U.S. Dairy Situation and Outlook

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By

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Making milk price forecasts 6 months to a year out is a real challenge.

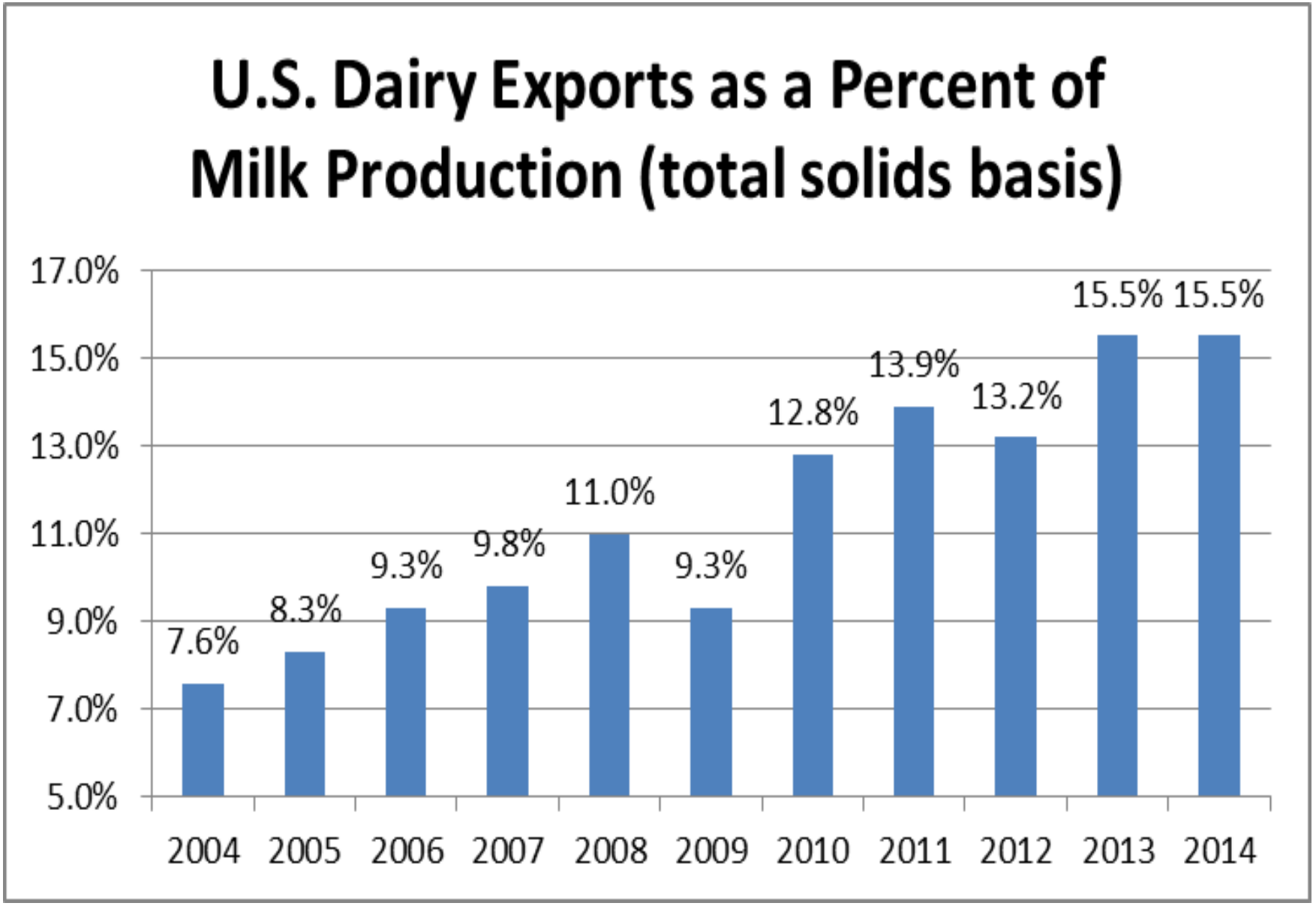
- Back in December of 2008 and January 2009 no one forecasted the very low milk prices summer of 2009.
- Forecasts for 2014 milk prices back in December 2013 and January 2014 way under shot how high milk prices got summer and fall.
- Back in October 2014 forecasts were for Class III to stay above $17.00 in 2015. By November forecasts were for Class III to stay above $16.00. By December some were forecasting a Class III price in the $14's first half of the year.
- So will current forecasts for all of 2015 be more accurate????

First, let me make an excuse why milk price forecasters appear to not be as accurate as years ago.

- I have made a monthly dairy outlook since 1974—that is almost 41 years.
- From 1974 until the mid-1990's I could forecast milk prices within $0.25 of accuracy. Why?
  - ✓ *From **1950 to 1981** milk prices were supported at 75% to 90% of parity. In the 1970's and 1980's all one had to do was to predict milk prices was to plug in the Index of Prices Paid in the **parity formula**.*
  - ✓ *In 1981 Congress scraped the Parity Formula and Congress now would set the support price on milk.*
  - ✓ *The support price was $13.10 in 1981 and was ratchet down to $9.90 by mid-1990's—a level of little support to milk prices.*
  - ✓ *So since the mid-1990's **market forces** have driven milk prices and milk prices became volatile and uncertain.*

A second reason why forecasting milk prices is now a bigger challenge is the international market.

- **Commercial U.S. dairy exports** were not a factor impacting milk prices until about 2004.
- Dairy exports prior to 2004 were mostly subsidized by the U.S. government to get rid of accumulated surplus dairy products under the federal support program.
- The level of dairy exports is now a major factor impacting factor impacting milk prices and has added to milk price uncertainty and volatility.
- Changes in dairy exports were a big factor for record milk prices in 2004 and 2007, depressed milk prices in 2009, and why forecasters missed predicting the record high milk prices in 2014.


U.S. Dairy Exports as a Percent of Milk Production (total solids basis)
17.0%
15.0%
13.0%
11.0%
9.0%
7.0%
5.0%
7.6%
8.3%
9.3%
9.8%
11.0%
9.3%
12.8%
13.9%
13.2%
15.5%
15.5%
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014

U.S. is the **third largest** exporter behind EU and New Zealand.

- In 2013 U.S. was

2nd behind EU-28 in exports of nonfat dry milk/skim milk powder accounting for about 30%

2nd behind EU-28 in exports of cheese accounting for about 23%

3rd behind New Zealand #1 and EU-28 #2 in exports of butter accounting for about 8%

Changes since 2003:

Year	Milk Production (Billion Pounds)	Percent Exported	Pounds Exported (Billion Pounds)
2003	170.4	4.5%	7.7
2014	206.2	15.0%	30.9
Increase	35.8 (+21.0%)		23.2 (+303.4%)

The increase in exports accounted for about 65% of the Increase in milk production.

So now **small changes** can result in **big changes** in milk prices.

- Small changes in milk production and domestic sales of milk and dairy products.

- Small changes in U.S. dairy exports.

- This why price risk management tools were developed—dairy futures and options starting in 1993.
- This is why the Margin Protection Program is now available under the 2014 Farm Bill.

Small changes can bring **big changes** in milk prices.

- The growth in the **domestic market** is modest—only about 1% more milk needed a year to meet demands at rather stable prices.
  - ✓ The growth is in manufactured dairy products with fluid sales on a continued decline.

	Per capita consumption	
	1980	**2013**
Fluid	246	189
Cheese	17.5	33.5
Butter	4.5	5.5
Yogurt	2.1	14.9
Total	543	607

This has changed how milk is used.

	% used as:	
	1980	**2013**
Fluid	**39.6**	**25.0**
Cheese	**26.4**	**50.0**

  - ✓ **Cheese has been the big driver of domestic sales**.

***Fluid sales in 2014 were 2.9% lower than 2013.

Another 1% or so more milk per year is needed to serve the **international market**.

- Therefore, **about 2% more** milk is needed per year for more stable milk prices.

- Milk production **well above 2%** results in low milk prices.

- Milk production **well under 2%** results in high milk prices.
- **Of course what is actually going on with domestic sales and exports is also critical.**

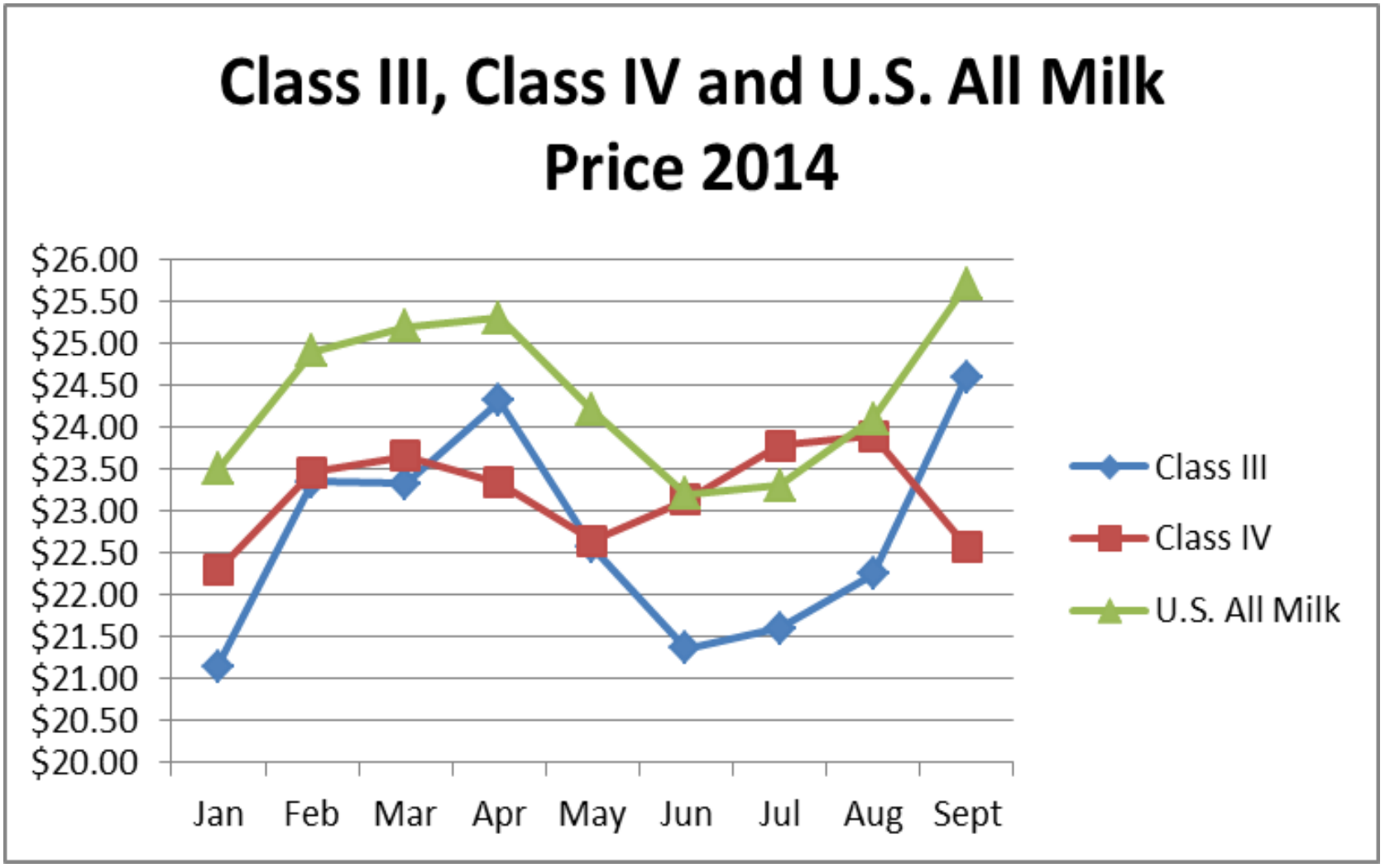
The good news is forecasting the **change in milk prices** (higher or lower) can be done with a high probability.

Forecasting when milk prices will start to change and the extent of change several months out is much more difficult.

This is an issue with the new Margin Protection Program since a decision needs to be made well in advance of the start of a new year.

A review of what factors drove record milk prices in 2014 and how these factors will differ in 2015 may be useful in forecasting possible 2015 milk prices.

- We will see that **two major factors** were and will be are:
    1. Level of U.S. milk production
    2. Level of U.S. dairy exports



Class III peaked at $24.60 in Sept.
Class IV peaked at $23.89 in Aug.
U.S. All Milk Price peaked in Sept at $25.70

Factors for record 2014 milk prices:

1. **Slow growth in milk production first 6 months:**

January	1.1%
February	1.0%
March	0.9%
April	1.3%
May	1.5%
June	2.2%

Remember the 2% growth factor.

Why the slow growth in milk production first 6 months?

1. **Very depressed milk prices in 2009 forcing many producers to borrow and increase their debt load.**

U.S. All Milk Price declined from $20.25 January 2008 to a low of $11.30 June 2009 and averaged just $12.83 for 2009 compared to $18.38 for 2008.

2. **Severe drought summer of 2012 resulted in high feed cost winter of 2012/13.**

Producers had to take on more debt to purchase feed, or feed less, or sell cows.

Margins were a low of $2.20 in July of 2012, averaged just $5.24 for the year; averaged just $5.68 January through July of 2013.

3. Poor growing season summer of 2013 resulted in poor quality forages winter of 2013/14.

This negatively impacted milk per cow—particularly in the Upper Midwest—resulting in reduced total milk production.

Milk production January through May was down 2.0% in Iowa, 2.2% in Minnesota and 1.3% in Wisconsin.

