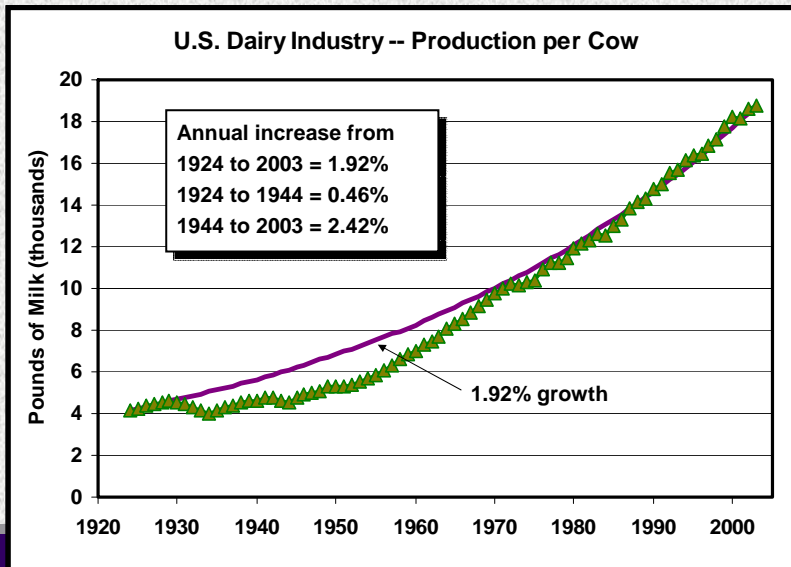


National Trends – Cows & production

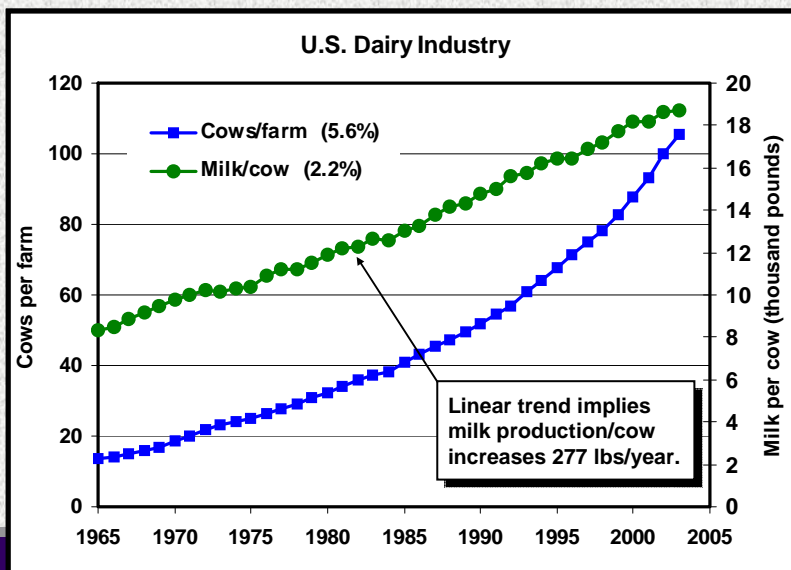


Milk ↑ and Cows ↓ → Better genetics and/or management

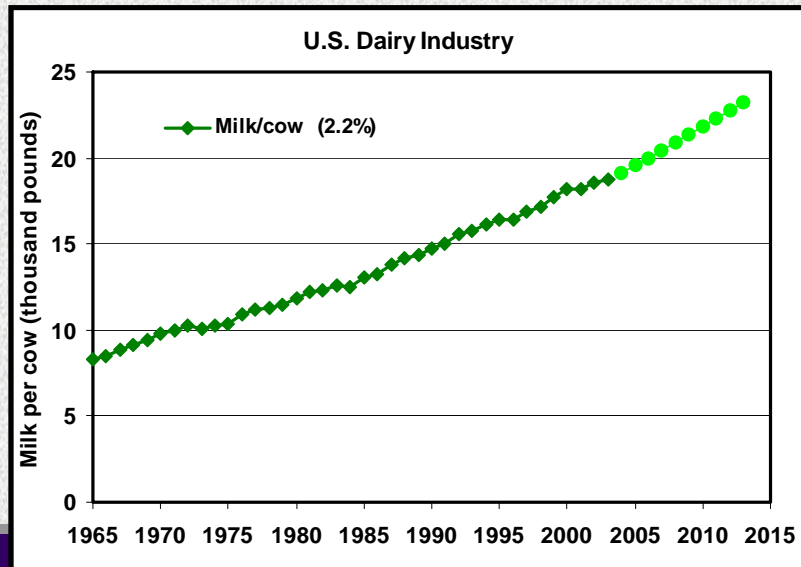
National Trends – Productivity



National Trends – Productivity & farm size



National Trends – Productivity



Projected *average* productivity benchmark

National Trends –

Productivity vs. farm size...

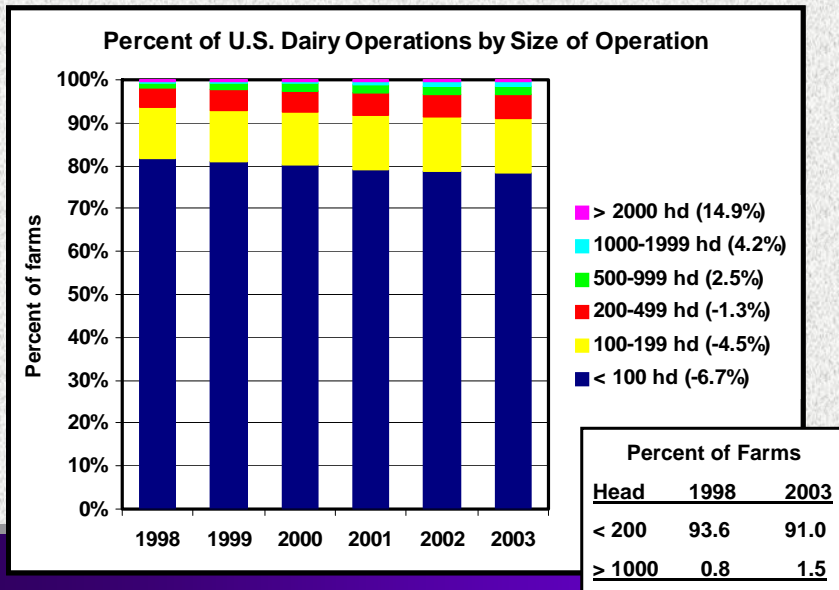
- Production/cow and cows/farm are positively related, but which is causing which (if either)?
- Are highly productive (profitable) farms increasing their size?
- Are large farms adopting technologies that allow them to be more productive?

Both, but likely driven technology (EOS).

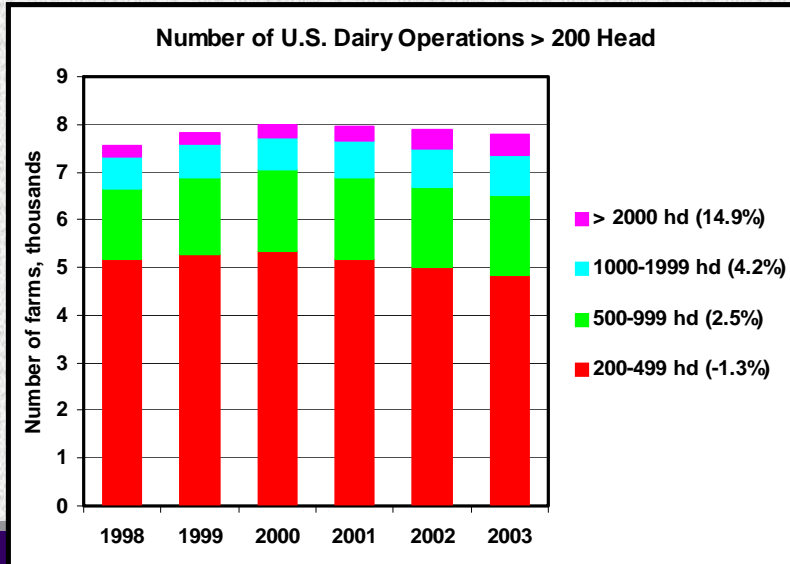
Average numbers...

- Averages can be deceiving, or at the very least, not tell the whole picture.
- Often it is useful to look at distributions to see what might be driving averages.

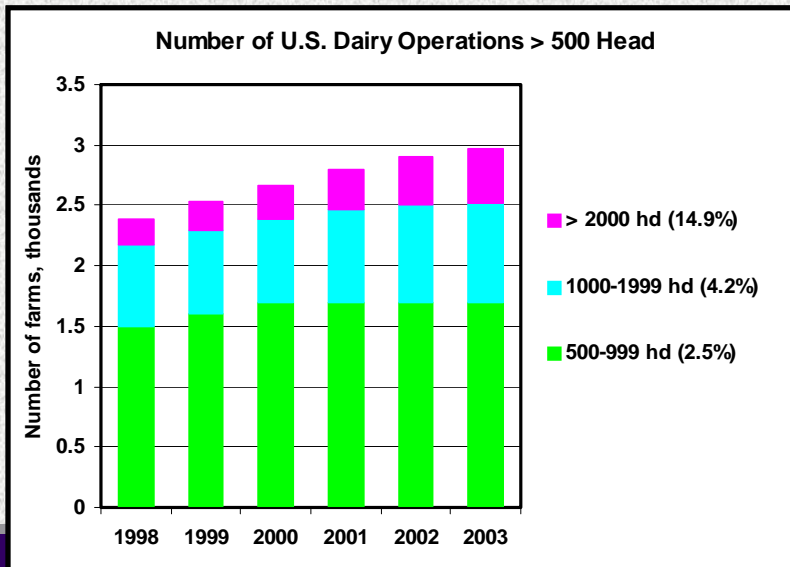
National Trends – Operations by farm size



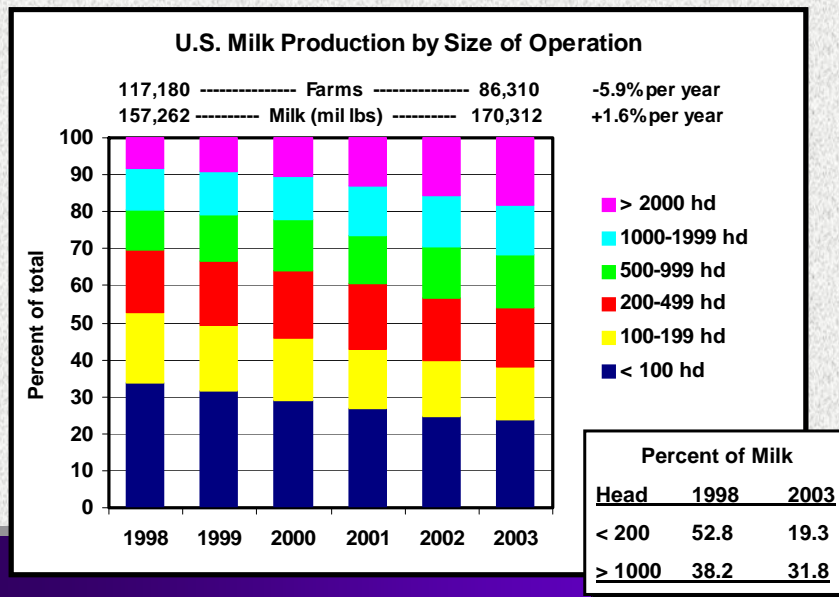
National Trends – Operations by farm size



National Trends – Operations by farm size



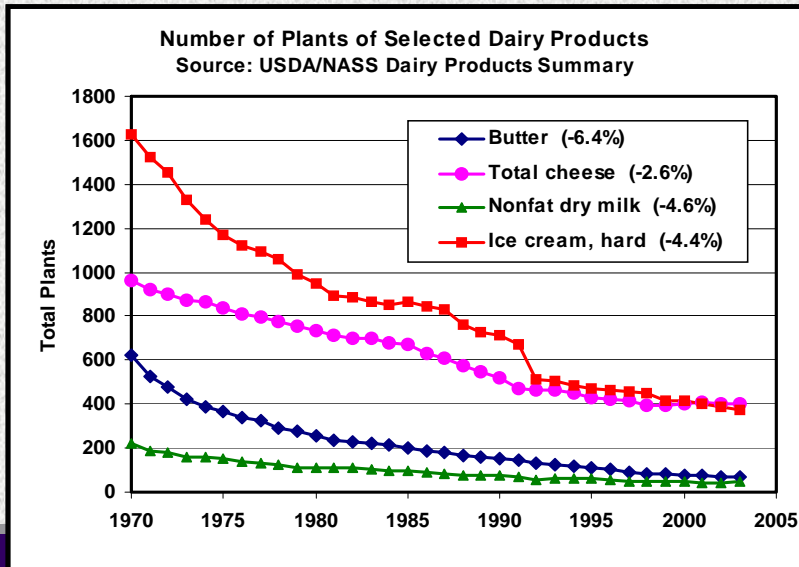
National Trends – Production by farm size



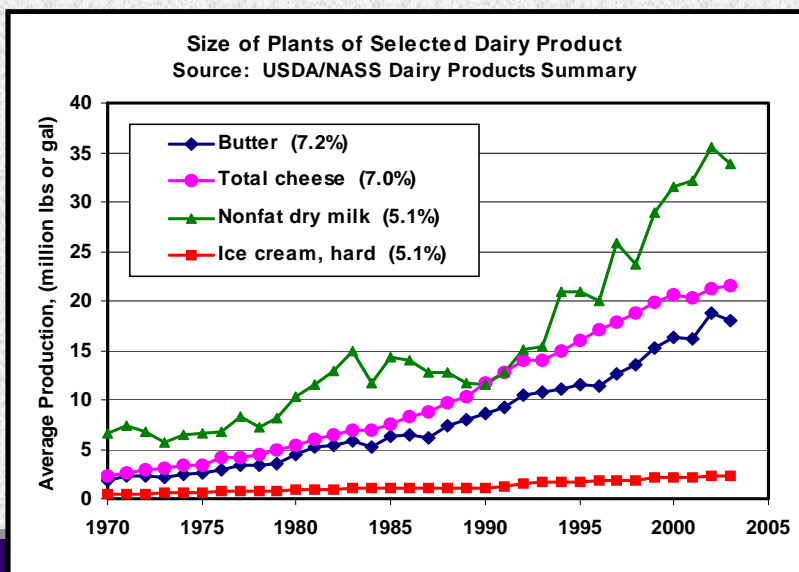
Farms, cows, and production summary...