The end result of these factors was many producers were using much improved milk prices, lower feed costs and record margins to pay down debt, improve working capital, catching up on delayed capital improvements rather than adding cows to expand milk production.

A second factor for record milk prices in 2014 was good growth in domestic sales.

- *While fluid (beverage) milk sales were running 3.0% lower than a year ago, both butter and cheese sales were strong.*

- *The Restaurant Performance Index has been above 100 all year indicating more people are eating in restaurants which is positive for butter and cheese sales.*
- *Domestic commercial use up 2.5% in 2014.*

A third factor was record dairy exports.
2014 Exports vs 2013 Exports

Product	January	March	April	May	June
NFDM/SMP	+22%	+31%	**-4%**	+8%	**-25%**
Cheese	+46%	+37%	+32%	+15%	+33%
Butter	+150%	+100%	+105%	**-8%**	**-21%**
Dry whey	**-1%**	+32%	+14%	+2%	**-7%**
% of milk production on a total solids basis	14.5%	17.7%	16.5%	16%	15.5%

Dairy product production was challenge to fulfill domestic sales plus exports.

Dairy Product Production Jan. – Jun.	
Cheddar cheese	+0.7%
Butter	-3.1%
Nonfat dry milk	+5.0%
Skim milk Powder	+1.4%

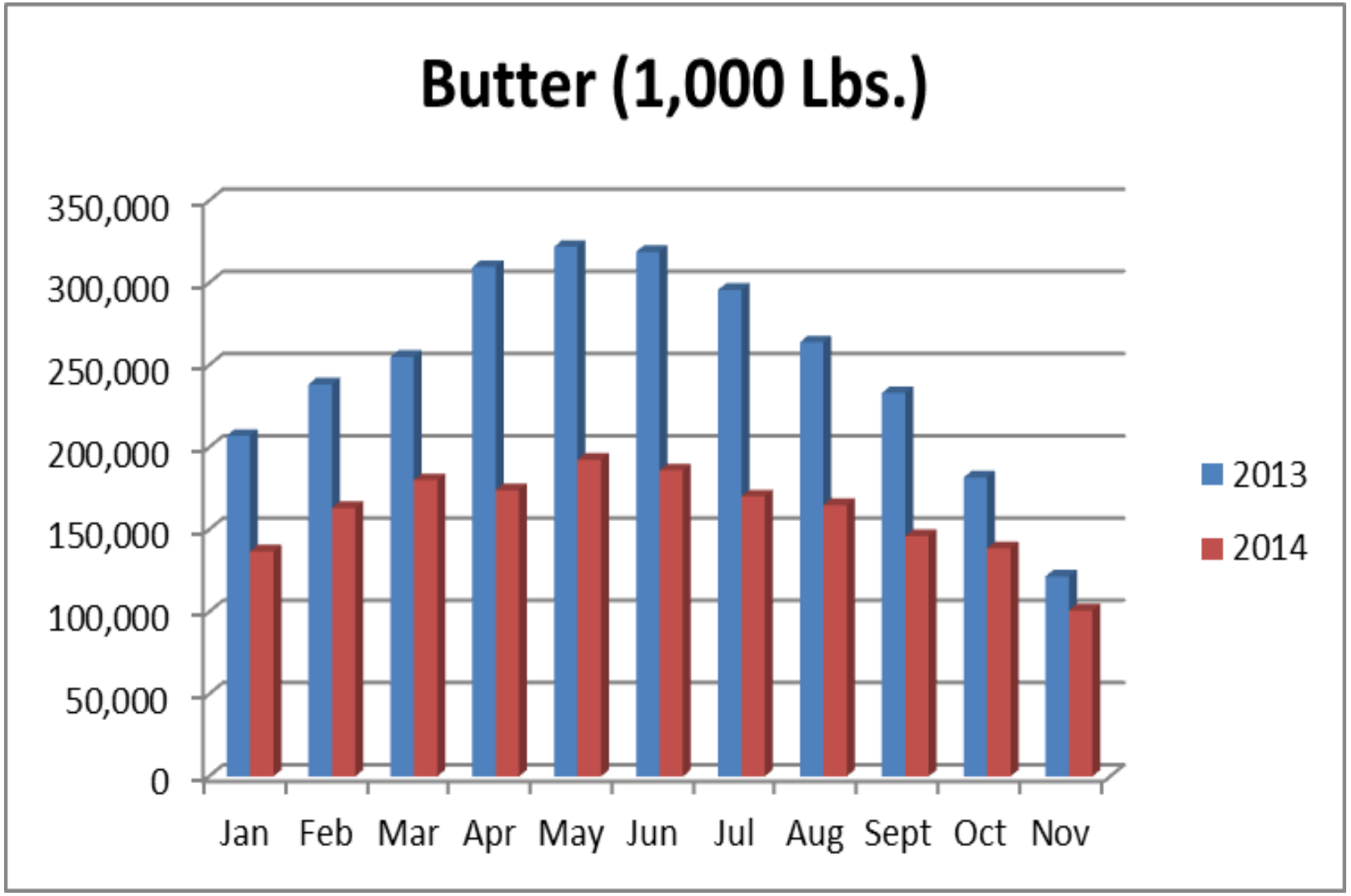
Note: *U.S. butter is 80% fat and salted while butter for exports is 82% fat and unsalted. Exports made salted butter for U.S. markets tight.*

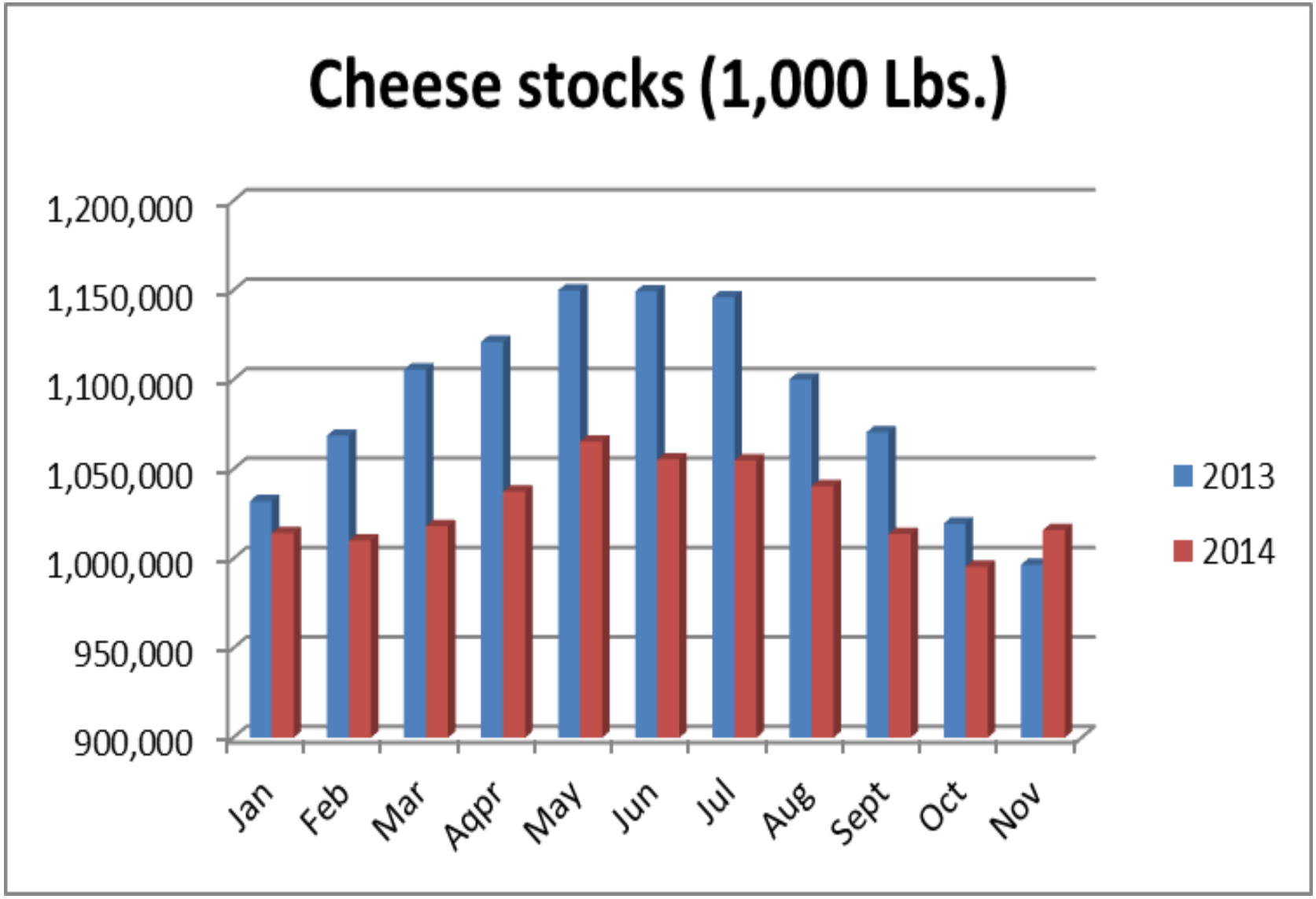
With milk production increasing less than 2% plus good domestic sales and increased dairy exports **stocks of dairy products were relatively tight.**

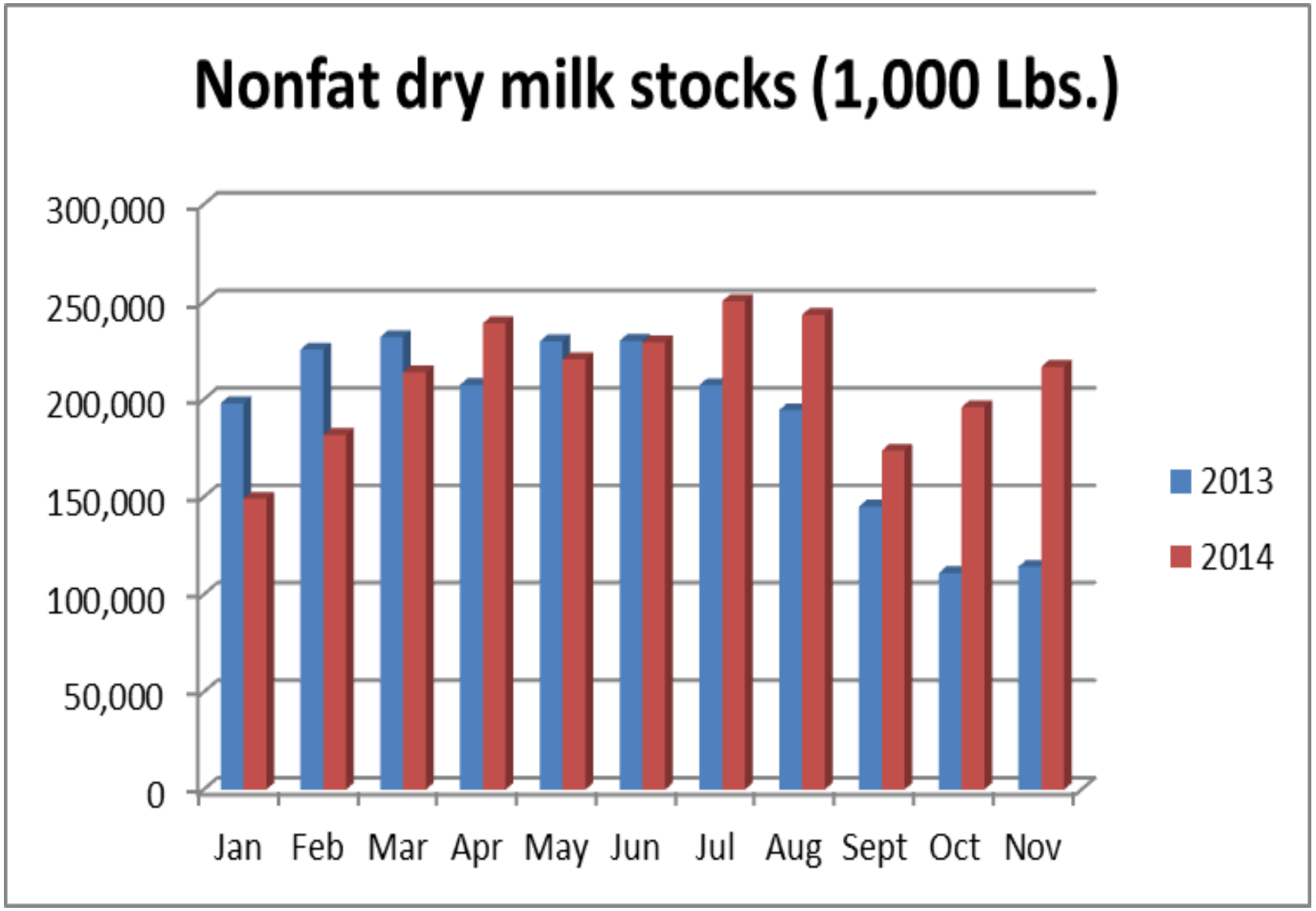
- Salted butter stocks were particularly tight—some butter buyers had to resort to imports.

- Cheese stocks were relatively tight as were nonfat dry milk stock first quarter of the year.