- Fewer herds
- Cow numbers declining to flat
- Larger herds
- More total milk
- Higher milk production per cow

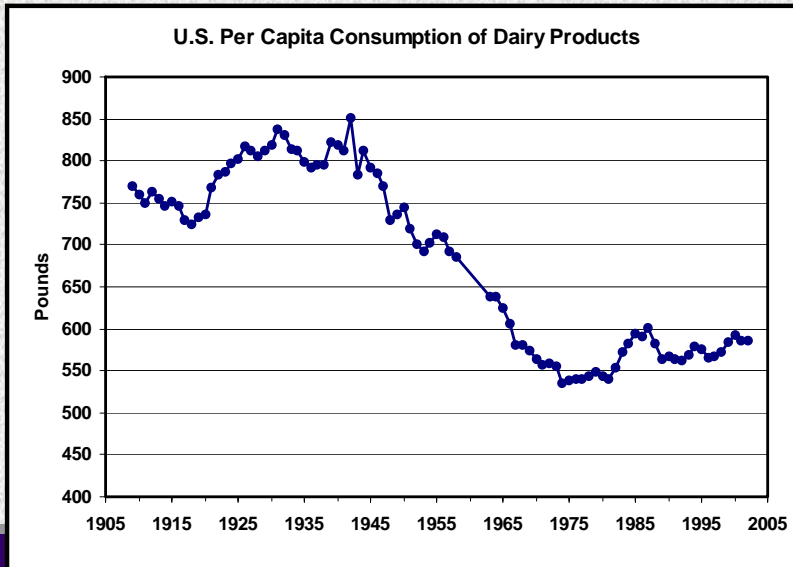
National Trends – Processing



National Trends – Processing

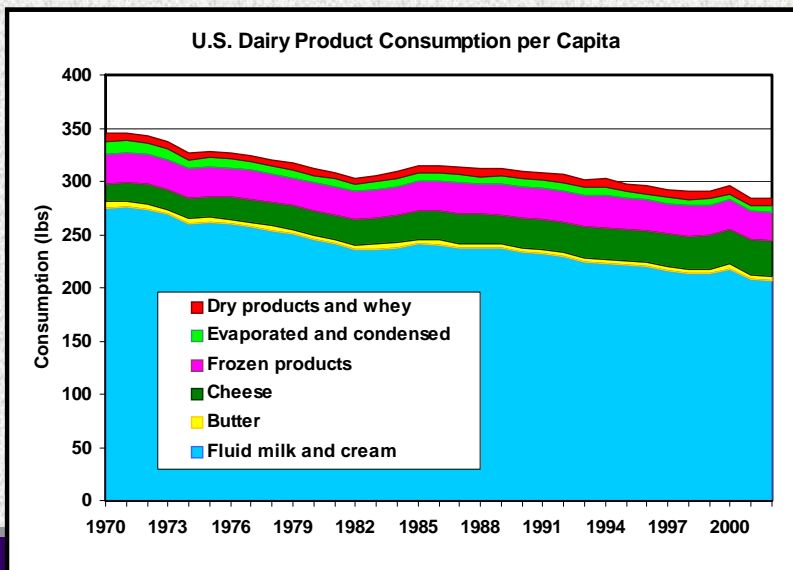


National Trends – Supply & demand

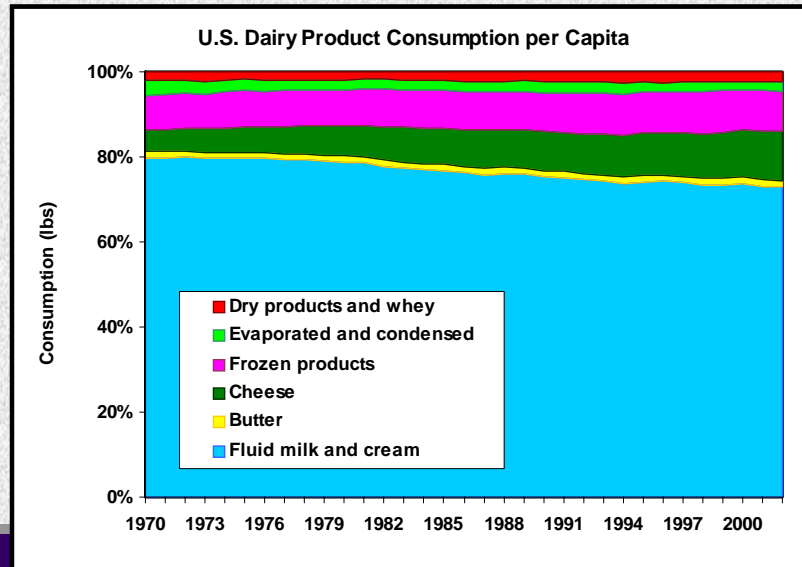


Consumption is all dairy products, milk equivalent, milkfat basis

National Trends – Consumption



National Trends – Consumption



National Trends – Consumption

- **Good economy**
 - Rich, fattier food
- **An average American in 2002**
 - Consumed 284 lbs of milk and dairy products
 - **Milk consumption**
 - 23.2% < 1973, 12.4% < 1983, 7.6% < 1993
 - **Cheese consumption**
 - 77.1% > 1973, 34.0% > 1983, 14.4% > 1993



Processing and consumption summary...

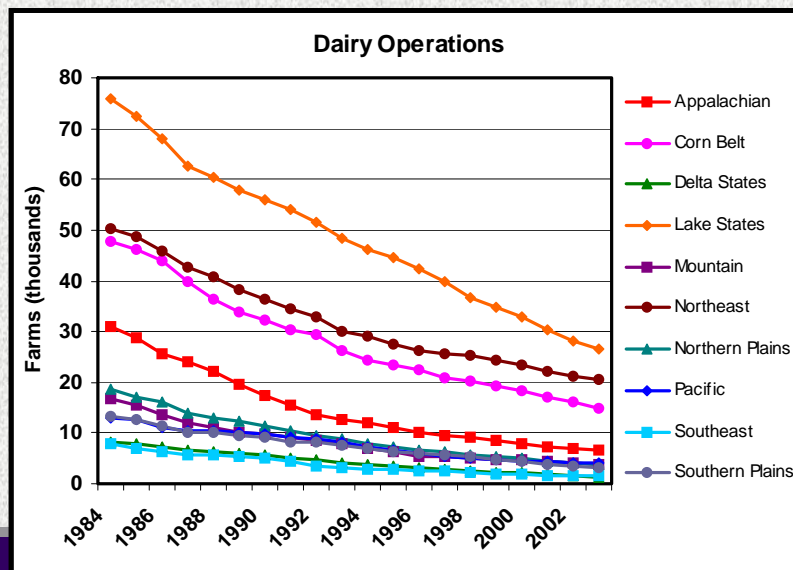
- Processing sector has similar trends as production sector (fewer, but larger plants)
- Consumption of dairy products today is significantly lower than in 1940's, but recently has increased slightly (due to cheese consumption)

Regional Trends – What's happening where?

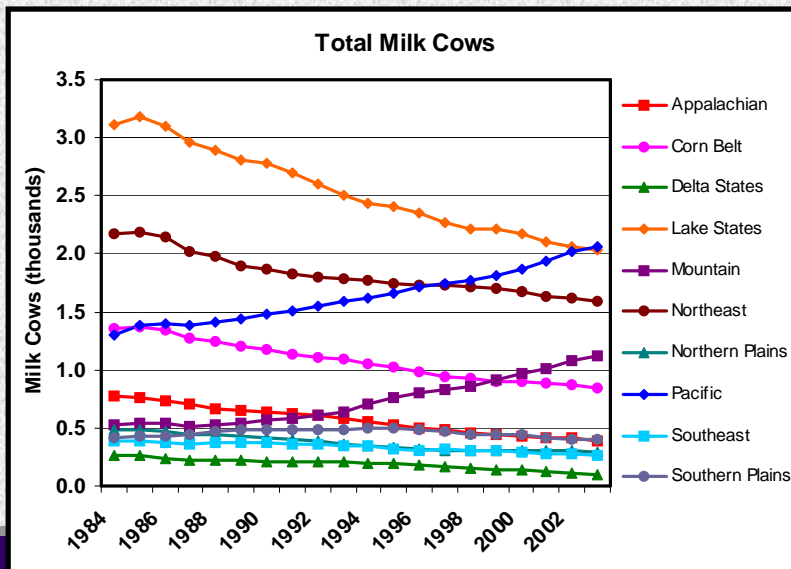
Definitions of regions –

- Northeast – ME, NH, VT, MA, RI, CT, NY, NJ, PA, DE, MD
- Lake States – MI, WI, MN
- Corn Belt – OH, IN, IL, IA, MO
- Northern Plains – ND, SD, NE, KS
- Appalachian – VA, WV, NC, KY, TN
- Southeast – SC, GA, FL, AL
- Delta States – MS, AR, LA
- Southern Plains – OK, TX
- Mountain – MT, ID, WY, CO, NM, AZ, UT, NV
- Pacific – WA, OR, CA, AK, HI

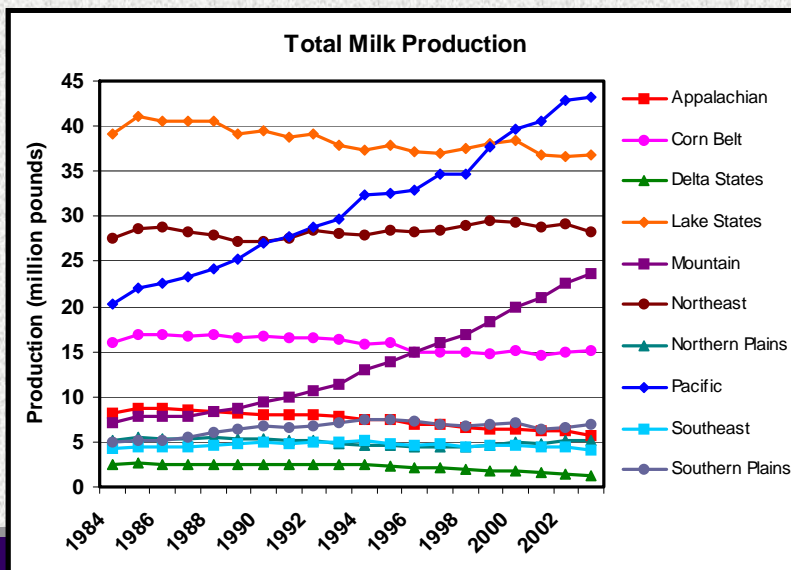
Regional Trends – Farms



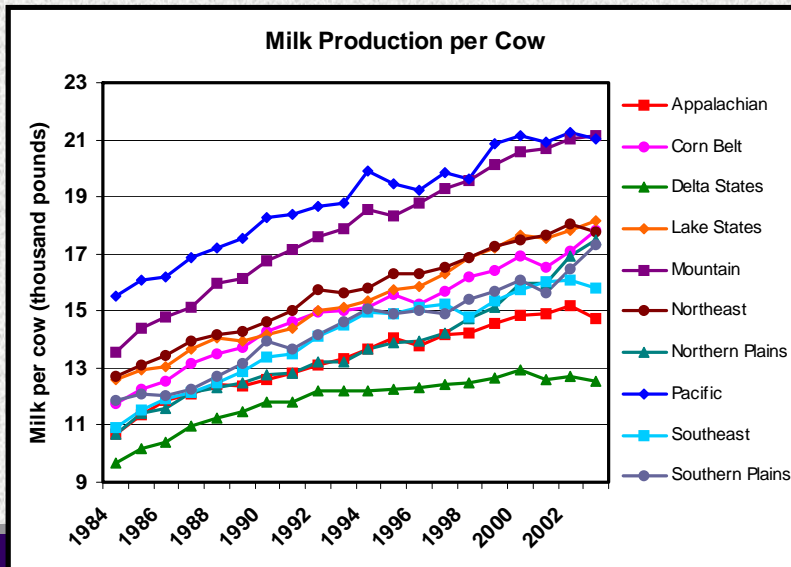
Regional Trends – Cows



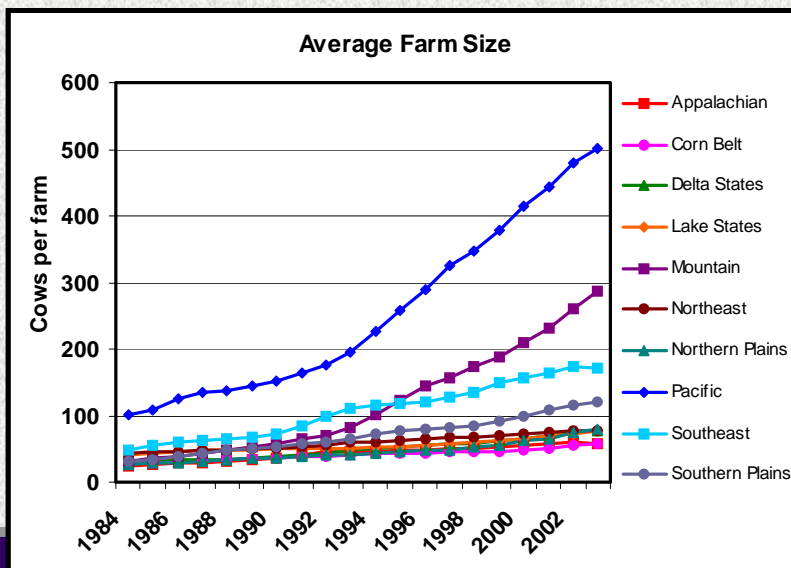
Regional Trends – Production



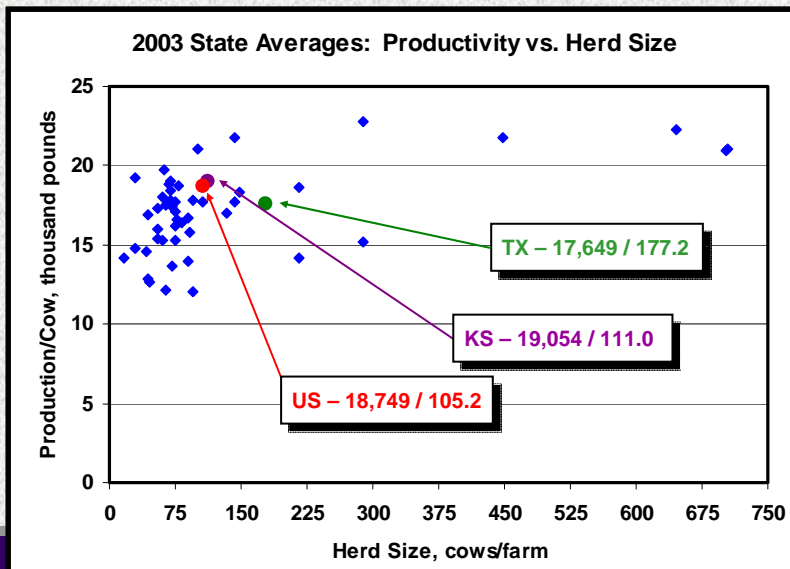
Regional Trends – Productivity



Regional Trends – Farm size



Productivity vs. Farm Size ...



Regional Trends – Production

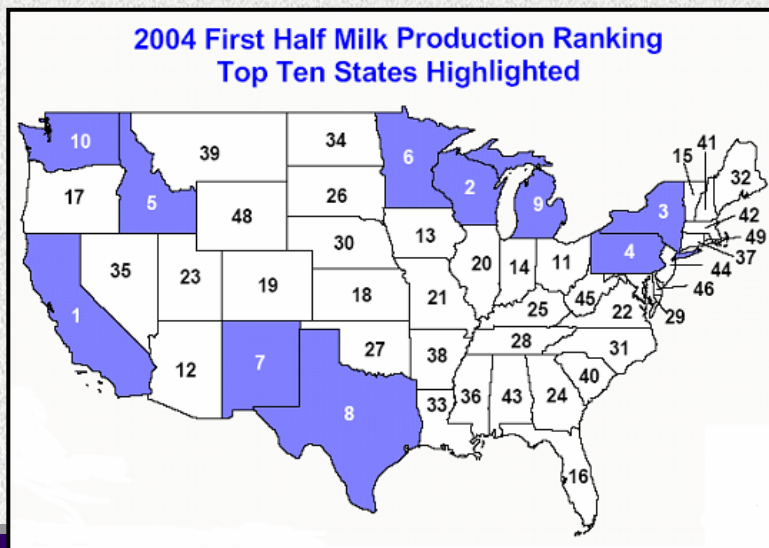
Top 10 Milk Production, 2003 (million lbs)

1.	California	35,437 (1,2)*
2.	Wisconsin	22,266 (2,1)
3.	New York	11,952 (3,3)
4.	Pennsylvania	10,338 (4,5)
5.	Idaho	8,774 (11,16)
6.	Minnesota	8,258 (5,4)
7.	New Mexico	6,666 (13,33)
8.	Michigan	6,360 (7,6)
9.	Texas	5,630 (6,9)
10.	Washington	5,581 (8,10)

* Rank in 1993 and 1983

Source: Milk Market Administrator – Central Order, Market Service Bulletin, Sept. 2004.

Regional Trends – Production



Source: Milk Market Administrator – Central Order, Market Service Bulletin, Sept. 2004.

Regional Trends – Productivity

Top 10 Milk per Cow, 2003 (lbs)

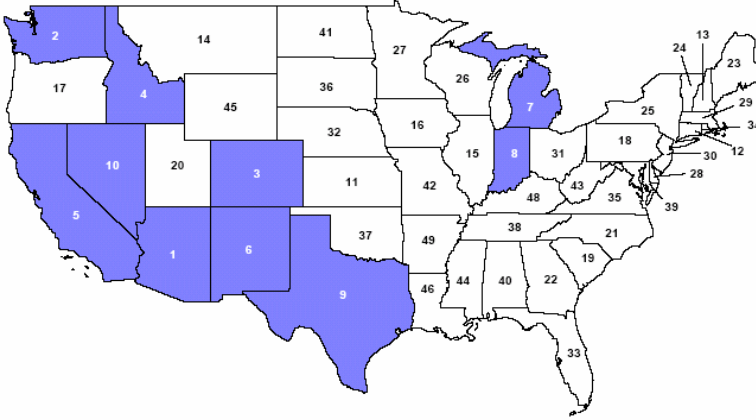
1.	Washington	22,780 (2,1)*
2.	Arizona	22,284 (4,4)
3.	Colorado	21,770 (5,14)
4.	Idaho	21,718 (7,13)
5.	Michigan	21,060 (10,5)
6.	New Mexico	21,028 (1,3)
7.	California	20,993 (3,2)
8.	Indiana	19,758 (17,35)
9.	Montana	19,222 (35,25)
10.	New Hampshire	19,063 (18,26)

* Rank in 1993 and 1983

Source: Milk Market Administrator – Central Order, Market Service Bulletin, Sept. 2004.

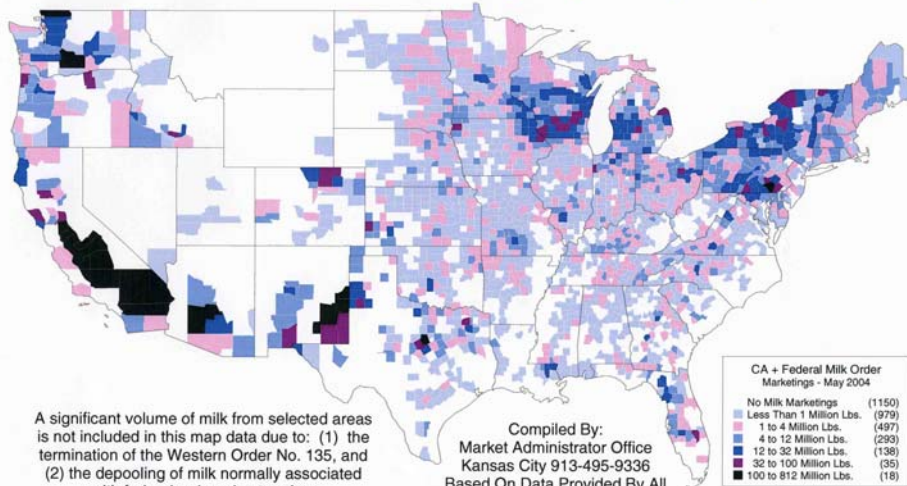
Regional Trends – Productivity

2004 First Half Milk Production Per Cow Ranking Top Ten States Highlighted



Source: Milk Market Administrator – Central Order, Market Service Bulletin, Sept. 2004.

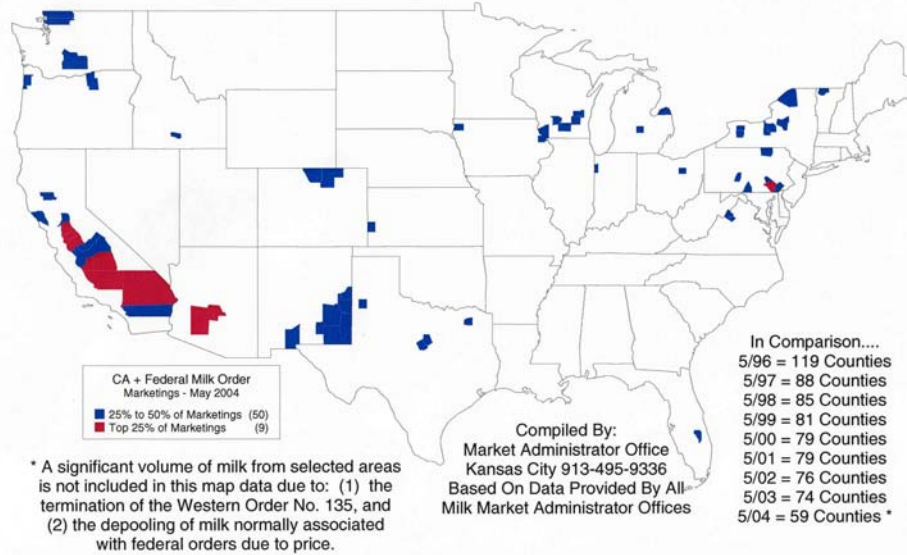
CA + Federal Order Milk Marketings By County - May 2004



A significant volume of milk from selected areas is not included in this map data due to: (1) the termination of the Western Order No. 135, and (2) the depooling of milk normally associated with federal orders due to price.

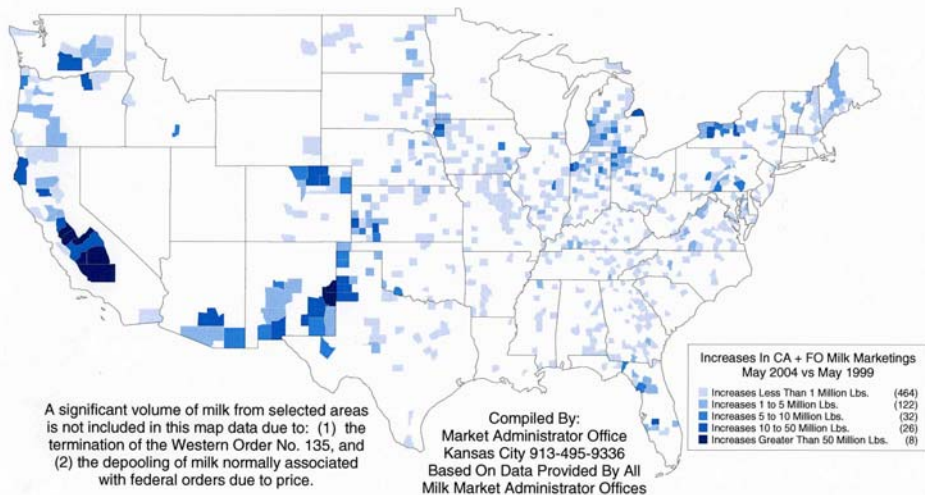
Compiled By:
Market Administrator Office
Kansas City 913-495-9336
Based On Data Provided By All
Milk Market Administrator Offices

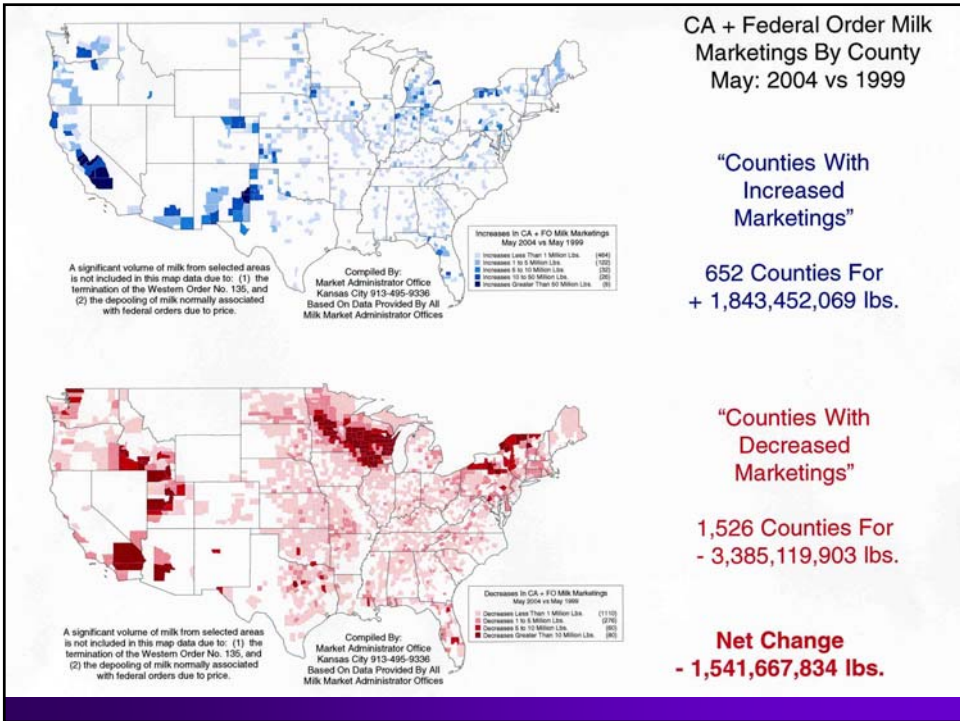
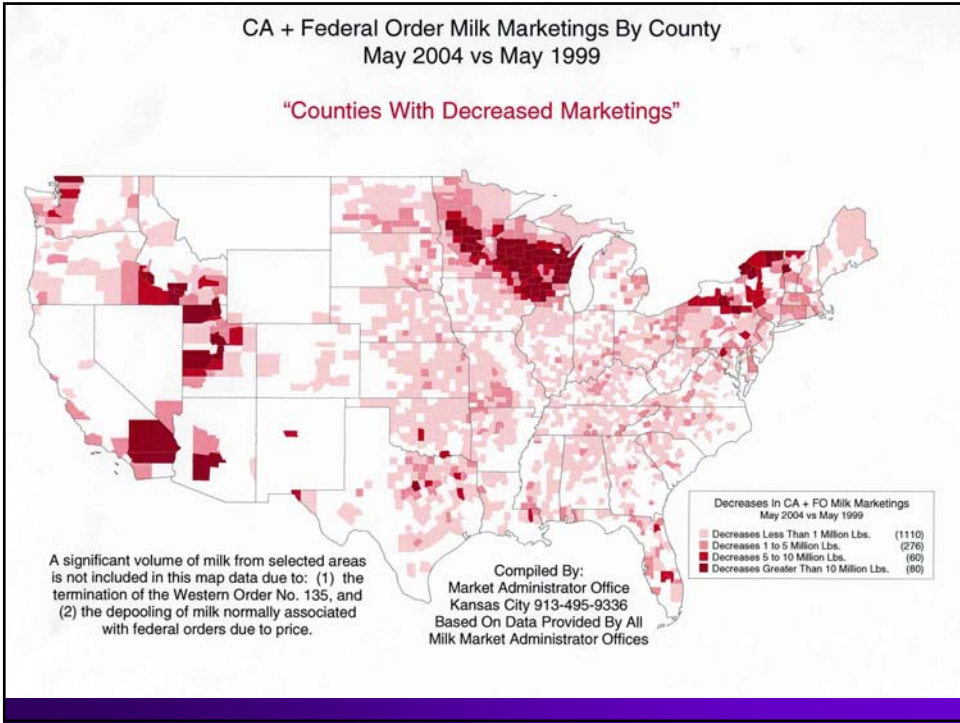
59 Counties Marketed 50% Of All
CA + Federal Order Milk During May 2004