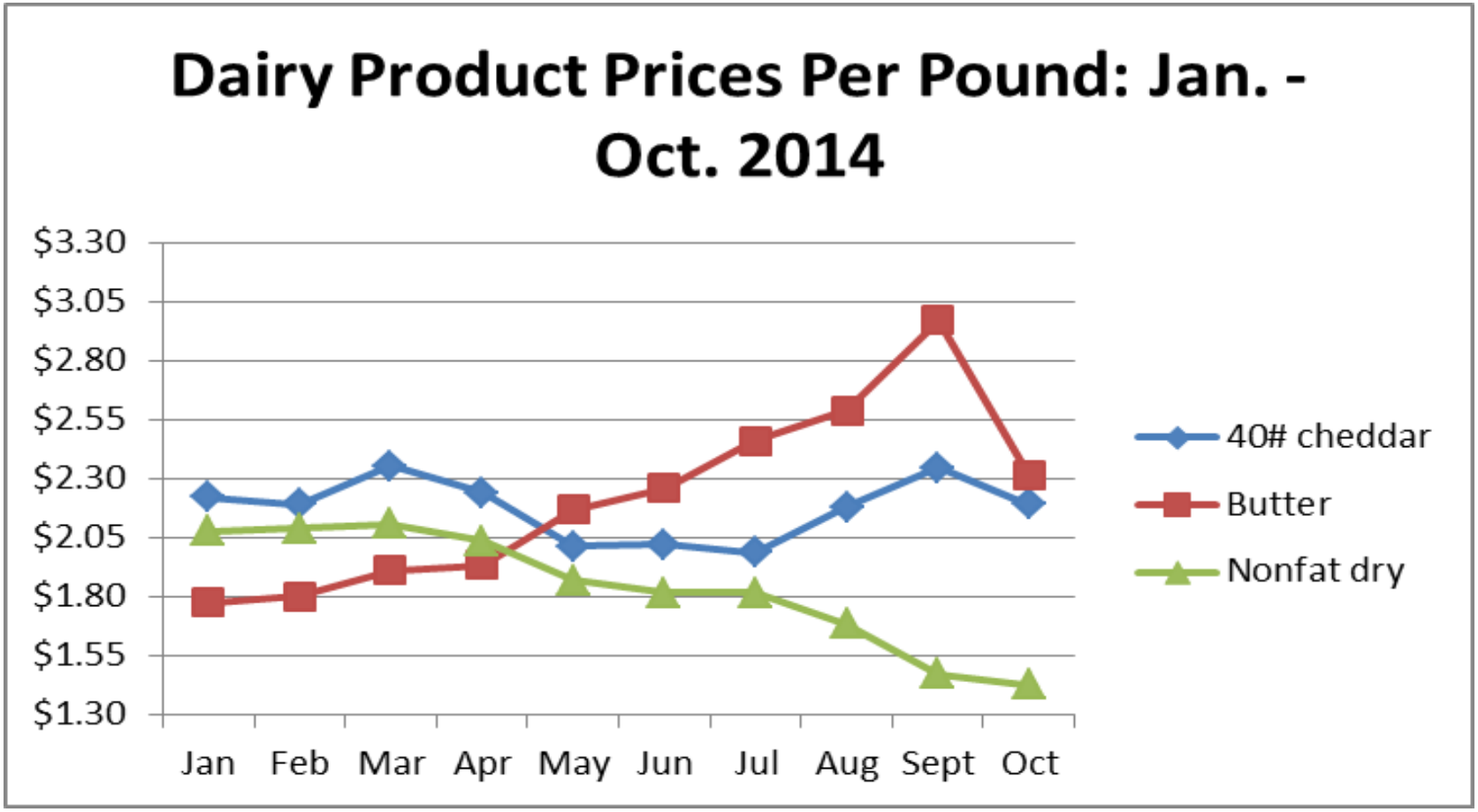
- Tighter stocks pushed butter and cheese prices to record levels


Butter (1,000 Lbs.)
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sept
Oct
Nov
2013
2014


Cheese stocks (1,000 Lbs.)
1,200,000
1,150,000
1,100,000
1,050,000
1,000,000
950,000
900,000
Jan
Feb
Mar
Aqpr
May
Jun
Jul
Aug
Sept
Oct
Nov
2013
2014


Nonfat dry milk stocks (1,000 Lbs.)
300,000
250,000
200,000
150,000
100,000
50,000
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sept
Oct
Nov
2013
2014

Tight dairy stocks resulted in some record dairy product prices through October 2014.

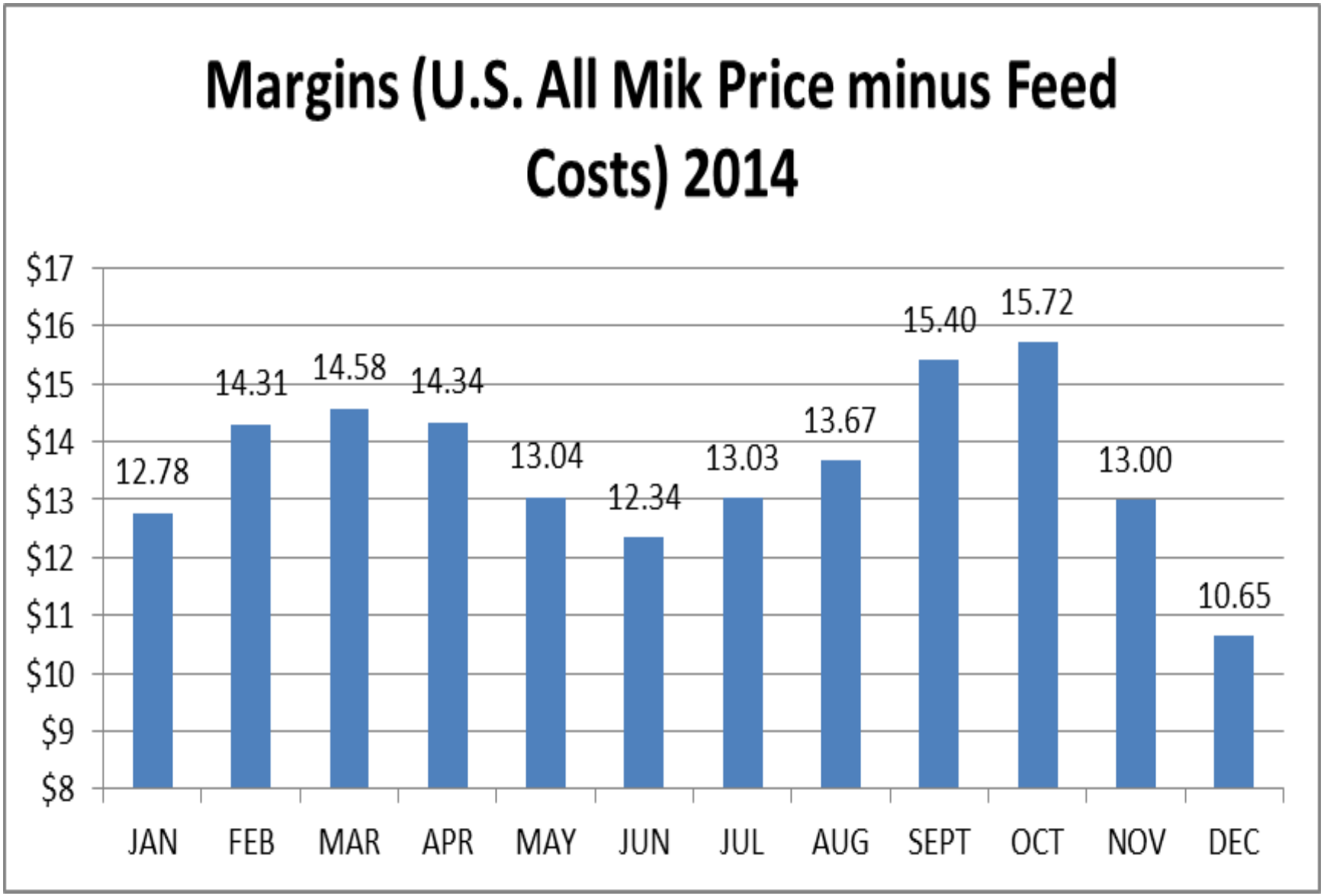


On Sept. 19th Butter hit a record $3.06 per Lb. and 40# cheddar blocks set a record $2.45 per Lb.

But, **things changed last quarter of 2014** and going into 2015 pushing dairy product prices and milk prices lower.

- **Two major factors pushing prices lower.**

1. With favorable margins dairy producers added milk cows and fed for higher milk per cow pushing the increase in milk production above 3%.
2. World milk prices declined significantly making U.S. dairy products not competitive resulting in lower exports and increased imports.


Margins (U.S. All Mik Price minus Feed Costs) 2014
$17
$16
$15
$14
$13
$12
$11
$10
$9
$8
12.78
14.31
14.58
14.34
13.04
12.34
13.03
13.67
15.40
15.72
13.00
10.65
JAN
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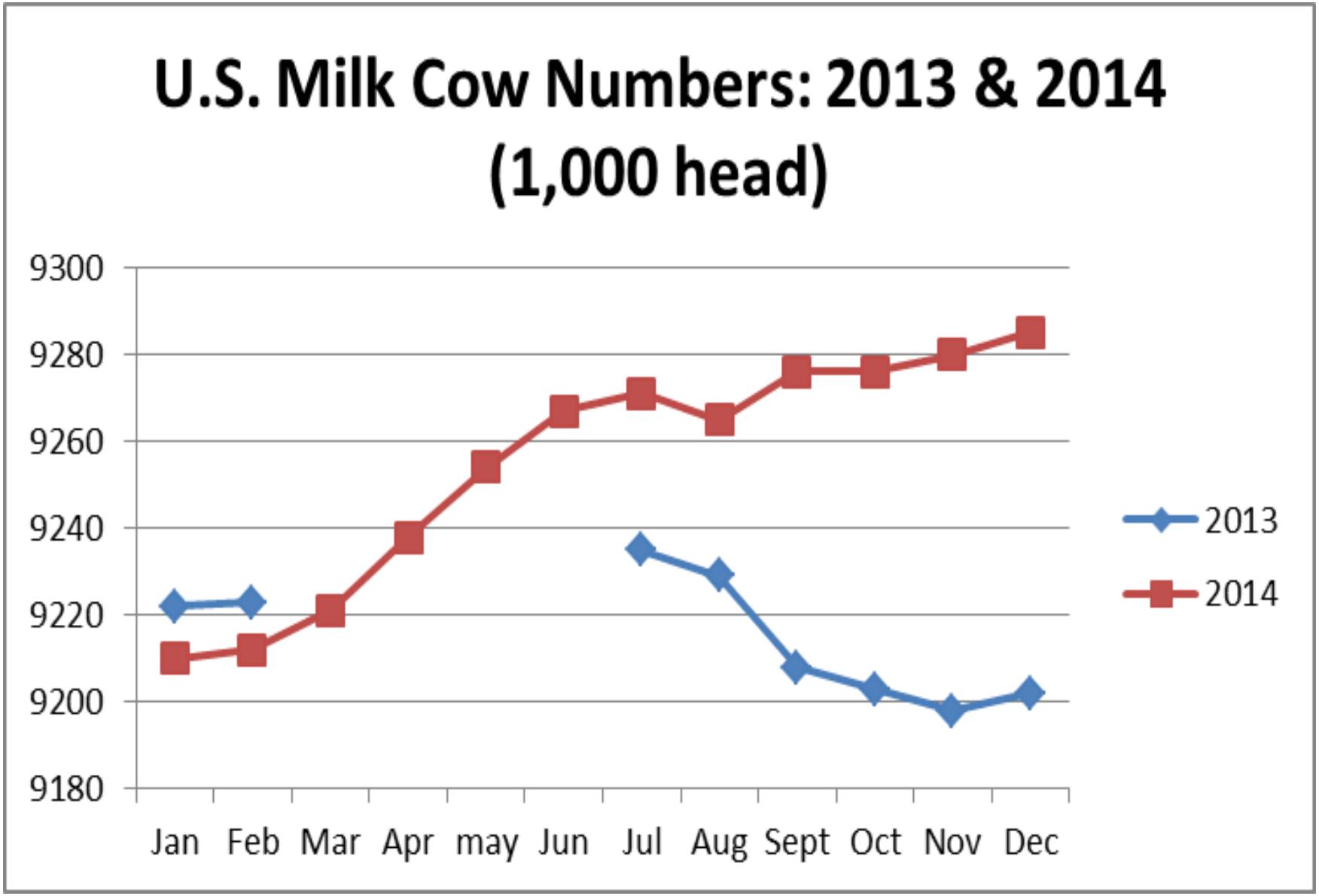
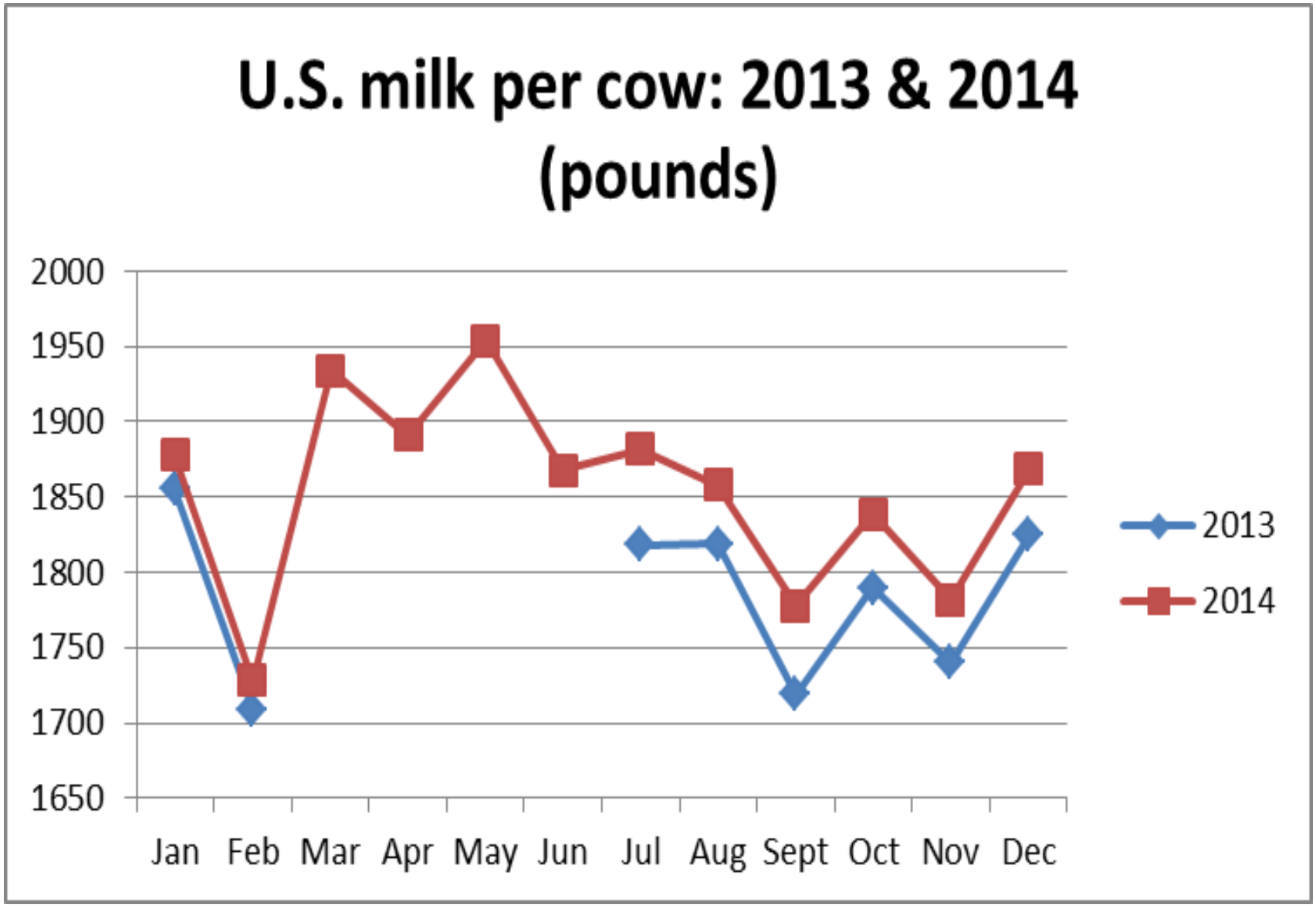
MAR
APR
MAY
JUN
JUL
AUG
SEPT
OCT
NOV
DEC


U.S. Milk Cow Numbers: 2013 & 2014
(1,000 head)
9300
9280
9260
9240
9220
9200
9180
Jan
Feb
Mar
Apr
may
Jun
Jul
Aug
Sept
Oct
Nov
Dec
2013
2014


U.S. milk per cow: 2013 & 2014 (pounds)
2000
1950
1900
1850
1800
1750
1700
1650
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sept
Oct
Nov
Dec
2013
2014

U.S. milk production July – November 2014

Jul. + 3.9%

Aug. +2.5%

Sept. +4.2%

Oct. +3.6%

Nov. +3.4%

Estimated U.S. Milk Production 2014

		Percent Change from 2013
Milk Per Cow (Pounds)	22,265	+2.0%
Number of milk cows (1,000 head)	9,255	+0.4%
Total Milk Production (Billion Pounds)	206.1	+2.4%

World dairy product prices fell making U.S. products not competitive lowering exports.

- **World prices fell for two primary reasons**:

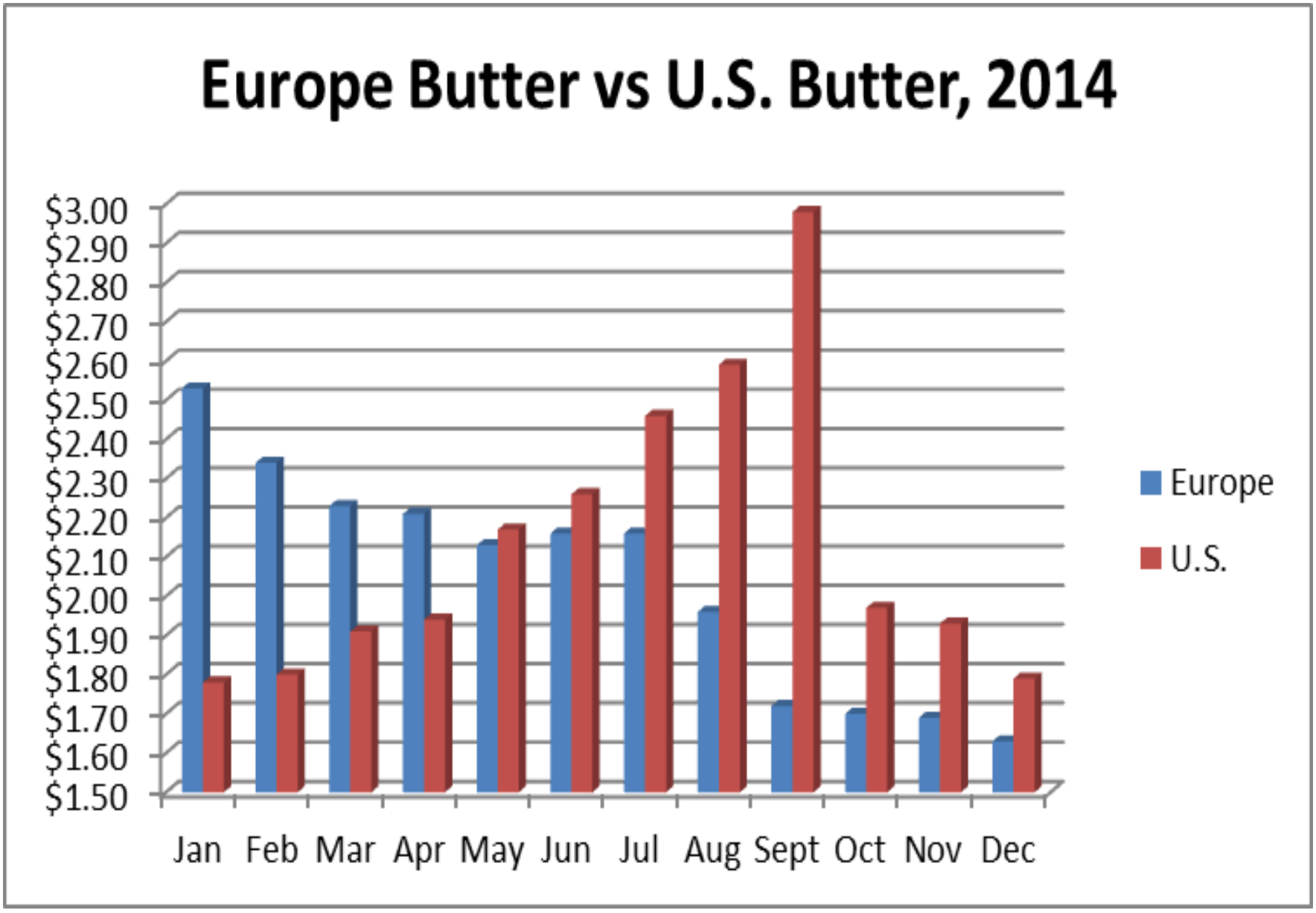
1. World milk production increased

USDA, FAS estimates milk 2014 milk production for major dairy exporters was: Australia +3.2%, EU-28 +4.7%, New Zealand +7.4%, U.S. +2.4%, with Argentina an exception at -0.9% for a total of all +3.9%

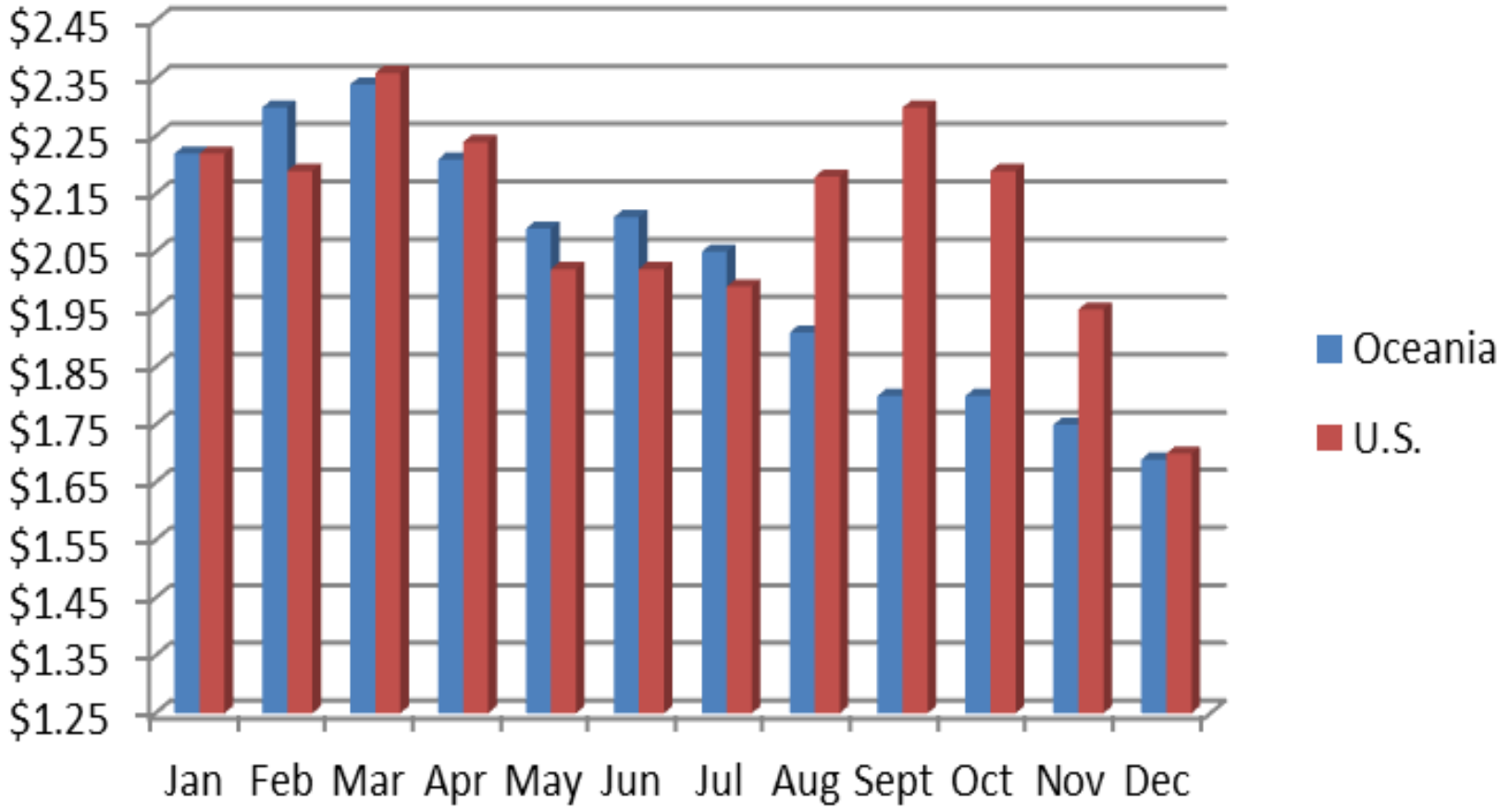
2. Lower world demand

China (largest world importer) imports dropped by more than 50% and Russia (third largest world importer)Ukraine situation banning imports from Europe—these two countries account for about 20% of world dairy imports. Russia very important to EU accounting for 30% of cheese exports and 25% of butter exports.