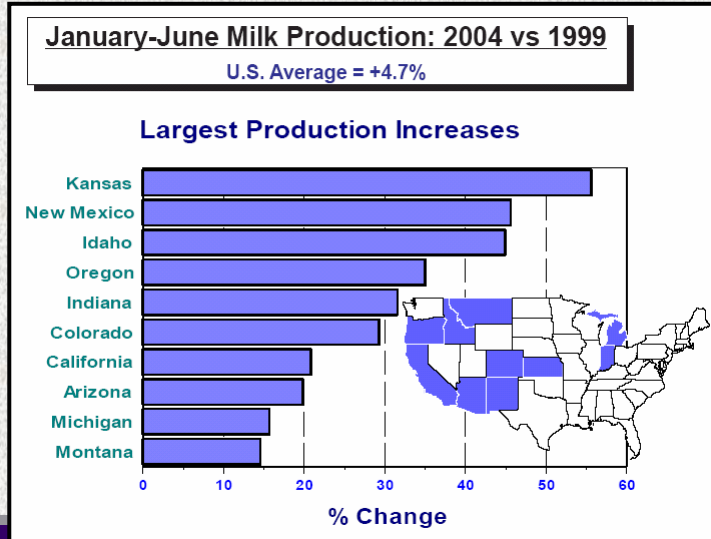
CA + Federal Order Milk Marketings By County
May 2004 vs May 1999

"Counties With Increased Marketings"



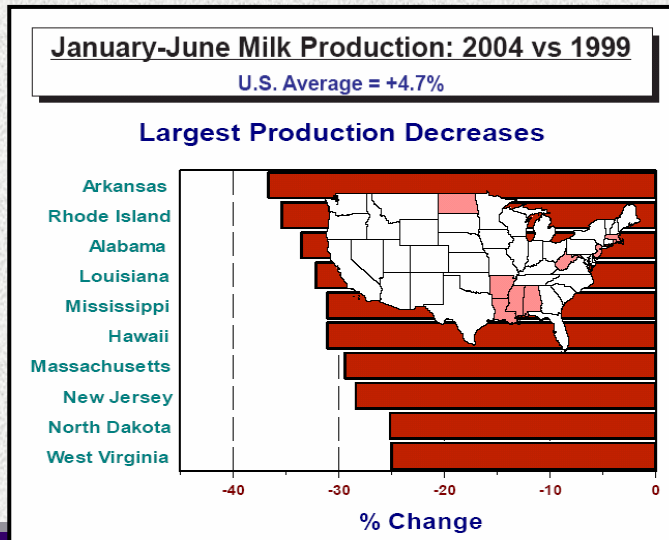


Regional Trends – Production



Source: Milk Market Administrator – Central Order, Market Service Bulletin, Sept. 2004.

Regional Trends – Production



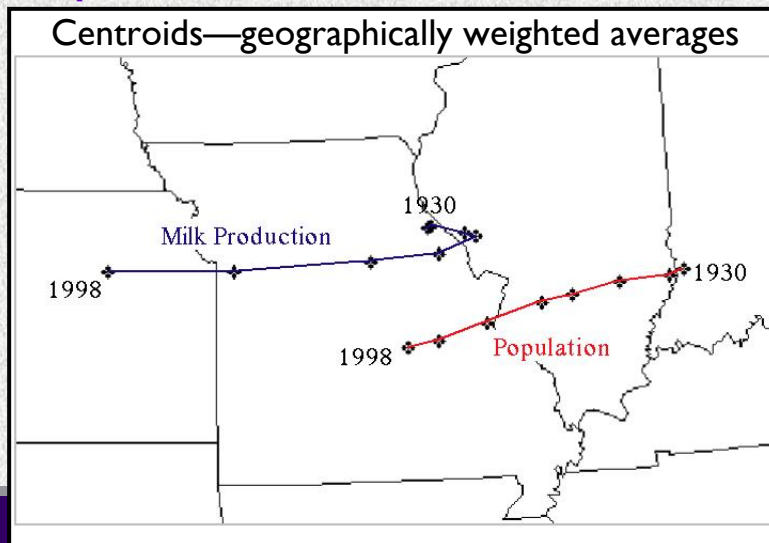
Source: Milk Market Administrator – Central Order, Market Service Bulletin, Sept. 2004.

Regional trends summary...

- Number of operations are declining in all regions
- Cow numbers and milk production are steady to down everywhere except the west
- Production is moving to the west

What is behind these trends?

People...



What is behind these trends?

Climate, soil, land, water...

- **Dry climates**
 - Easier to manage manure
 - Can build drylot dairies
 - Irrigated forage production
- **Cow performance**
 - Easier to produce milk (heat, cold, humidity)
- **Large tracts of land**
- **Water resources will determine how many cows we can locate in the west**

What is behind these trends?

“Culture” of dairies – East vs. West...

- **East**
 - Family life
 - Grow own forage
 - Expansion ⇒ need crop land
- **West**
 - Larger operations to serve population ↑
 - Early adoption of bulk tanks
 - Purchase forage

What is behind these trends?

Changes required...

- **Decline in milk production in traditional areas**
 - Facilities that need to be updated
 - Don't want to manage employees
 - Better opportunities for young people
 - Population density
 - Social acceptance to change

What is behind these trends?

Processing and distribution...

- **Milk supply \uparrow \Leftrightarrow processing facilities \uparrow**
- **Transportation cost \downarrow**
 - Not critical for production to be near consumers

What is behind these trends?

Business environment...

- Management personnel
- Communities' reception towards large animal ag operations
- Environmental regulations
- Cost of compliance/acceptance
- Regulations on corporate farms
- Large dairies displaced out of southern CA (have to increase herd size)

Factors behind regional trends

Summary...

- Complex!
- Difference in management style
 - Large dairies established in the West
 - Constraint on expansion in the East
- Economies of scale
- Environmental concerns and regulations

Where will industry be in the future?

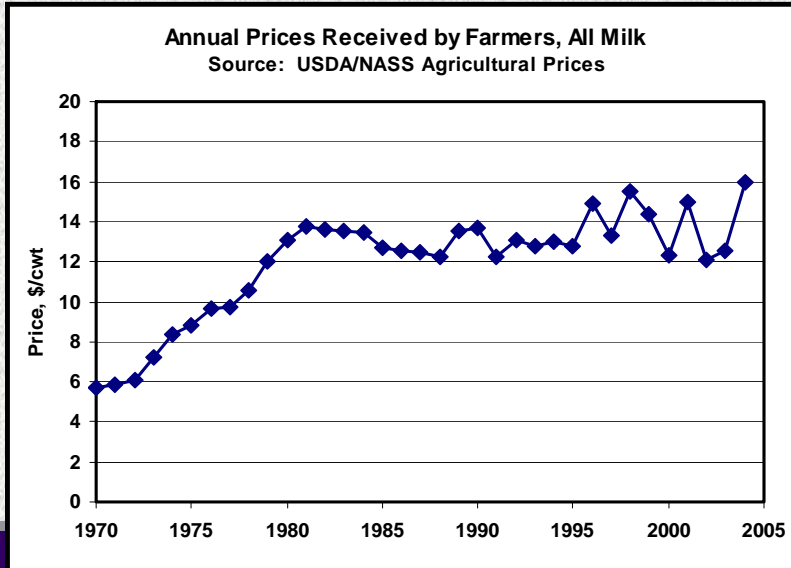


Produce milk where people are, or where they aren't?

Prices – Dairy industry is very “data rich”

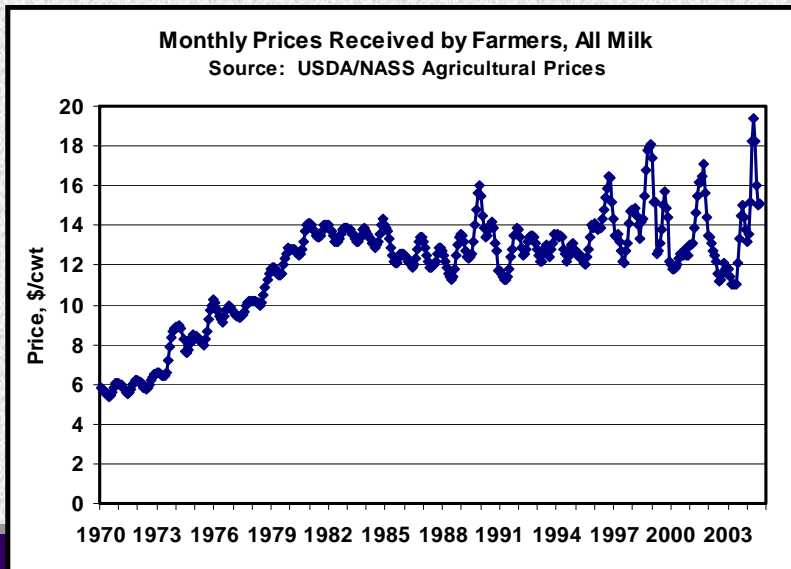
- Many, many resources available ...
 - <http://www.ams.usda.gov/dairy/>
 - <http://www.dallasma.com/>
 - <http://fmma-central.com/>
 - <http://www.dfamilk.com/>
 - <http://www.aae.wisc.edu/future/>
 - <http://dairyoutlook.aers.psu.edu/>
 - <http://agebb.missouri.edu/dairy/index.htm>
 - Etc.

Prices – Price levels constant for 25 years



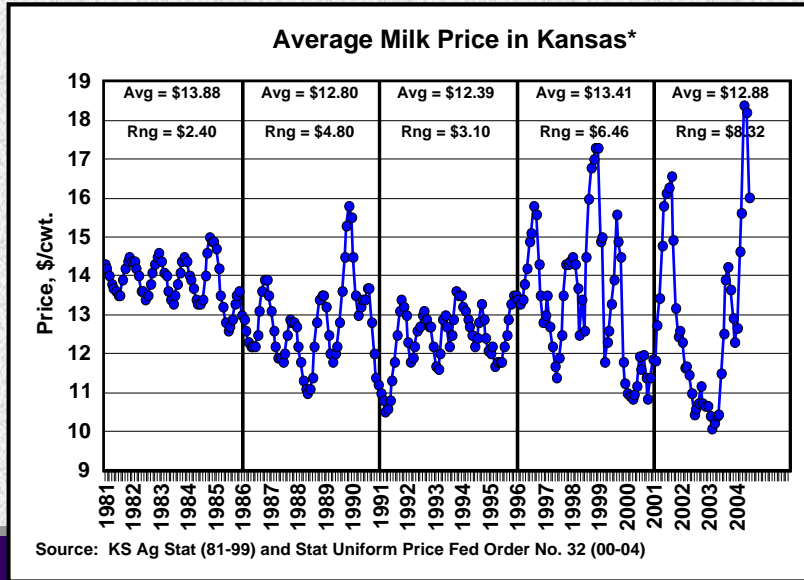
2004 is not a complete year (Jan through Sep).

Prices – Variability increasing

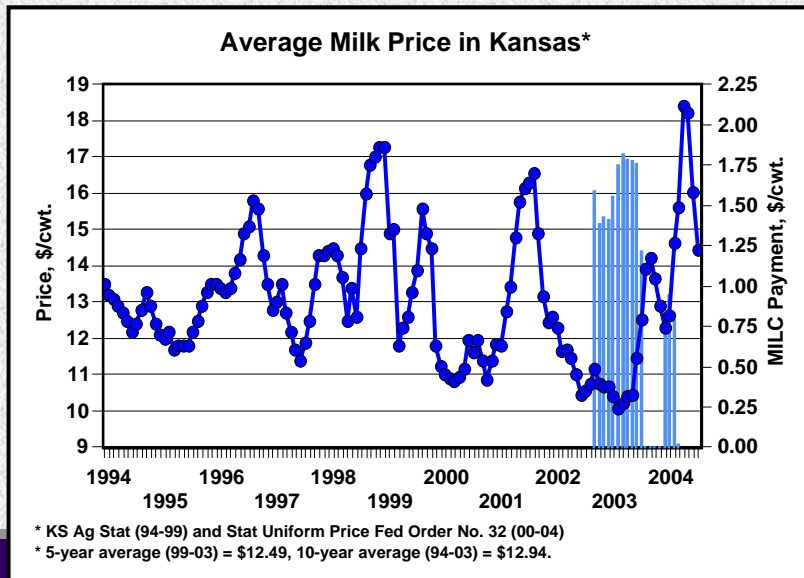


2004 is not a complete year (Jan through Sep).