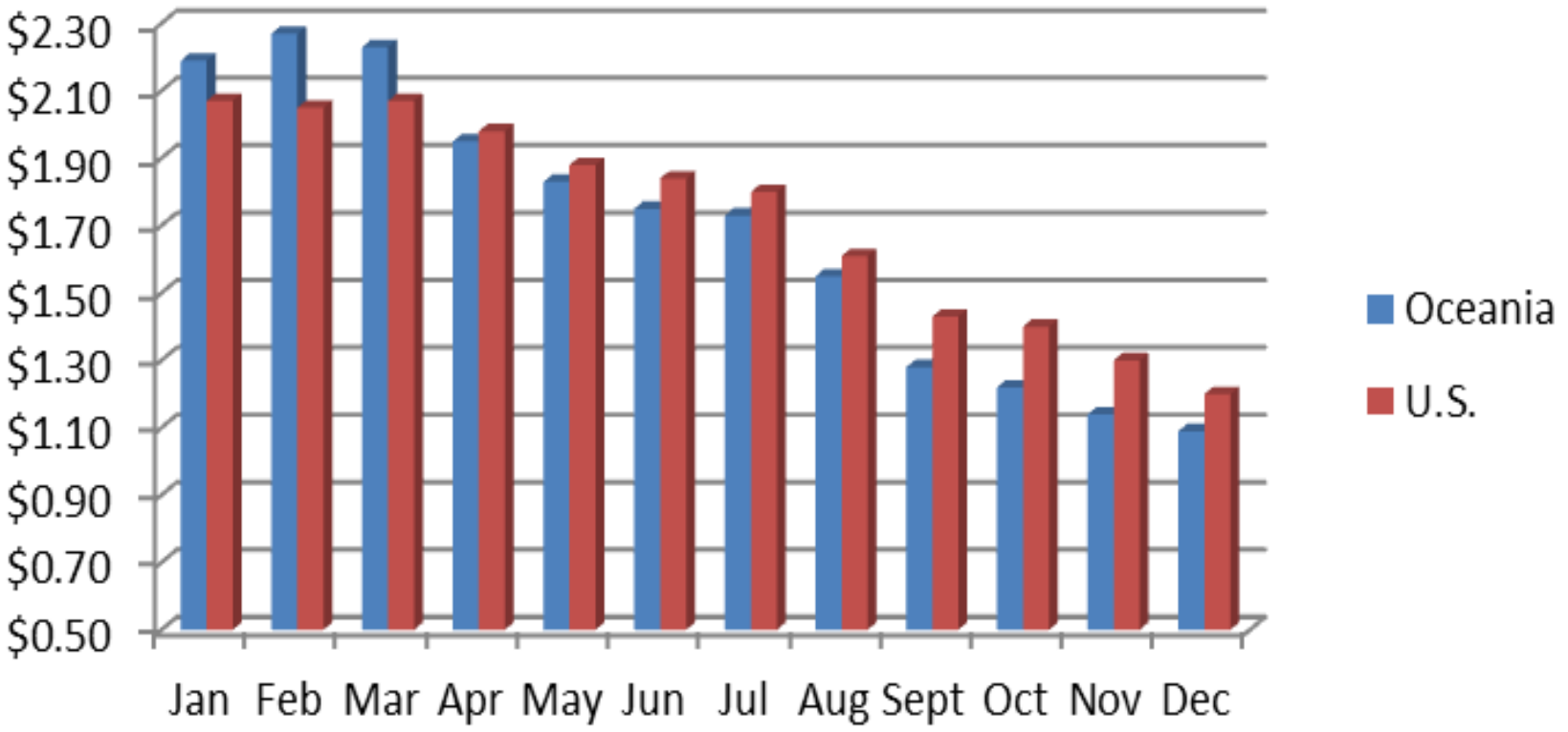
Note: Higher U.S. dollar also hurts exports.


Europe Butter vs U.S. Butter, 2014
$3.00
$2.90
$2.80
$2.70
$2.60
$2.50
$2.40
$2.30
$2.20
$2.10
$2.00
$1.90
$1.80
$1.70
$1.60
$1.50
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sept
Oct
Nov
Dec
Europe
U.S.

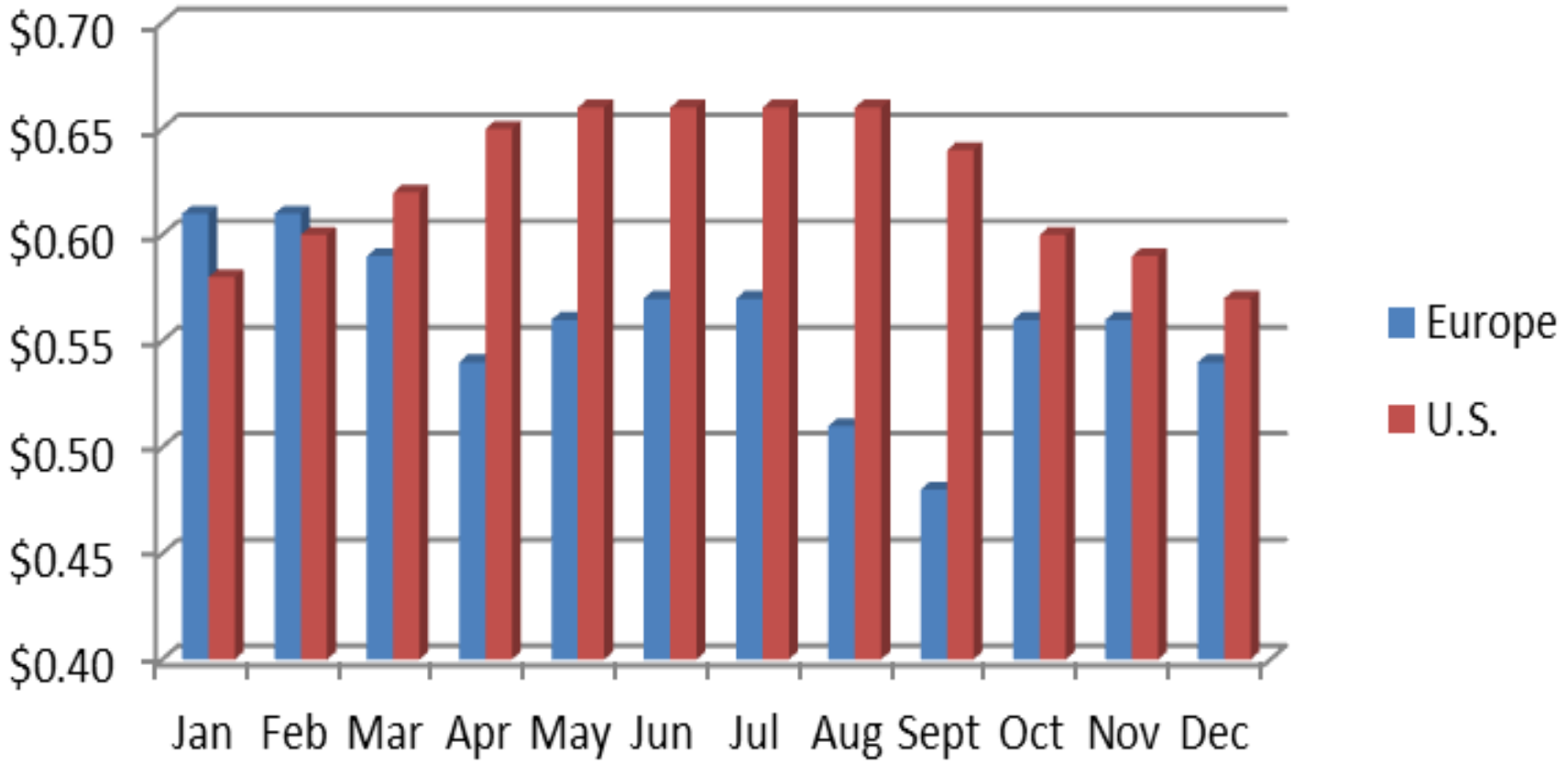
Oceania Cheese vs U.S. Cheese, 2014



Oceans Skim Milk Powder vs. U.S. Nonfat Dry Milk



Europe Dry Whey vs U.S. Dry Whey, 2014



While domestic sales remained strong (except for fluid milk -3.0%) **dairy exports fell**.

Product	Jul.	Aug.	Sept.	Oct.	Nov.	Yr-to-date
Nonfat dry milk	+1%	**-10%**	**-29%**	**-25%**	**-7%**	+1%
Cheese	+18	+11%	+9%	**-3%**	**-13%**	+20%
Butter	**-39%**	**-59%**	**-79%**	**-81%**	**-72%**	**-21%**
Dry whey	**-17%**	**-20%**	**-13%**	**-9%**	**-17%**	**-2%**
% of U.S. milk Production	**15.9%**	**14.9%**	**13.2%**	**14.4%**	**14.0%**	**15.0%**

While exports fell U.S. prices higher than world prices attracted dairy imports.

- Quota imports January through November:

  - ✓Butter 42% higher than 2013

  - ✓Cheese 12% higher than 2013

With milk production increasing the production of dairy products increased allowing rebuilding of stocks.

November Dairy Product Production

(Percent change from year ago)

Butter	**-4.7%**
American cheese	+4.5%
Cheddar	+2.8%
Total cheese	+2.9%
Nonfat dry milk	+48.9%
Skim milk powder	**-45.5%**

Dairy stocks no longer as tight by November.

November 30th stocks

(% change from 2013)

Butter **– 17.0%**

American cheese + 3.4%

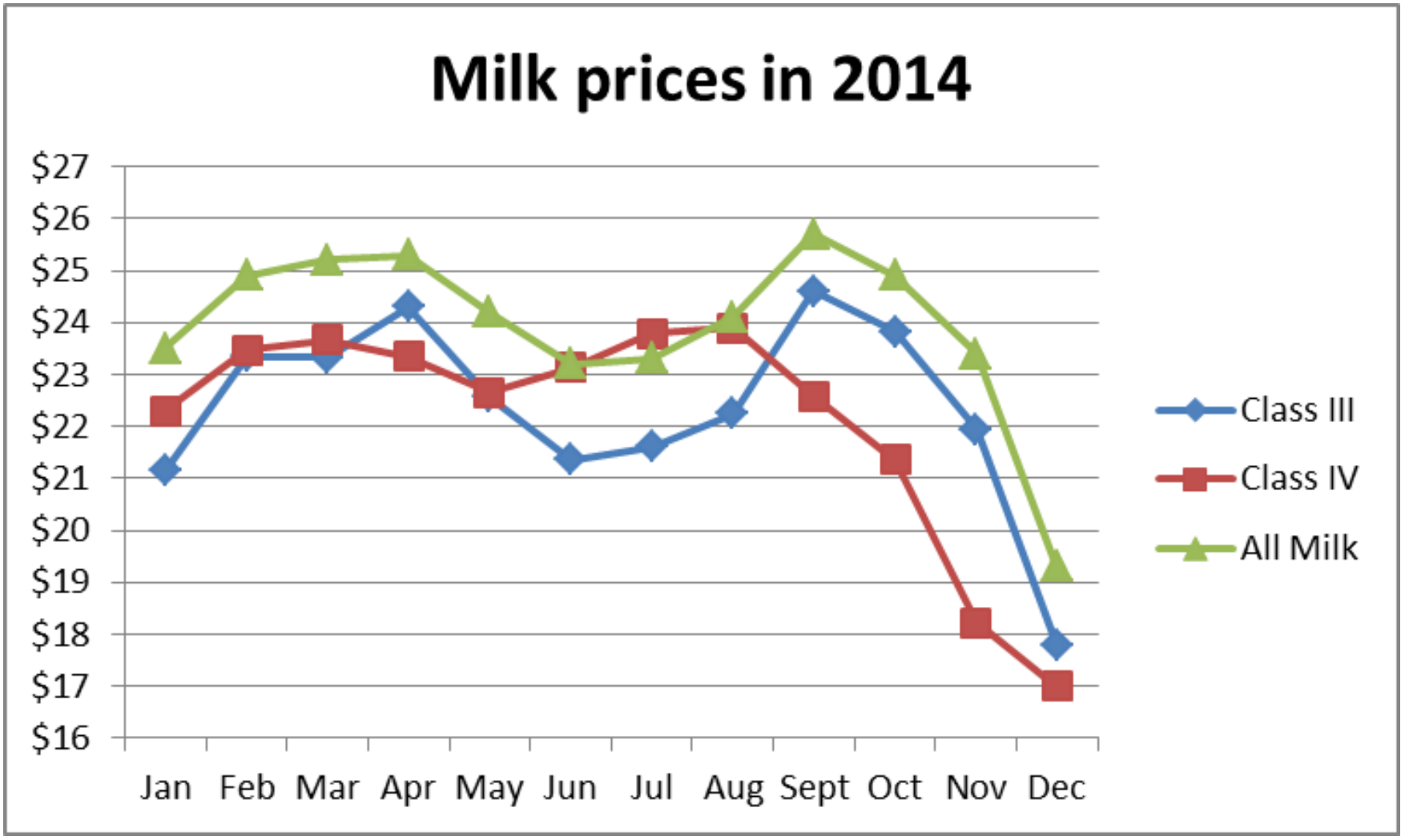
Total cheese + 1.9%

Nonfat dry milk +89.7%

Net result, milk prices declining rather sharply by December.

- Yet, 2014 will be remembered as a year of record milk prices and record margins for dairy producers.

- Dairy producers enter 2015 in much stronger financial position.



Class III peaked at $24.60 in Sept., averaged $22.34 ($17.99 in 2013),
Class IV peaked at $23.89 in Aug., averaged $21.09 ($19.05 in 2013)
All Milk peaked at $25.70 in Sept., averaged $23.97 ($20.05 in 2013)

What to expect for 2015?

- I think we all agree that milk prices will be lower.
- But, there is considerable disagreement as to how much lower and when prices will recover.
- The final answer depends upon **two major factors**.
  1. Will dairy producers continue to add cows, feed for more milk per cow and push the increase in milk production near 3%
  2. What will be the level of dairy exports?

- *As we move through the year and new market information* becomes available forecasts no doubt will be revised.

Milk Production in 2015:

- What is different from the start of 2014?
- The start of 2014 dairy producers were paying off accumulated debt, building their balance sheet.
- The start of 2015 dairy producers have recharged their balance sheet with equity.