Prices – Variability increasing

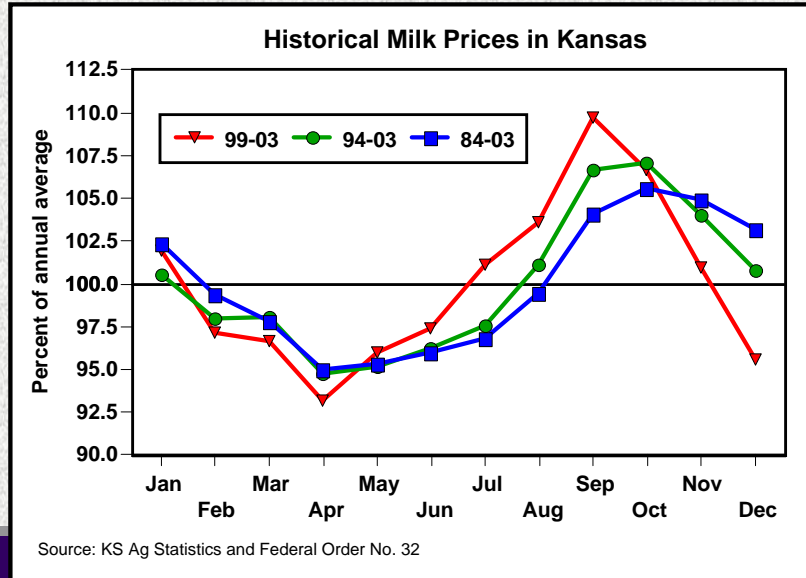


Prices – Milk Income Loss Contract program



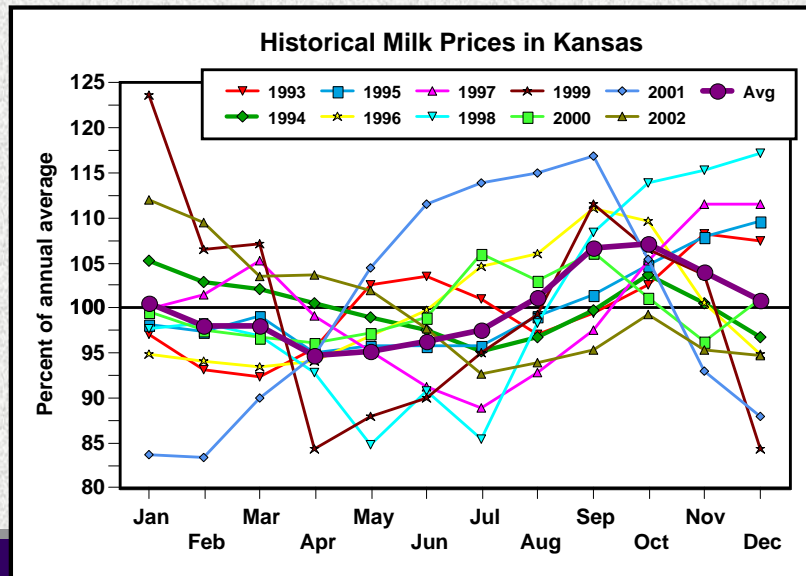
MILC price supports mean very little to large dairies (2.4M lb max).

Prices – Seasonality



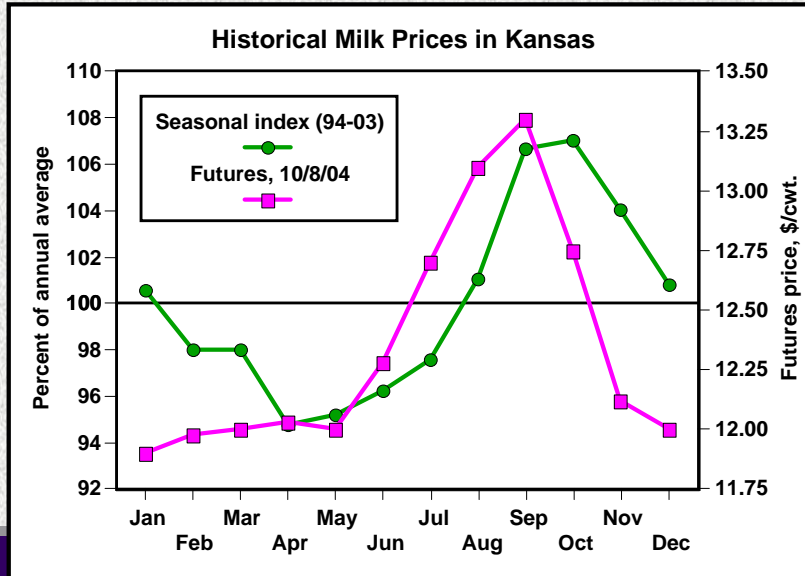
Milk prices appear to follow predictable seasonal pattern.

Prices – Seasonality



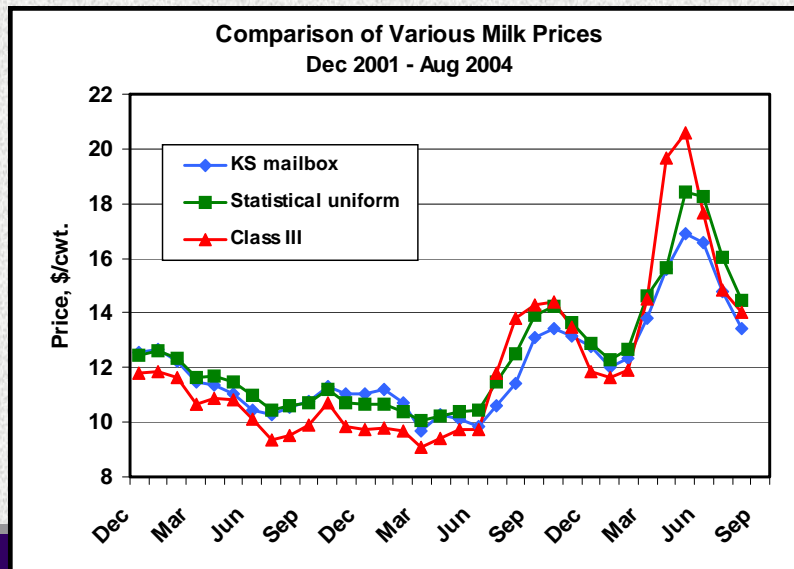
Or, do they?

Prices – Seasonality & futures market



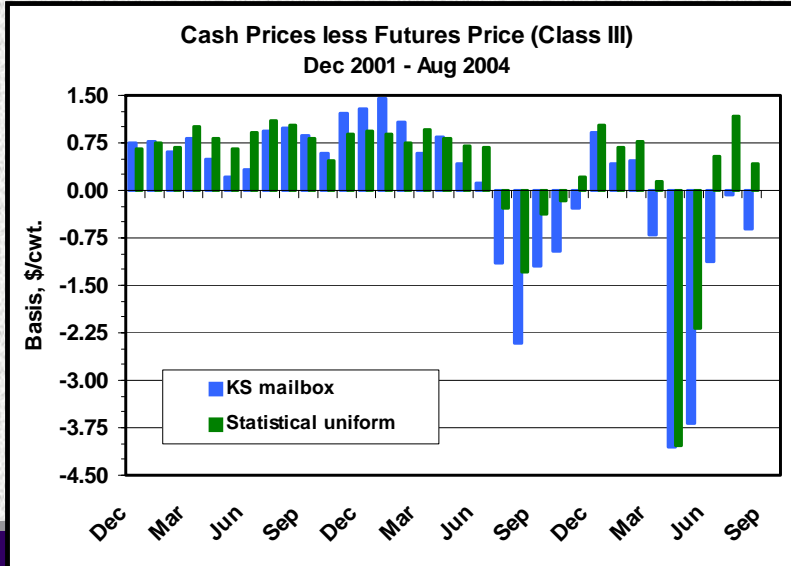
Futures market tends to capture seasonality.

Prices – Various prices to consider

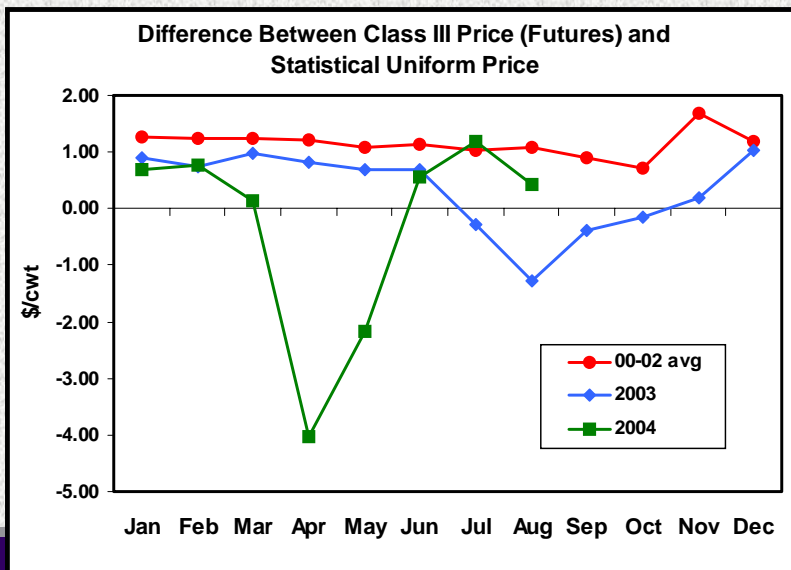


Prices appear to track together quite well.

Prices – Basis



Prices – Basis

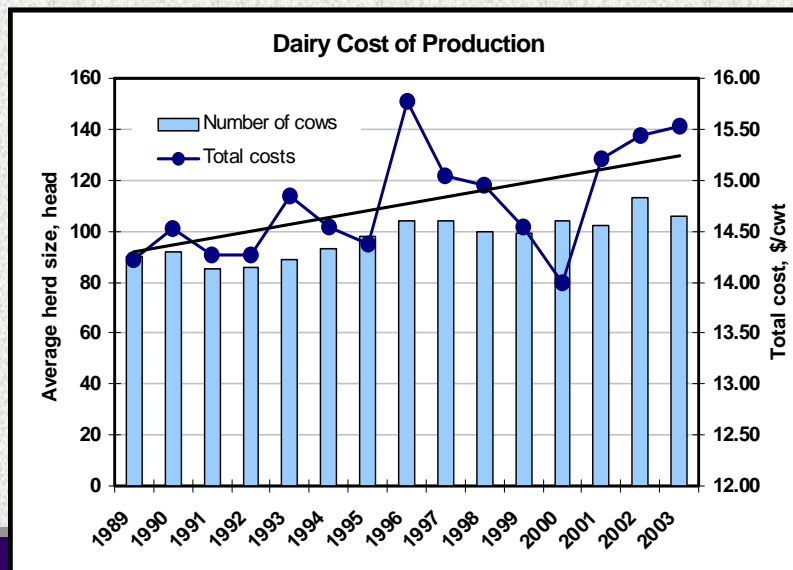


Basis "deviations" vary from year to year...

Prices summary...

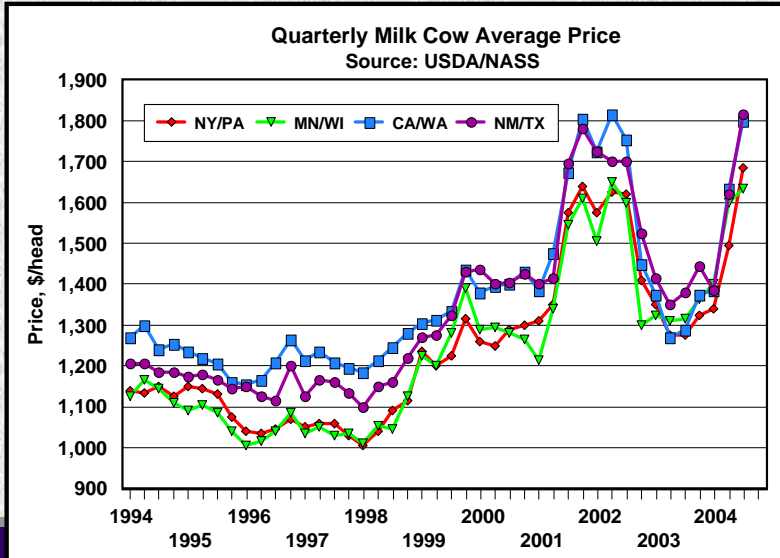
- Average prices have changed very little in the last 25 years
- Price variability has increased significantly – MILC support payment not very helpful for large dairies
- Prices tend to follow seasonal pattern, but not a lot can be done about it
- Basis has been unpredictable last several years

Costs – Are costs increasing over time?



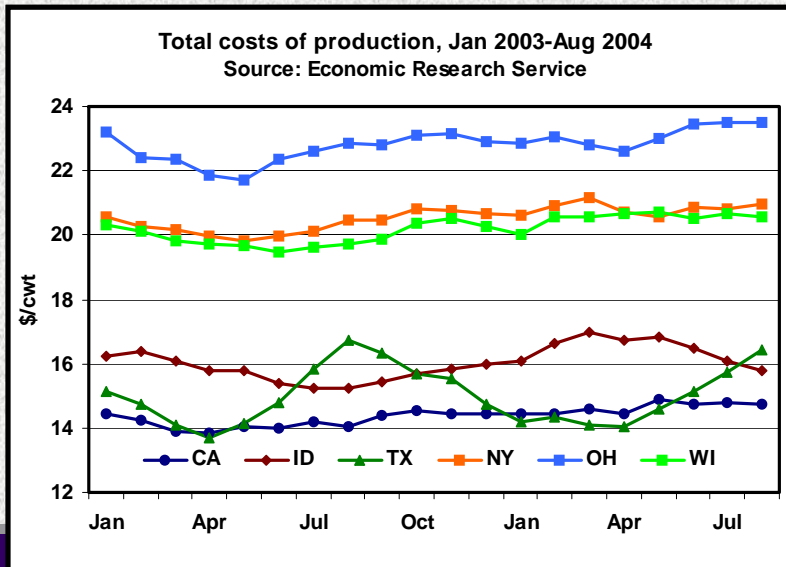
Source: Kansas Farm Management Enterprise Analysis

Costs – Regional differences



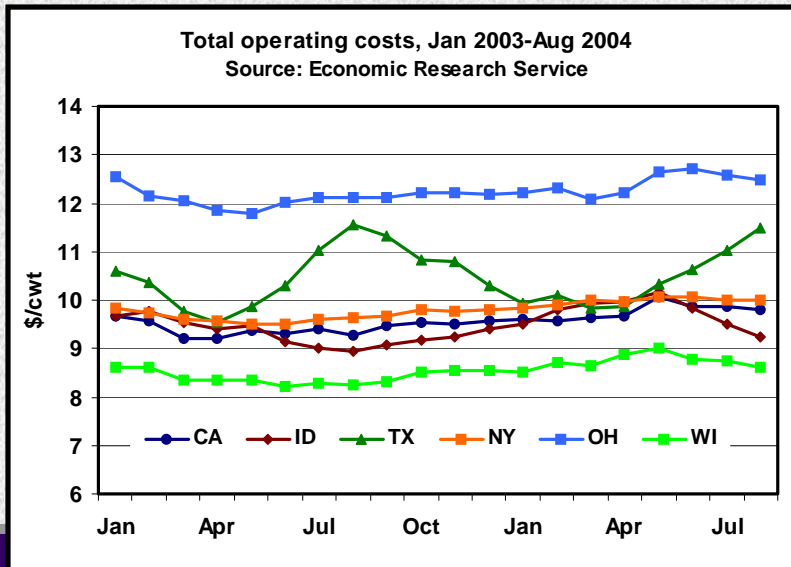
Replacements are less expensive in “traditional” states.