Milk production:

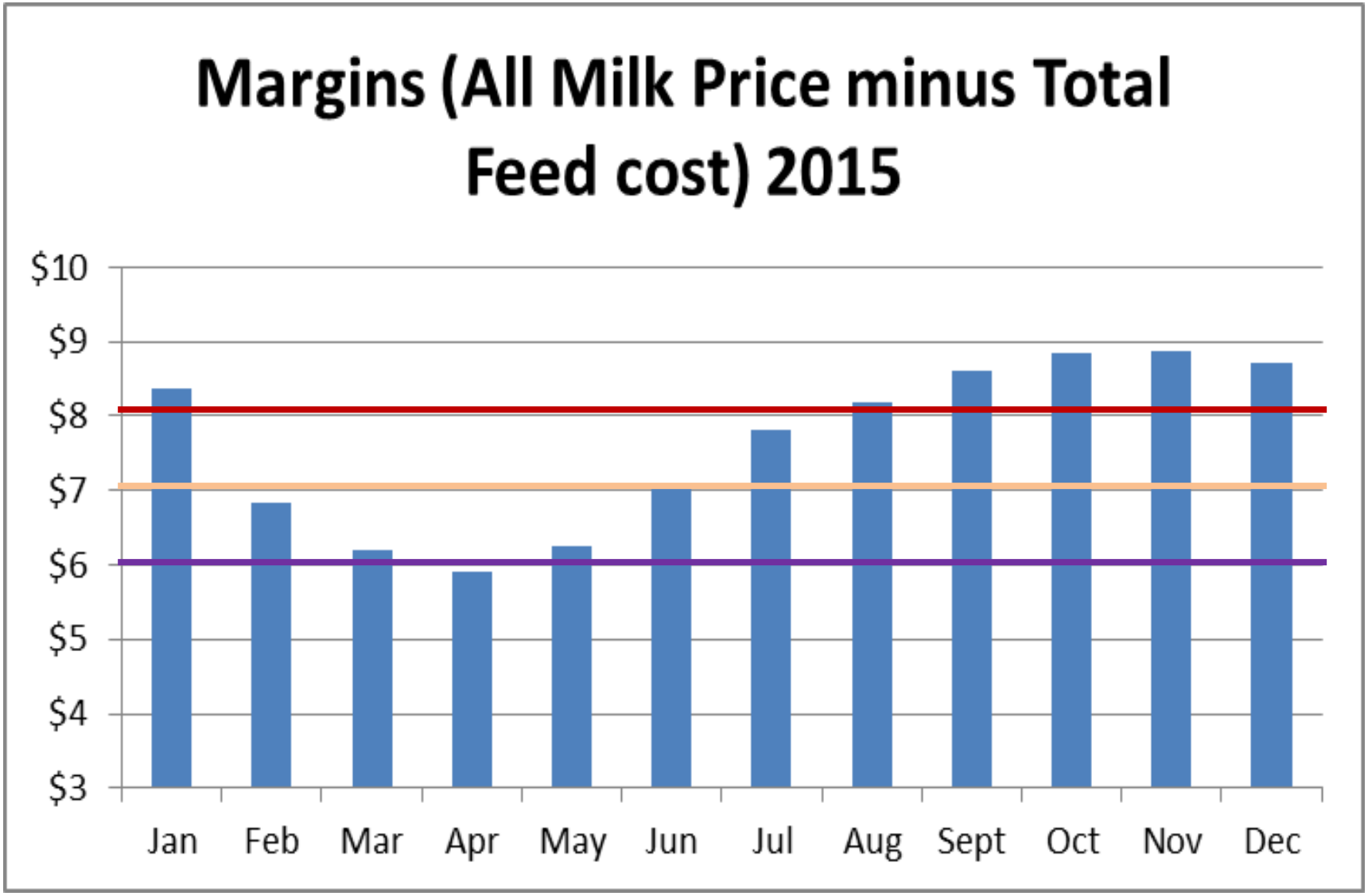
- **Margins:**

✓ *Margins will not be as favorable in 2015.*

✓ *But, record margins in 2014 will carry the momentum for increased milk production into 2015*

✓ *And margins will still be at a level to sustain a growth in milk production—while milk prices will be lower, this will be partially offset by lower feed costs.*

✓ ***A side note:*** *China has been a major importer of hay. China recently rejected GMO hay (Roundup Ready alfalfa)---imports dropped 22% August – October, which means lower hay prices for California.*


Margins (All Milk Price minus Total Feed cost) 2015
$10
$9
$8
$7
$6
$5
$4
$3
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sept
Oct
Nov
Dec

Milk production:

- **Milk cows:**
  - ✓ *Dairy replacements are lower than 2012—July 1st 2014 numbers were down 5% at 42.1 per 100 milk cows versus 44.6 in 2012.*
  - ✓ *Dairy replacements are $600 to $700 higher than a year ago, but prices are likely to come down.*
  - ✓ *Slaughter cow prices will remain high—as milk prices fall and margins become tighter dairy producers may increase culling. Cow slaughter numbers were 10% lower in 2014 than 2013.*
  - ✓ *The increase in milk cow numbers will likely continue until at least 4th quarter of 2015.*

Milk production:

- **Milk per cow:**
  - ✓ *The annual increase in milk per cow averaged 1.6% for the 10 year period of 2004 to 2013.*
  - ✓ *Milk per cow increased 2.8% for the last half of 2014 and averaged 2.0% for the year.*
  - ✓ *2014 was partially a recovery of milk per cow since milk per cow increased just 0.6% in 2013.*
  - ✓ *But, can milk per cow increase well above the trend line for two consecutive years?*
  - ✓ *Feed prices will remain much lower than 2013, but corn, soybean meal and alfalfa hay have seen some increase in prices.*
  - ✓ *The increase in milk per cow may slow by the second half of the year.*

Estimated milk production for 2015

	Cropp's forecast		USDA's forecast	
Milk cows (1,000 head)	9,311	+0.6%	9,325	+0.8%
Milk per cow (pounds)	22,710	+2.0%	22,760	+2.2%
Total milk production (billion lbs.)	211.5	+2.6%	212.2	+2.9%

Domestic demand:

- ***Positives:***
  - ✓ *Continued improvement in the economy. GDP grew 2.3% in 2014 and is expected to grow about 3.3% in 2015.*
  - ✓ *Wholesale and retail prices will be lower.*
  - ✓ *Restaurant Index to improve—good news for cheese and butter.*

- *Demand is expected to be fairly robust.*

Dairy Exports:

- **Positives:**

✓ *Dairy producers in major exporting countries are also experiencing lower margins—this should slow the increase in world milk production to closer to 1%. (New Zealand currently experiencing hot and dry weather).*

✓ *World dairy product prices appear to have bottomed out and should increase with good strength the second half of the year.*

✓ *Accumulated stocks in both exporting and importing counties will decrease and imports of importing countries should pick up by second half of the year, in particular China, but at a more modest pace.*

✓ *Russia is to lift the ban on imports from the EU-28 in August.*

Dairy Exports:

- **Negatives:**

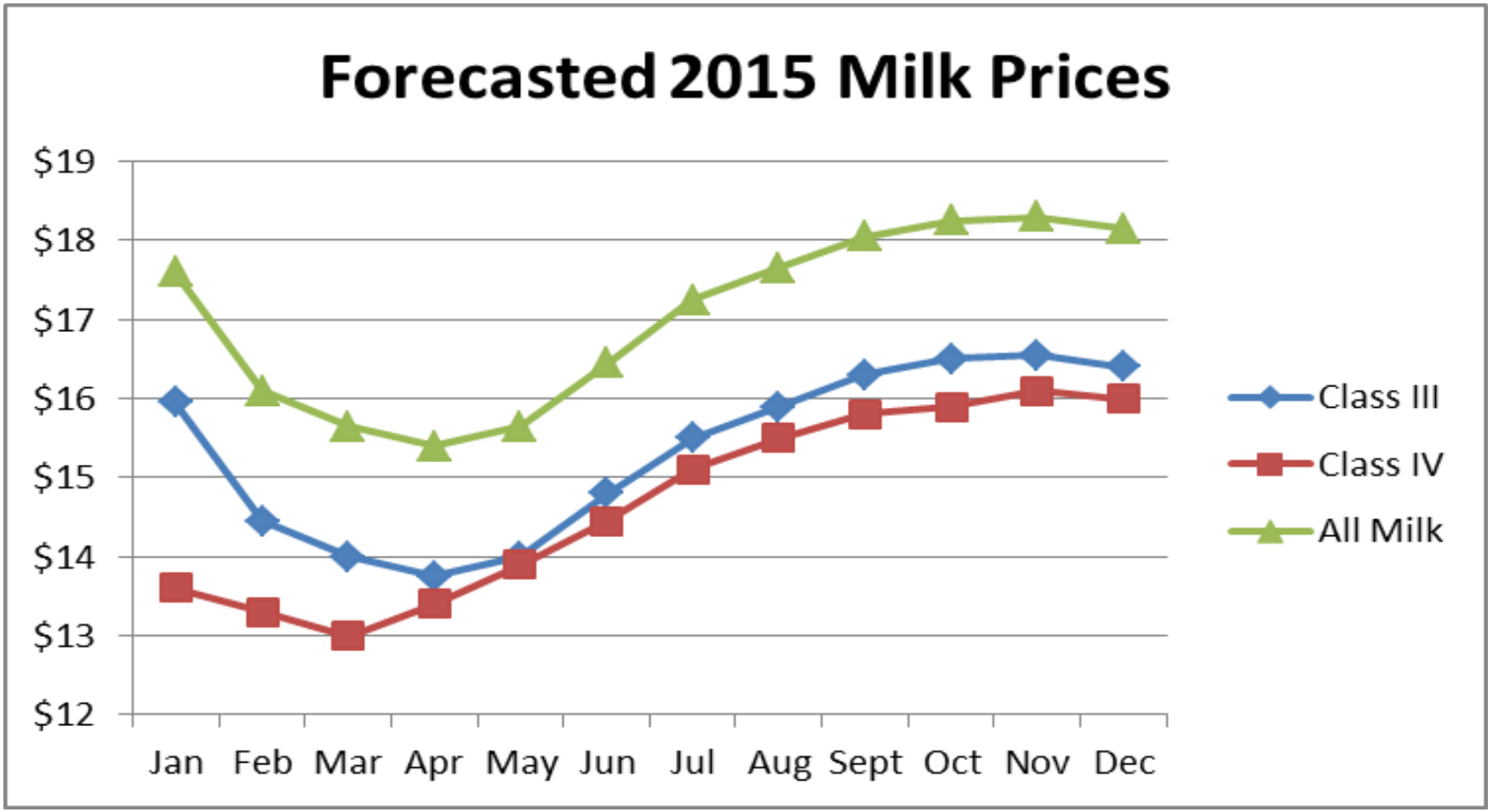
✓ *EU-28 lifts quotas April 2015—but, over quota production will result in stiff fines on some countries if they don't reduce 1st quarter production—overall the quota lift will not result in a big increase in milk production in 2015.*

✓ *Some world economies are slowing—Japan, China, EU and oil exporting countries.(China's GDP estimated to go from 7.4% in 2014 to 6.5% in 2015)*

✓ *The U.S. dollar will remain relatively strong.*

USDA's dairy export prediction for 2015:

- **2015 exports versus 2014 exports:**
  - ✓Cheese **– 4.9%**
  - ✓Nonfat dry milk **- 5.3%**
  - ✓Butter **– 20.3%**
  - ✓Milk equivalent on a milkfat basis **-10.6%**
  - ✓Milk equivalent on a skim solids basis **-3.4%**



Cropp's forecast

Class III average = $15.34 compared to $22.34 in 2014, $7 lower
Class IV average = $14.67 compared to $22.09 in 2014, $7.42 lower
U.S. All Milk Price = $17.04 compared to $23.97 in 2014, $6.93 lower

How can milk prices fall that low first half of 2015?

- Look how dairy product prices have fallen.

Dairy Product	Peak 2014	Jan 15, 2015	$ change/Cwt.
Butter	$3.06	$1.54	$6.85
Nonfat dry	$2.05	$0.95	$9.90
40# cheddar	$2.45	$1.54	$9.10
Dry whey	$0.67	$0.36	$1.86

Some are forecast prices higher than this and some lower—all are possible.

- From my perspective prices there is a 50-50 chance prices could average higher than my forecast.
- It basically comes down to the final level of milk production and how exports recover.
- USDA's December forecast has prices considerably higher than mine.

  Class III $16.55 - $17.35

  Class IV $16.45 - $17.35

  U.S. All Milk $18.45 - $19.25

- Let's hope USDA is right.