Costs – Regional differences



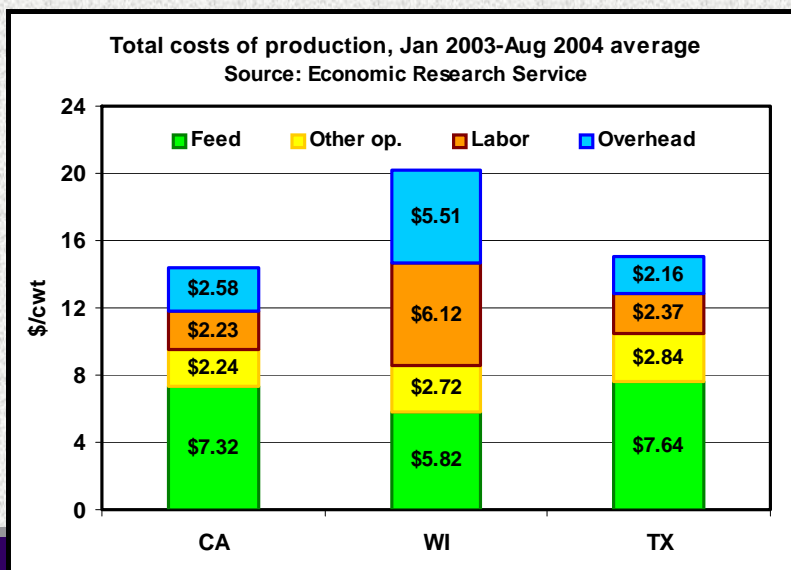
“Traditional” states have much higher costs.

Costs – Regional differences



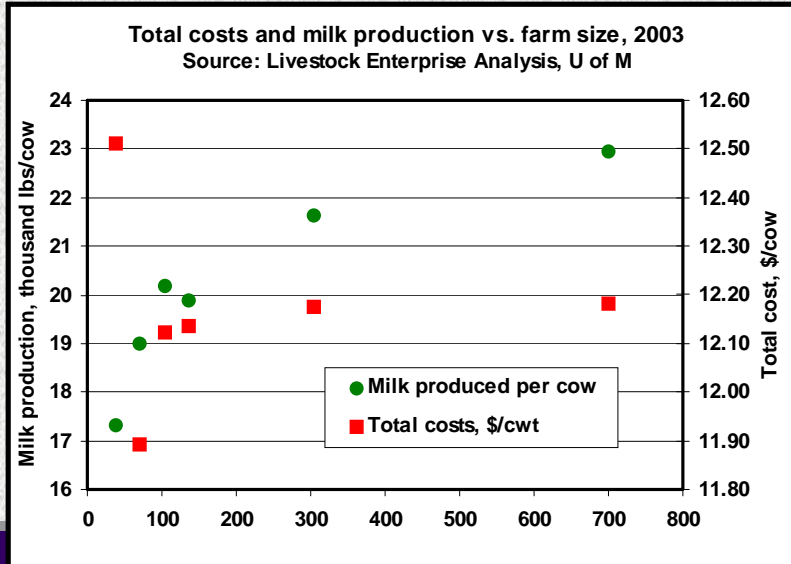
“Traditional” states are competitive with operating costs.

Costs – Regional differences



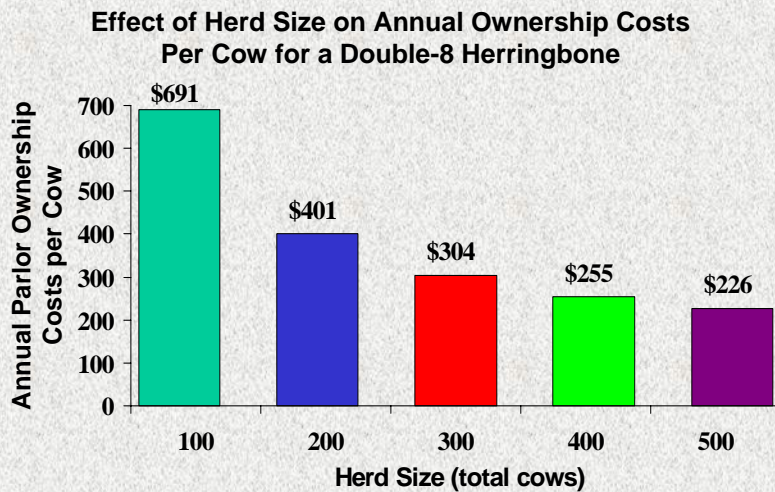
“Traditional” states are not competitive with labor and overhead.

Costs – Cost and production vs. farm size



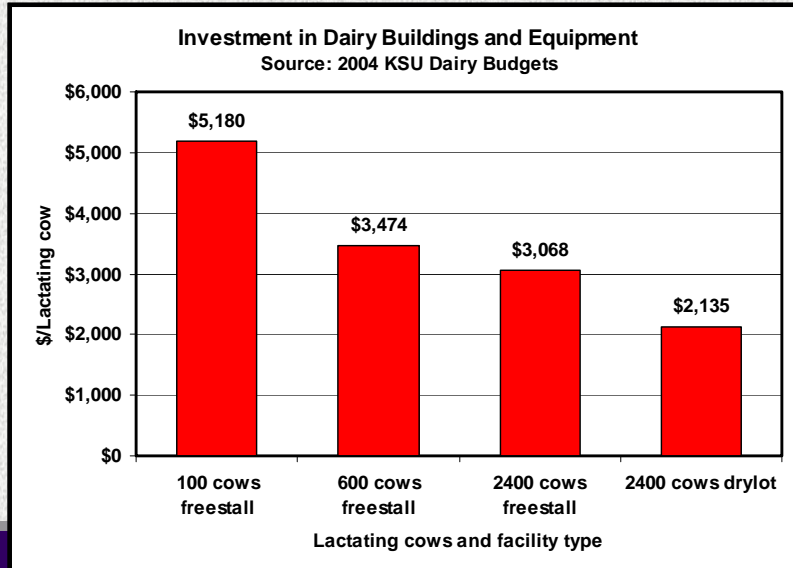
Lower costs for small dairies is due to feed – is this believable?

Costs – Facility cost

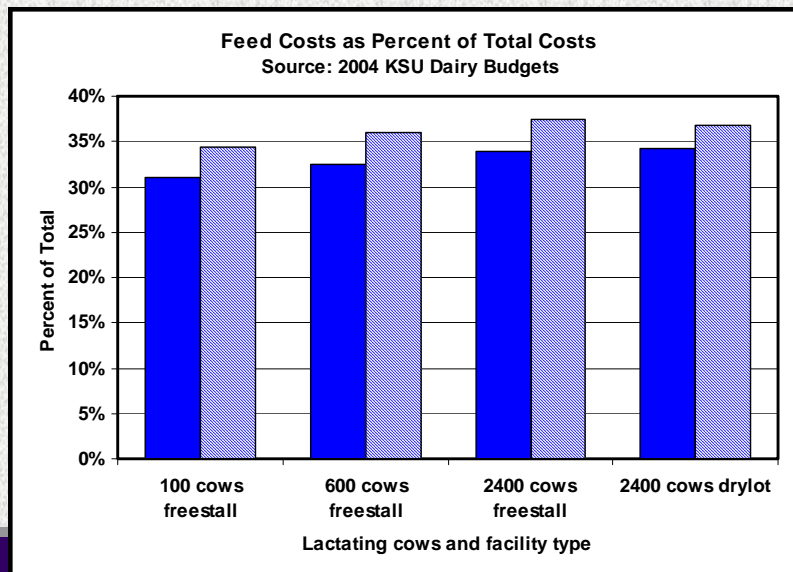


Source: Craig Thomas, Michigan State University

Costs – Facility investment



Costs – Feed costs vs. other costs



Increasing feed costs indicate other costs are falling (EOS exist).

Costs – Facility type



Breakeven Milk Price for Drylot and Freestall Dairies (2400 lactating cows)

Dairy Type	Production Level (lbs/cow/year)			
	18,000	19,000	22,000	24,000
Drylot	\$13.36		\$12.30	
Freestall		\$13.59		\$12.29

Source: 2004 KSU Dairy Budgets

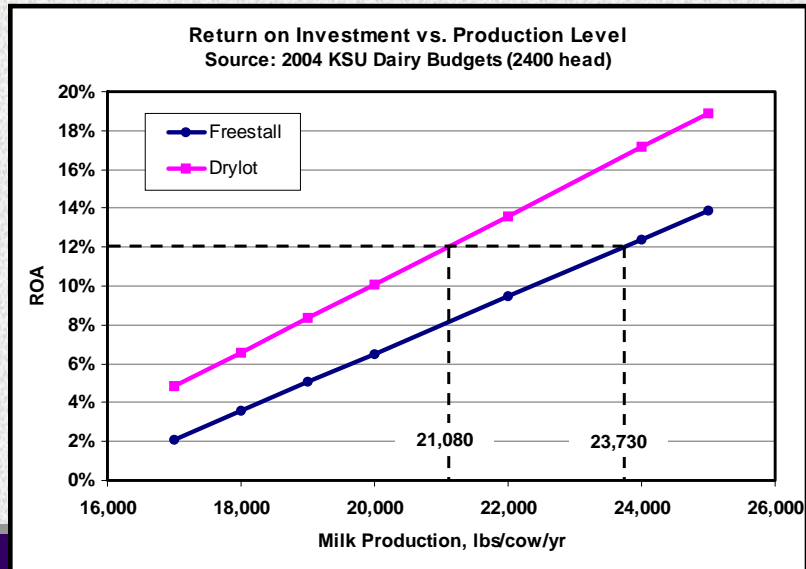
Costs – Facility type

Net Return on Assets for Drylot and Freestall Dairies (2400 lactating cows)

Dairy Type	Production Level (lbs/cow/year)			
	18,000	19,000	22,000	24,000
Drylot	6.59%		13.62%	
Freestall		5.04%		12.40%

Source: 2004 KSU Dairy Budgets

Costs – Facility type



Costs – Production vs. investment

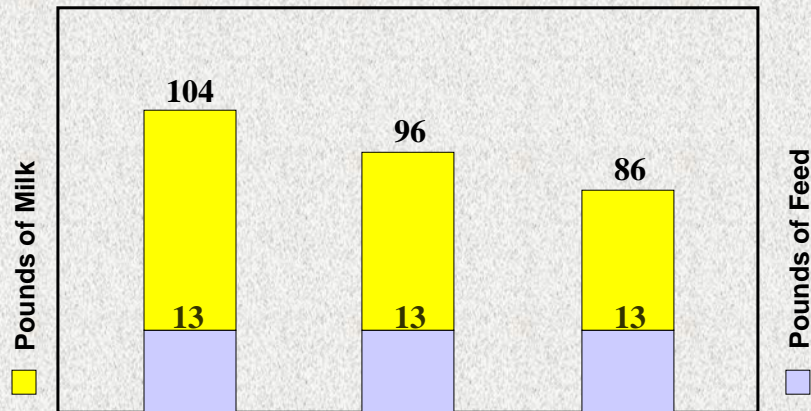
Drylot Dairy (2400 lactating cows)

Sensitivity of Return on Assets to Production and Investment					
Investment per cow**	Production level (lbs milk sold)*				
	16,000	17,000	18,000	19,000	20,000
\$1,579	2.5%	5.1%	7.6%	10.2%	12.8%
\$1,679	2.1%	4.6%	7.1%	9.6%	12.1%
\$1,779	1.7%	4.2%	6.6%	9.0%	11.5%
\$1,879	1.4%	3.7%	6.1%	8.5%	10.8%
\$1,979	1.0%	3.3%	5.6%	7.9%	10.2%

* Feed prices vary proportionately as production changes
** Investment/cow is for all cows in herd (lactating and dry).

Source: 2004 KSU Dairy Budgets

Pounds of Feed (DM Basis) Required* For Maintenance at Different Levels of Peak Milk Production



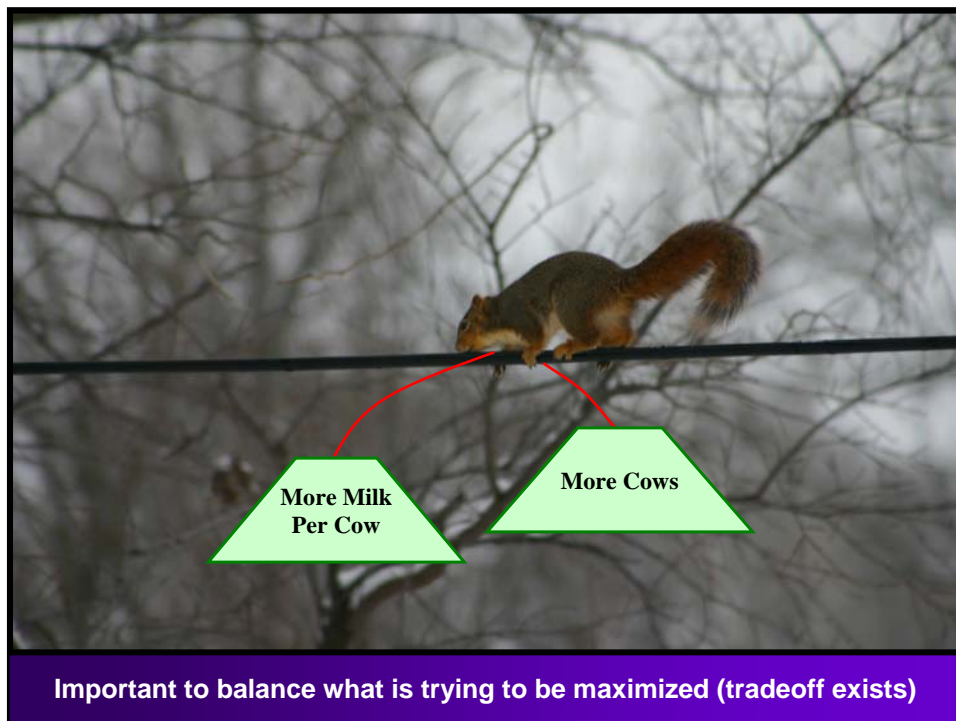
* Assumes a ration containing 0.78 Mcal/lb of dry matter
* Assumes environmental factors are constant.