Fluid Milk Challenges & Opportunities

Southern Dairy Conference

January 20, 2015

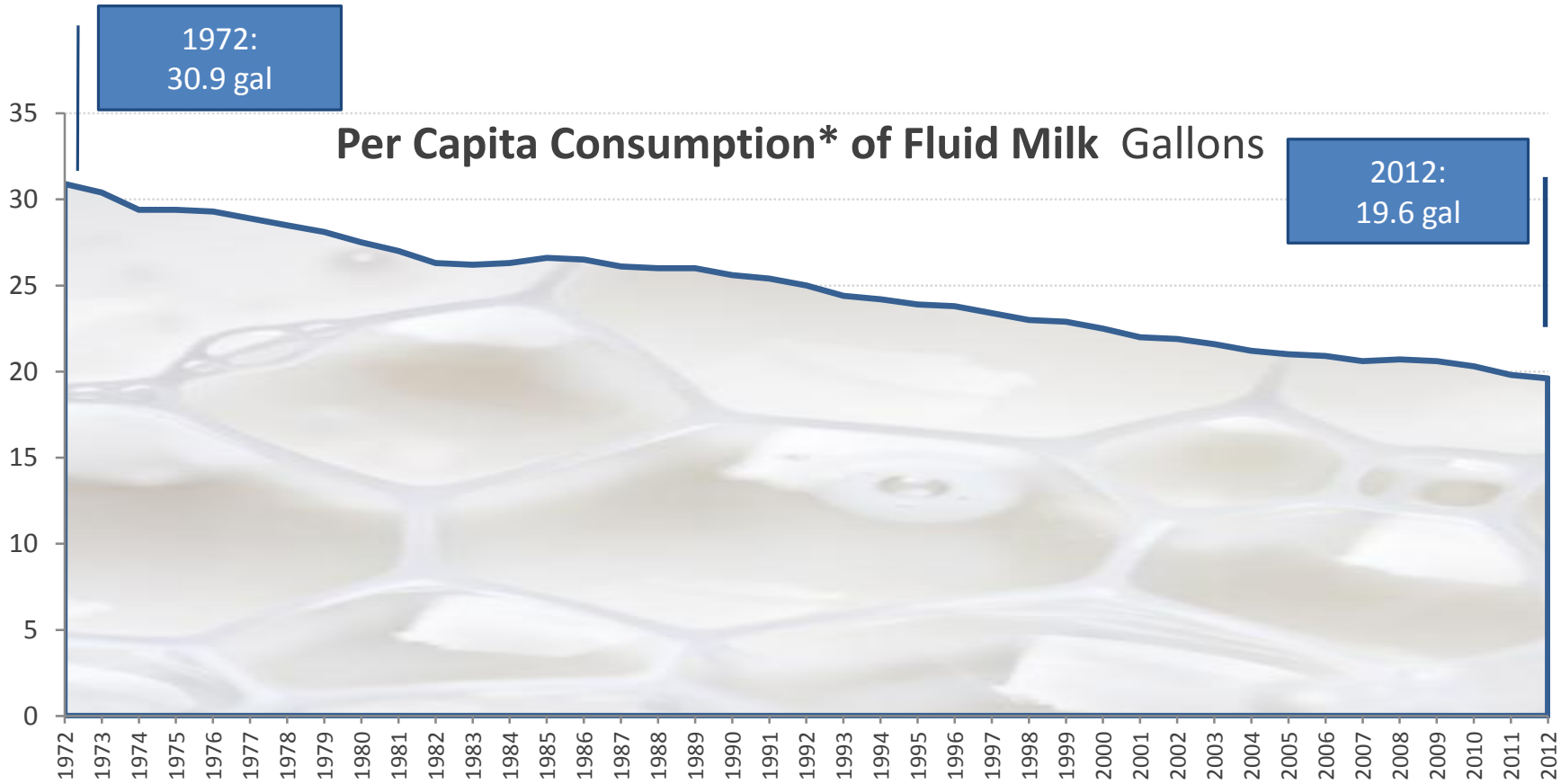
MILK

113 Million Households Purchasing.
Over $17 Billion at Retail.
Over 1 Billion Weekly Drinking Occasions.
Considered a Classic.
Viewed as a Smart, Healthy Choice.
Large Majority See as Trustworthy.
Rooted in Solid Family Ties.

YET LOSING FANS

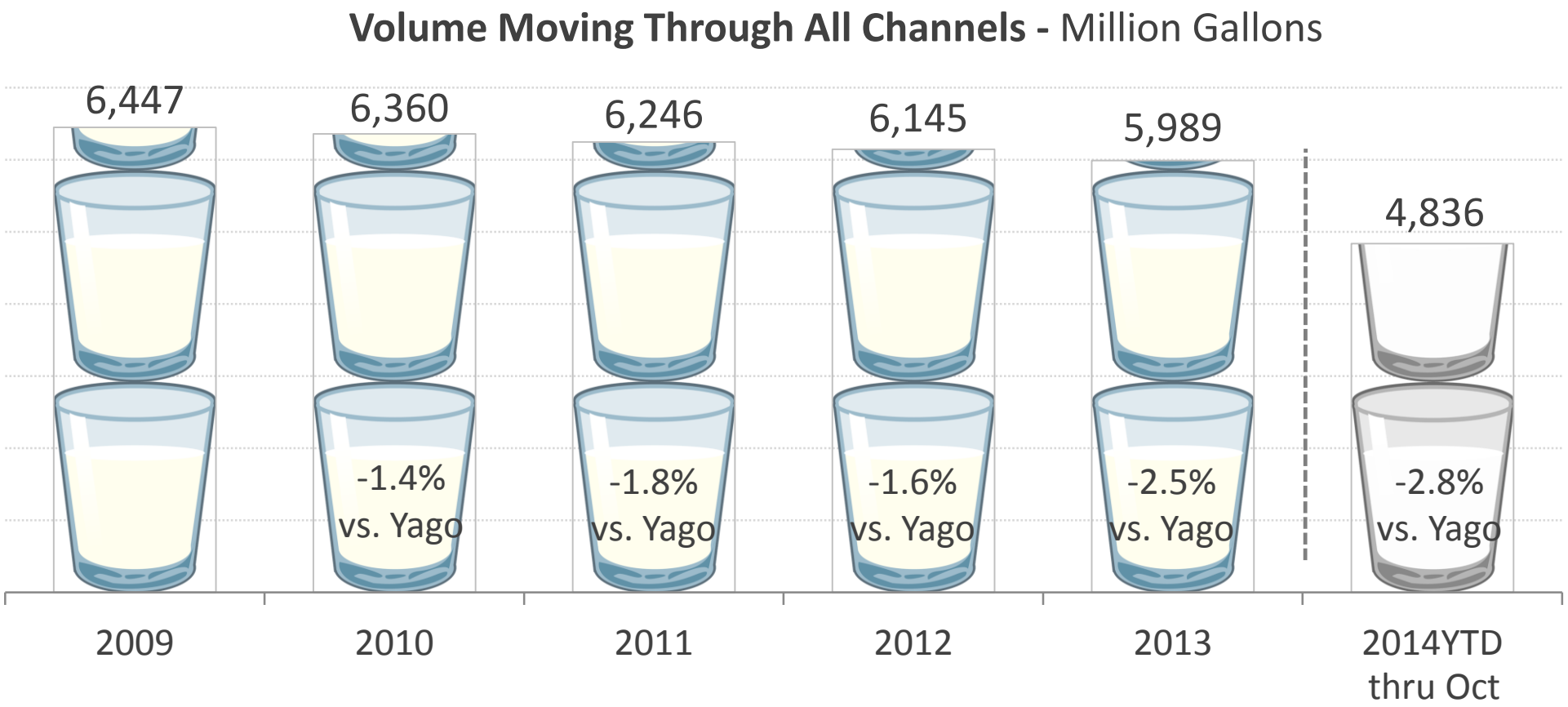
Milk Situation

Americans Consuming Less Fluid Milk



Source: USDA ERS
Food available to be consumed

Rate of Total Milk Volume Decline has Accelerated in 2013-14



Source: USDA AMS

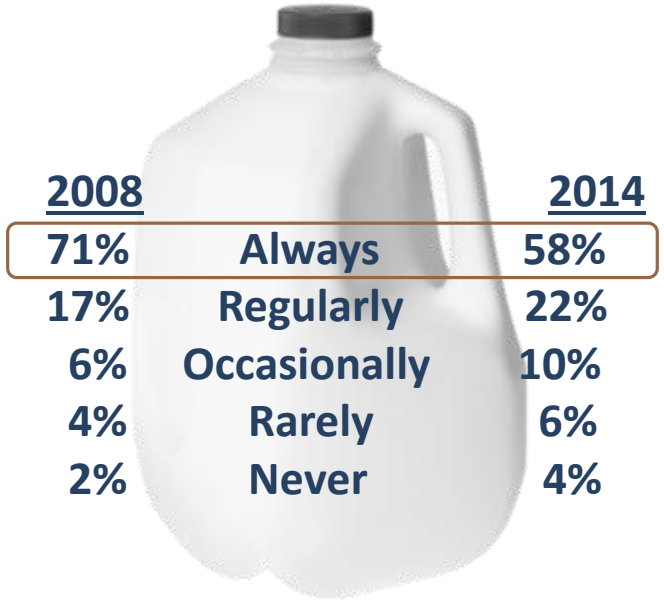
Retail Indicators Point to Fewer and Lighter Milk Users

- Milk penetration high but deteriorating

	2010	2014
ANNUAL		
- Penetration	97%	96%
- Volume per Buyer	36.0	34.6
WEEKLY		
- Penetration	84%	80%
- Volume per Buyer	1.6	1.4

"1 point" penetration drop = loss of 1.2 million households!

- Households becoming lighter users

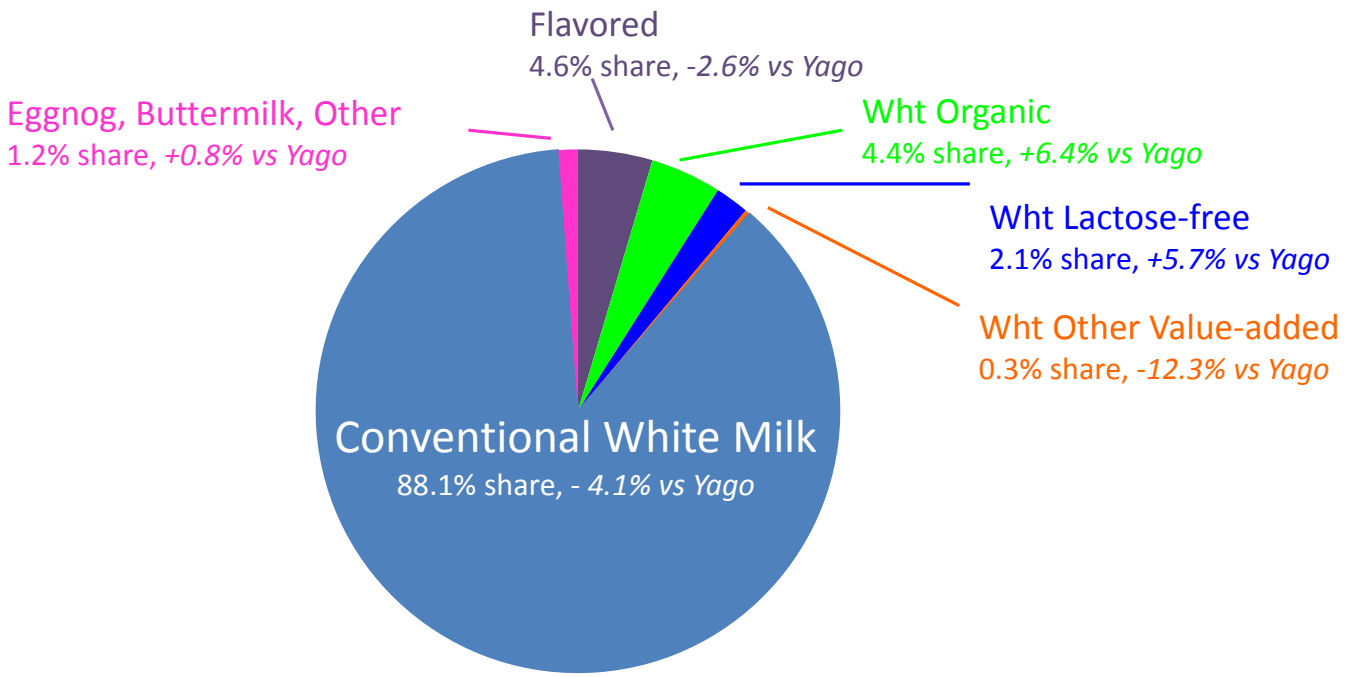


Sources: IRI consumer panel; Milk Barriers & Opportunities Study

Milk Retail Market is Predominantly Commodity Yet the Commodity End is Struggling

Products offering additional benefits posting growth

Retail Milk Volume Share 52 weeks ending October 5, 2014



Source: IRI custom milk database
Multi-outlet + convenience stores

Cereal, an Important Contributor to Milk Sales, is Also on a Downward Path

Cereal estimated at 20-25% milk consumption

Volume Losses at retail

2012: -3.0%

2013: -2.3%

2014: -3.1%

Not eating as much cereal as in the past reported as a reason why some people consume less milk

Changing lifestyles impacting cereal consumption

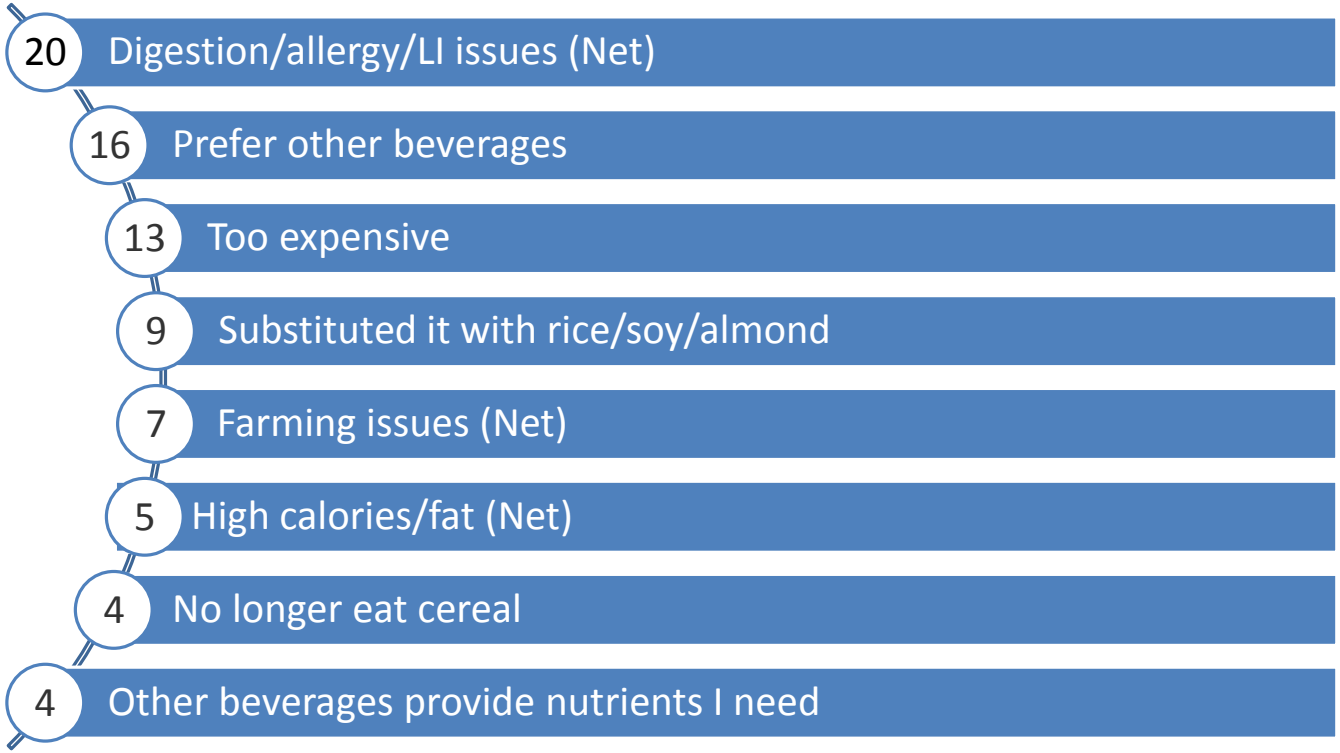
Consumers increasingly looking for portable breakfast foods