New Dairy Facilities

- Dilute fixed assets over as many cows as possible
 - Increase the bottom line
 - Manage employees
 - Manage resources vs. work with cows
 - Ability to manage heat stress
 - Special needs facilities

Costs summary...

- "Western" states appear to have a cost advantage over "traditional" states due primarily to lower labor and overhead costs
- While data are somewhat conflicting, hard to argue that economies of size do not exist
- As a general rule, minimizing fixed costs is done by maximizing cows and production per cow

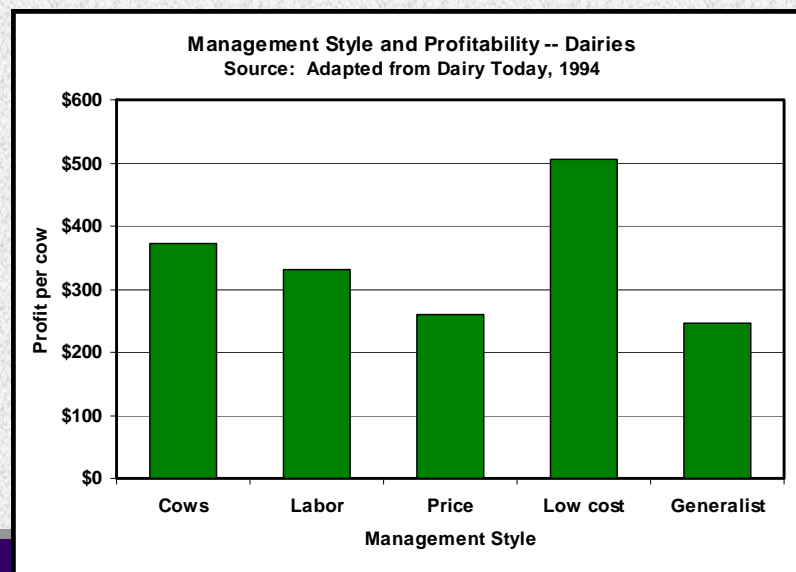


Management –

What should a dairy manager focus on?

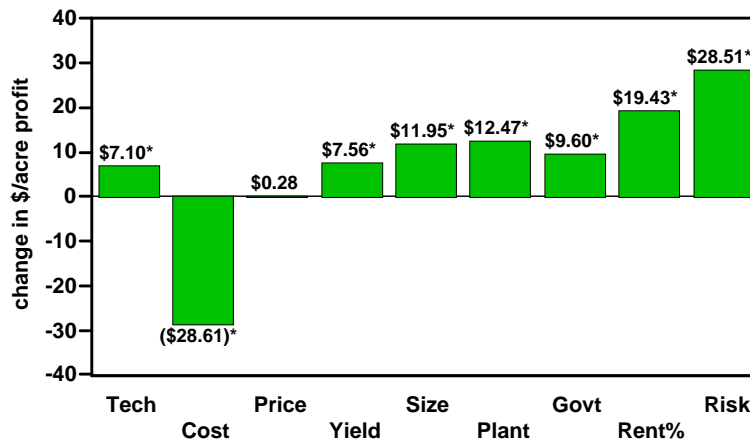
- Production
- Costs
- Marketing

Management –



Factors affecting profits of KS crop producers ...

(1992-2001) Change in \$/acre profit with a 1 std increase in: (bars represent typical farm in high third of category)



* statistically different from 0 at 90% confidence

Take control of your milk price

Sometimes hindsight is the greatest teacher.

If you're still reeling from the November Basic Formula Price of \$0.79 — a 21-year low — then it's time to learn what price you could have earned by using risk-management tools to set your milk price.

Several risk management tools exist. Through the futures market, you can use hedging and options, and most co-ops offer forward contracts. All of these strategies allow you to set your own milk price for all, or a portion, of the milk you produce.

Granted, with the steep climb in cheese prices that started in early June, many producers and market analysts thought the market was headed for a repeat of the fall of 1998. Many asked themselves, "Why lock in a milk price and miss the top price?" But, instead, the end of the year unfolded with a steep decline.

A look back at the settlement price history for the November BFP contract on the Chicago Mercantile Exchange shows that opportunity did exist. You could have locked in a milk price at or above \$12 per hundredweight at anytime between December 1998 (the start of the contract) until Oct. 6, 1999. In fact, on



almost half of those trading days, you could have locked in a price of at least \$13 per hundredweight. (The chart above shows the daily settlement price for the November 1999 BFP contract on the CME.)

Locking in a price of \$12 or \$13 per hundredweight wouldn't have given you the peak price, but it would have been better than the announced November BFP. And, remember the goal is not to lock in the highest price, but to lock in a profitable price.

A look back
Here's an example of how price protection tools — in this case, hedging — could have been used to lock in a milk price.

On June 10, you could have locked in a milk price of \$13.80 per hundredweight by selling a November BFP futures contract. Say you sold just one 20,000-pound contract to lock in a price for half of your November milk production.

For nine and a half weeks, you would have watched the market climb to a peak of \$16.79 per hundredweight

and then plummet over the next 11 weeks until the contract closed at \$9.85. During the first nine and a half weeks, you would have paid nearly \$6,000 in margin calls. However, once the market started to drop, money would have been paid to your trading account. The drop from \$16.79 to the contract close of \$9.85 would have paid you back \$13,800. That's \$7,800 more than what you paid in margin calls. And, the total price on the 20,000 pounds of milk you hedged (base price + futures earnings) would have been \$13.79 per hundredweight. When you added in the price for the unhedged milk, your earnings would have been \$12.79 per hundredweight — \$2 above the announced price.

Yes, margin calls can be difficult for some people to handle. And, paying a total of \$6,000 in margin calls before the market turned back around was enough for some producers to get out of the market last fall. Others maintained their positions to the end. The frustration of second-guessing one's position and having to write the check often leads producers to abandon their marketing strategy.

But that's what using risk-management tools is all about. Developing a marketing strategy and using the tools available — forward contracts, hedging, and options — to market your milk at a profitable price. If you haven't already, perhaps now would be a good time to start learning.

RESOURCES

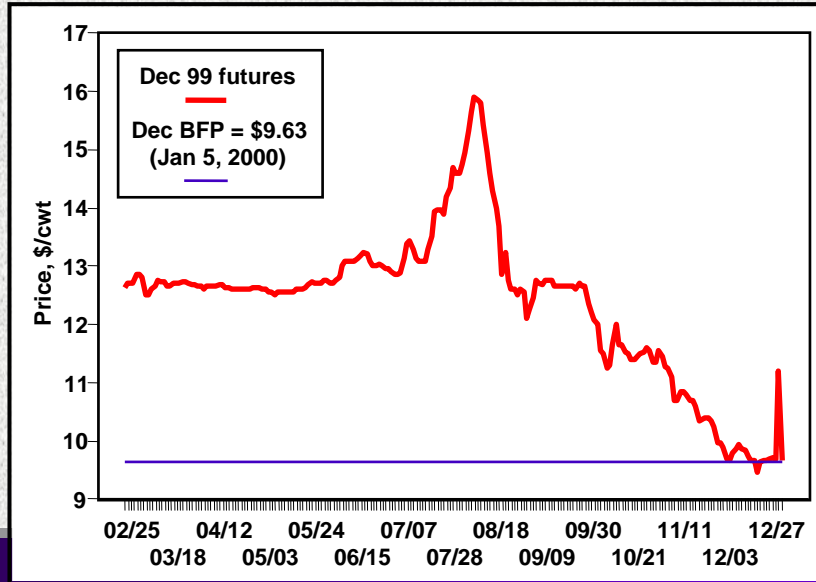
- Receive free educational materials on using futures and options from Chicago Mercantile Exchange, (800) 531-5332, New York Board of Trade, (800) 433-4343.
- On the Internet, visit the Dairy Herd Management web site at: www.dairyherd.com. The Markets section contains links on marketing education and on market news and prices.
- Contact your extension office.
- Request a directory of commodity brokers who work in the dairy industry, CME, (800) 531-5332.
- NYET (800) 433-4348.
- Read a book "From Price Taker to Price Maker" by Phil Plouffe, is a basic primer of how to use risk-management tools. Available from the New York Board of Trade. Call (800) 433-4348 for a free copy.

HERE'S HOW THE NUMBERS WORK

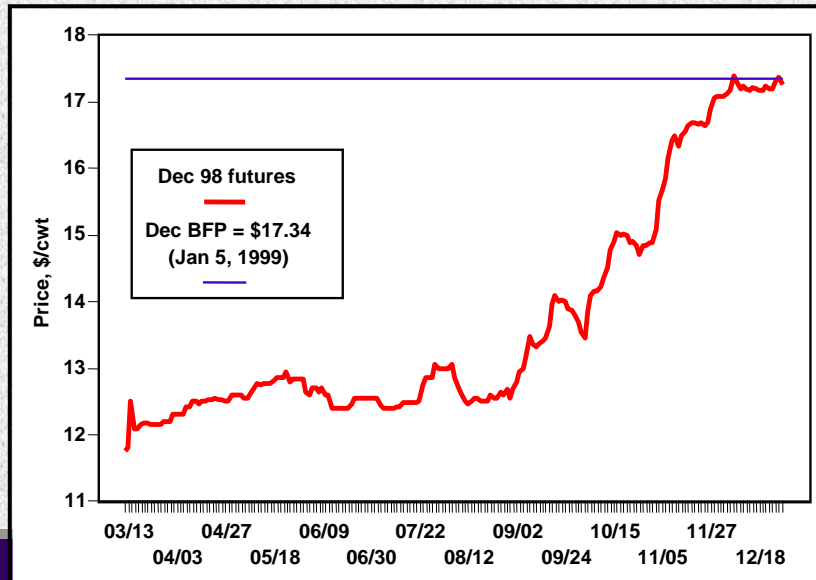
Sold one November BFP contract for	\$13.80
November BFP contract closed at	\$9.85
Futures margin call	\$6,000
November BFP sold for your milk check	\$13.79
Plus the future market gain	\$13.80
Your price received for your milk	\$13.79

- Article in Dairy Herd Management, January 2000
- Risk management marketing strategies are easy in hindsight.
- It's not that easy in real-time!

December 1999 BFP futures price



December 1998 BFP futures price



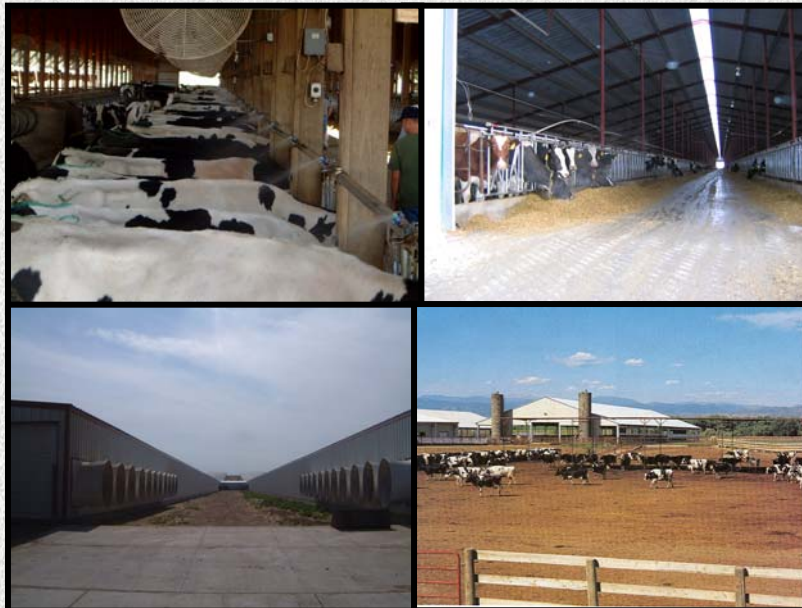
Important economic principles

- Average profits equal zero
- Very difficult to “beat the market”
- Risk-return trade-off

What does this mean?

- **Be a low cost (\$/unit) producer**
- **Marketing efforts should focus on the things you can control (quality, quantity, etc.)**
- **Early adopters of technology realize profits in the short run**

Business Models?



Business Models...

- **Maximize production per cow**
 - Dilute the maintenance cost of the cow
 - Marginal milk
 - Works in any system
 - Necessity in freestall dairies due to the additional investment per cow
- **Cost cutters**
 - Fix production per cow and milk more cows
 - Only works in low input situations
 - Drylot dairies
 - Hard to do in freestall dairies
 - Cost cutters think high production is a luxury?
 - Look for opportunities to add more cows vs. increasing production per cow

Industry Trends...

- **Dilute fixed assets over as many cows as possible**
 - Consolidation
 - Milking parlor & manure management
- **Manage employees**
- **Partnerships & different business structures**
- **Increase multiple unit operations**
- **Marketing niches**
 - Brand identity cheese, ice cream or milk
 - High quality milk
 - Animal welfare and environmental audits
 - Organic

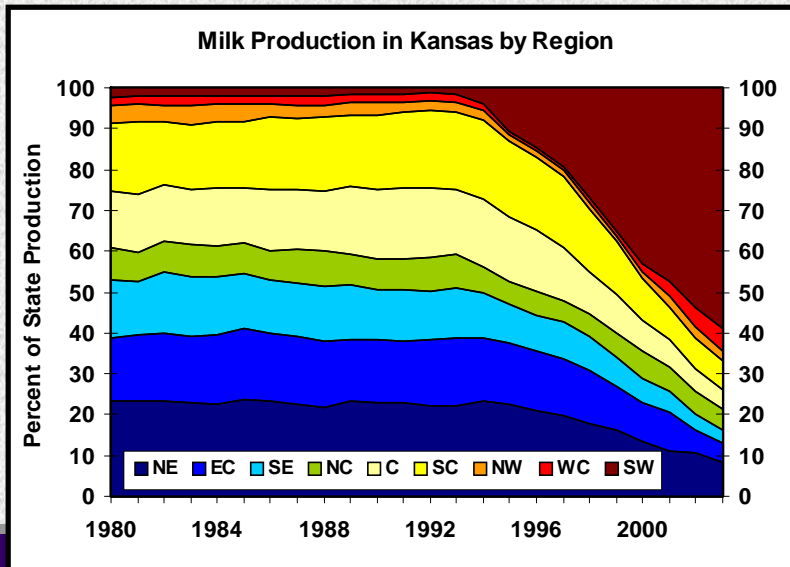
Expansion/Relocation -- limitations

- Capable managers
- Ability to obtain permits
 - Clear definition of requirements
 - Permits held up in court
 - Different regulations for counties?
- Social acceptance
- Technical support
 - Engineers, contractors, technicians, etc.
- **Water!!!**

Future...

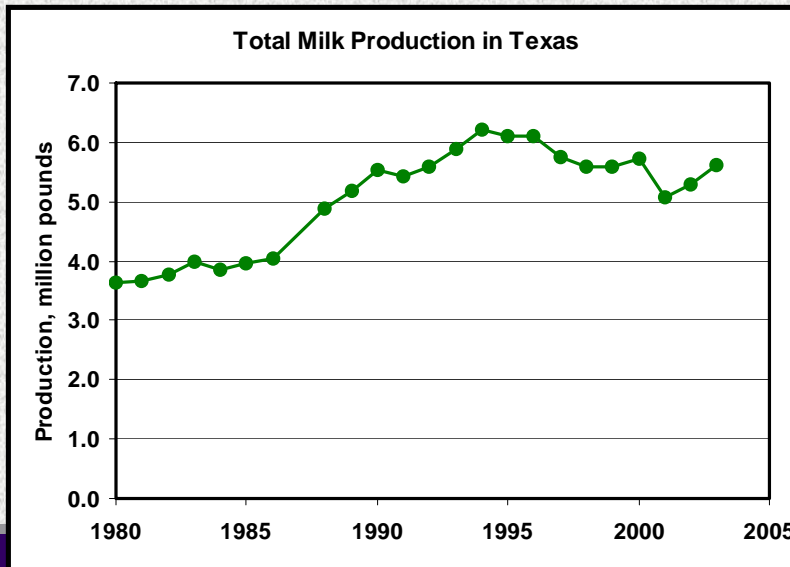
- The dairy industry will change drastically
- The trends will continue and may accelerate
 - Consolidation and structural change
 - Shifts in regional milk production
- Change is always a challenge
- Change can occur very rapidly

Dairy in Kansas...

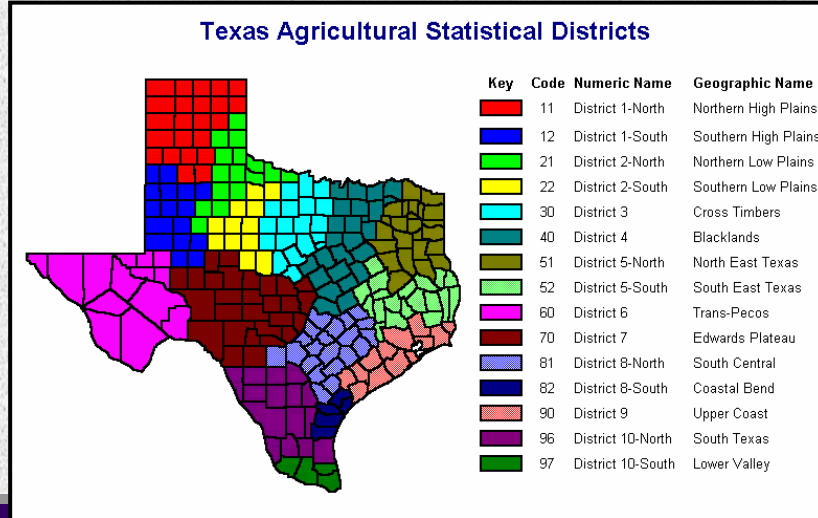


Things can change significantly quite rapidly!

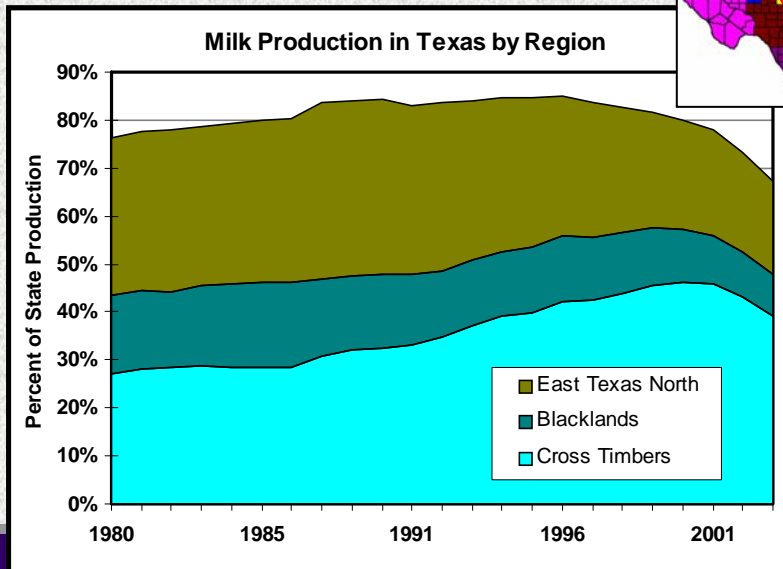
Dairy in Texas...



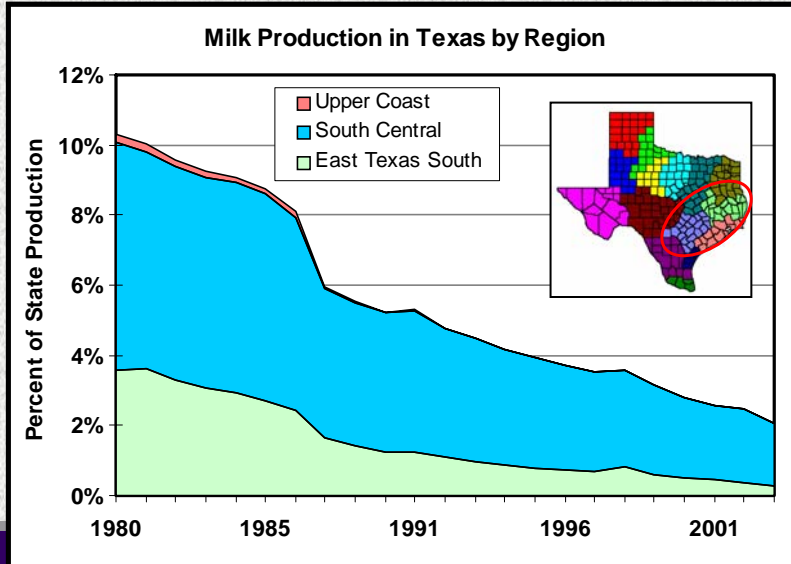
Dairy in Texas...



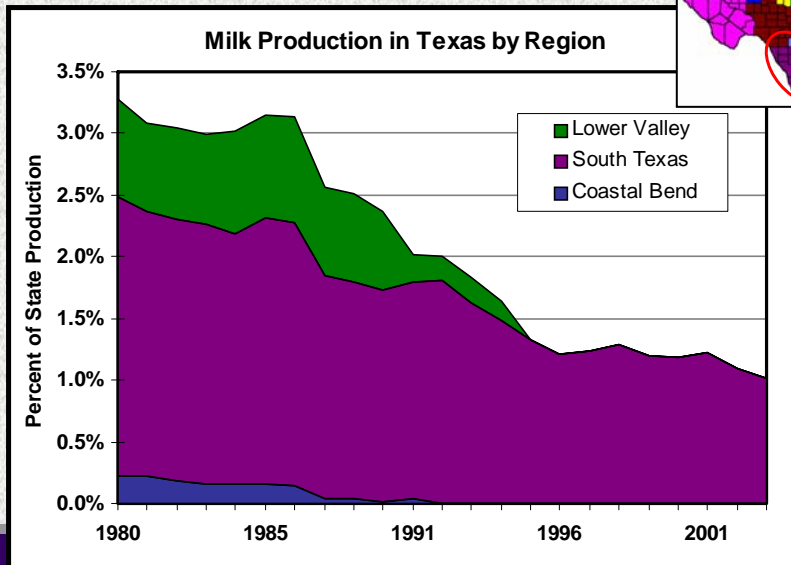
Dairy in Texas...



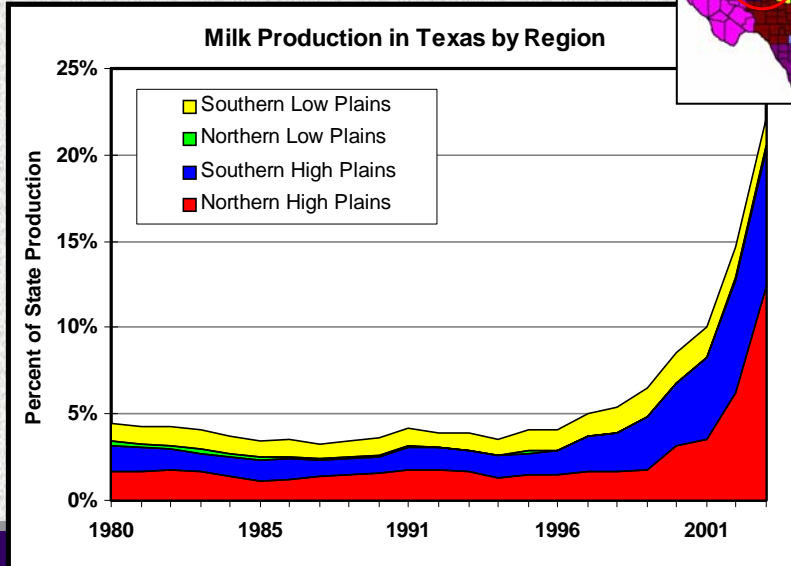
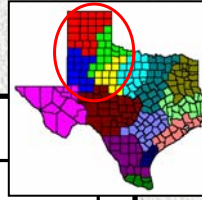
Dairy in Texas...



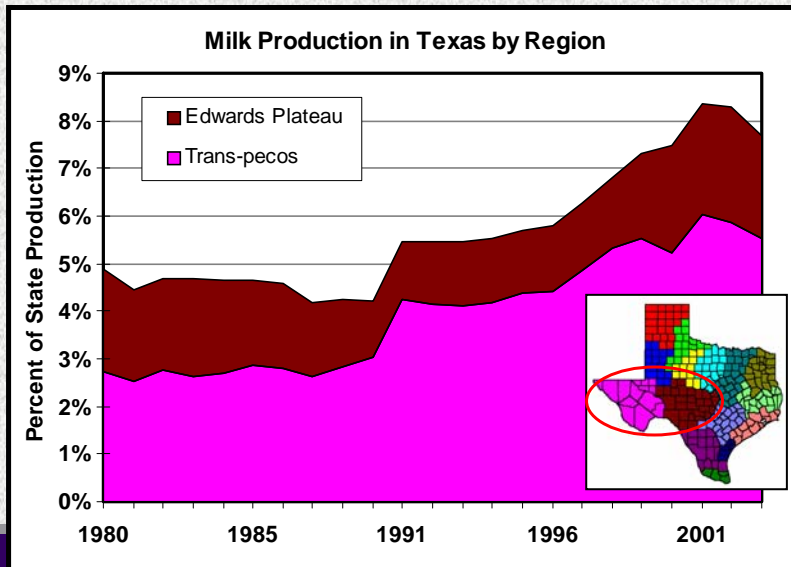
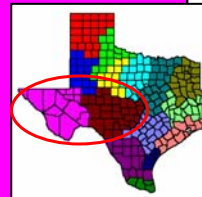
Dairy in Texas...



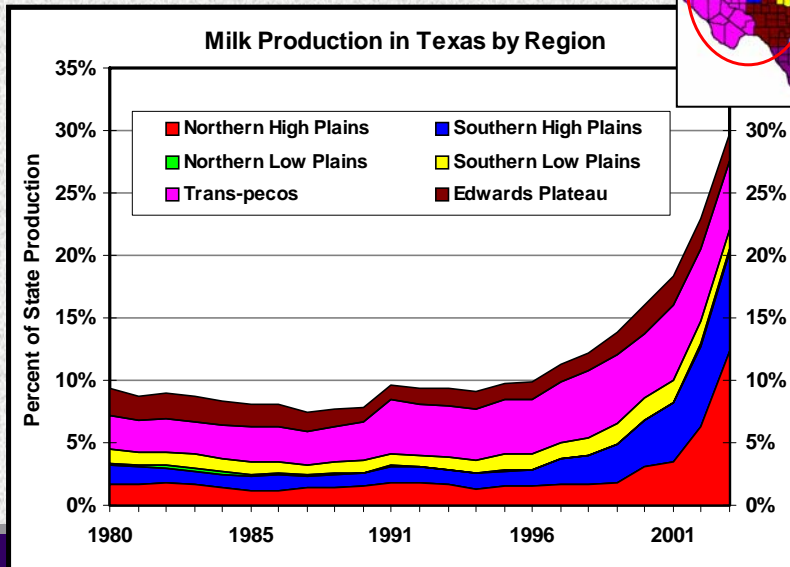
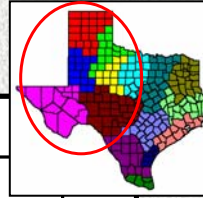
Dairy in Texas...



Dairy in Texas...



Dairy in Texas...



Future...

- **Managers vs. owners**
 - Educated
 - More demanding
 - Looking for business relationships that provide excellent technical service
- **Fierce competition**
- **The survivors will adapt and prosper**
- **Opportunities exist for those willing to change**

Thank You!!

Kevin C. Dhuyvetter
785-532-3527
kcd@ksu.edu