Source: IRI DMI Custom Milk Database
2012: Retail multi-outlet; 2013/14: retail multi-outlet + c-stores

Digestion Issues, Preference, and Cost are Main Reasons for Consuming Less Milk

Top reasons why less milk consumed

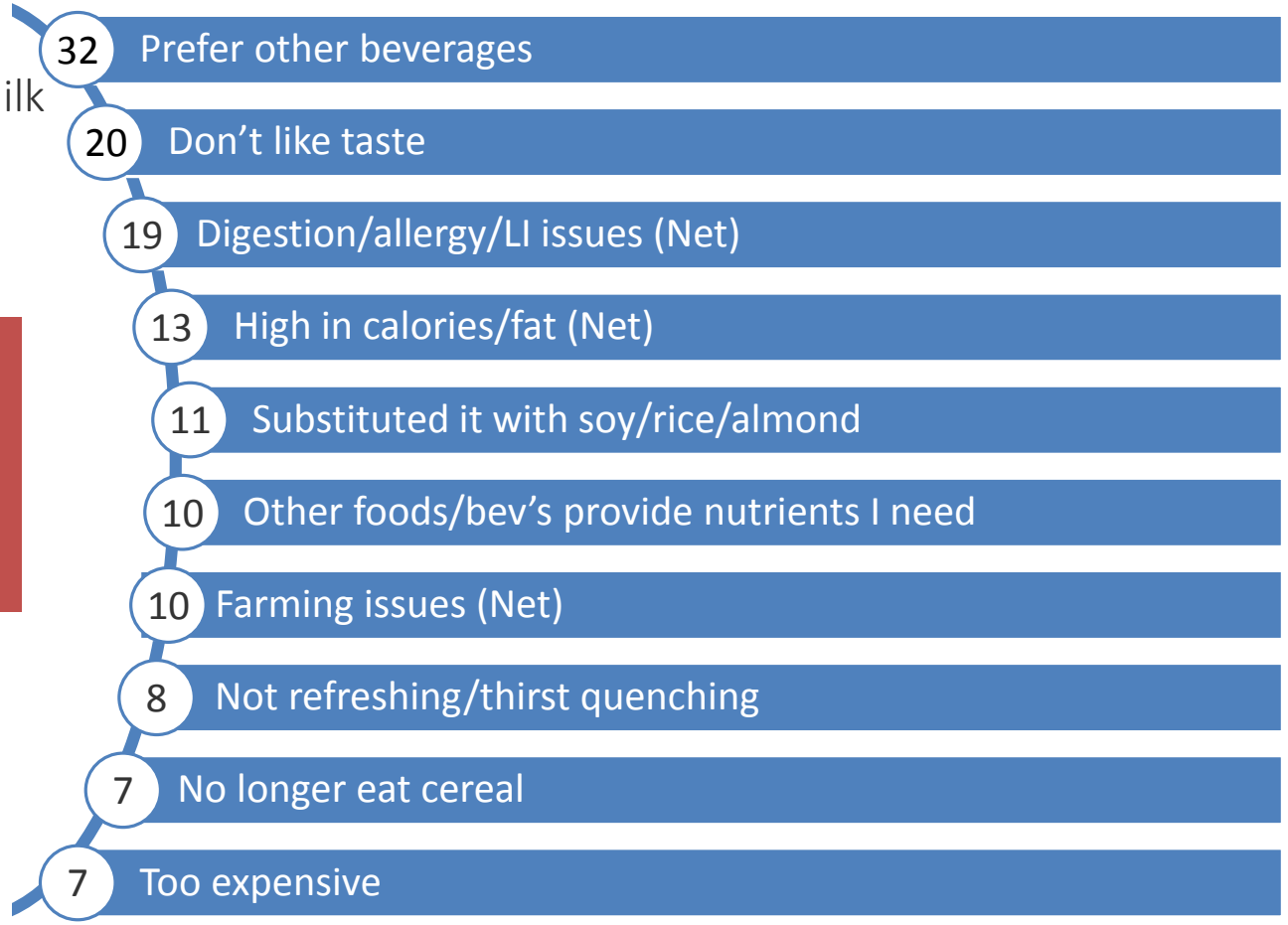
14% report drinking less than 1 year ago



Base: Consuming less milk than one year ago (n=1115)

Similarly, Non-drinkers are Avoiding Milk Due to a Preference for Other Beverages, Taste and Digestion Issues

Top reasons for not drinking milk – past 30 days



Taste is a significantly greater issue for teen non-drinkers. New flavor or innovative products could help to addresss.

Base: Have not drunk traditional dairy milk in the P30D (n=4105)

Consumers are Changing

Changing Age Structure Plays an Important Role in Milk's Long-term Struggle

Youth (kids<18) is a smaller proportion of population

- 1960: 36% population
- 1980: 28%
- 2000: 26%
- 2020_p: 23%

Population projections indicate youth will continue to grow at a slower pace than total population

Kids are more than twice as likely to drink milk compared to adults

2013 Weekly Behaviors	Kids (<18 yrs)	Adults
% Drink milk weekly	84%	41%
Milk drinking occasions per user	9.3	5.3
Milk drinking occasions per capita	7.8	2.2

Increased Population Diversity Has Also Been a Driver of Long-term Change in Milk Consumption

U.S. Population is more racially and ethnically diverse

- 1975: 87% white; <6% Hispanic
- Today: 78% white; 17% Hispanic; non-white and Hispanics are weaker milk consumers

Average Dairy Fluid Milk Intake – All Uses
Age 2+

Cups/day	Non-Hispanic Black	Hispanic	Non-Hispanic White
Milk	0.6	0.9	1.1

Source: DRI/NHANES 2009-10

Non-Caucasians are more likely to consume beverages to cool off and to purify. Fun/taste is also important.

- ✓ Sweeter taste profiles
- ✓ Full calorie beverages
- ✓ Smoothies
- ✓ Flavored Milk (Hispanics)
- ✓ Specialty coffee (Hispanics)
- ✓ Energy drinks
- ✓ Protein drinks

Younger Generations Less Committed to Milk

People born in **1990s**

consume less

than those born in **1970s**

who consume less

than those born in **1950s**

Today's kids

less likely to drink milk than those born 20 yrs ago

African Americans

- Less likely to drink milk
- Fewer occasions among milk drinkers
- Declining further

Hispanics

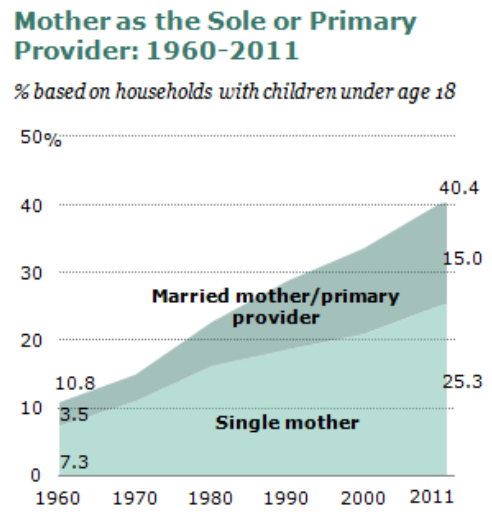
- Lower milk intake than Non-Hispanic White
- Higher than Non-Hispanic Black

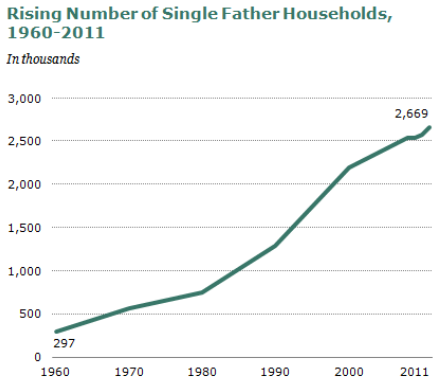
As newer generations replace older, the population's

average milk consumption level will continue to drop

Source: USDA; NHANES; Kantar

Cultural and Lifestyle Changes in the U.S. have Also Brought Challenges for Milk





Cultural Shifts

Delayed adulthood, marriage, children

More one-person, single father and Mom as provider households

Parent Role Changing

From *"I said so"* to *"So tell me why you don't agree"*

Kids 6-9 make 1 in 4 beverage decisions today

By age 14, they make 1 in 2 beverage decisions

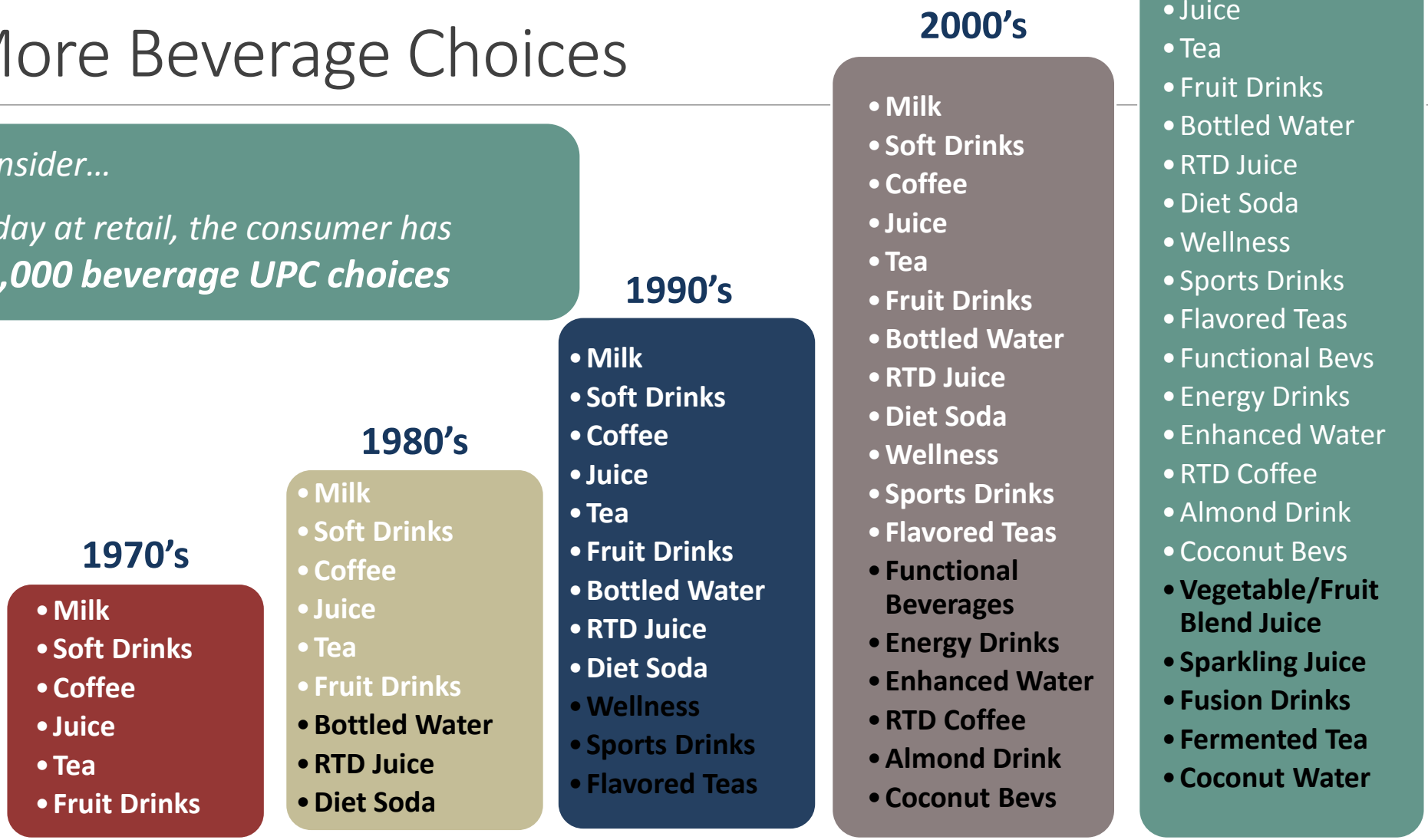
Source: PEW Center, DMI FOD Delighting Kids

Marketplace Also Changing

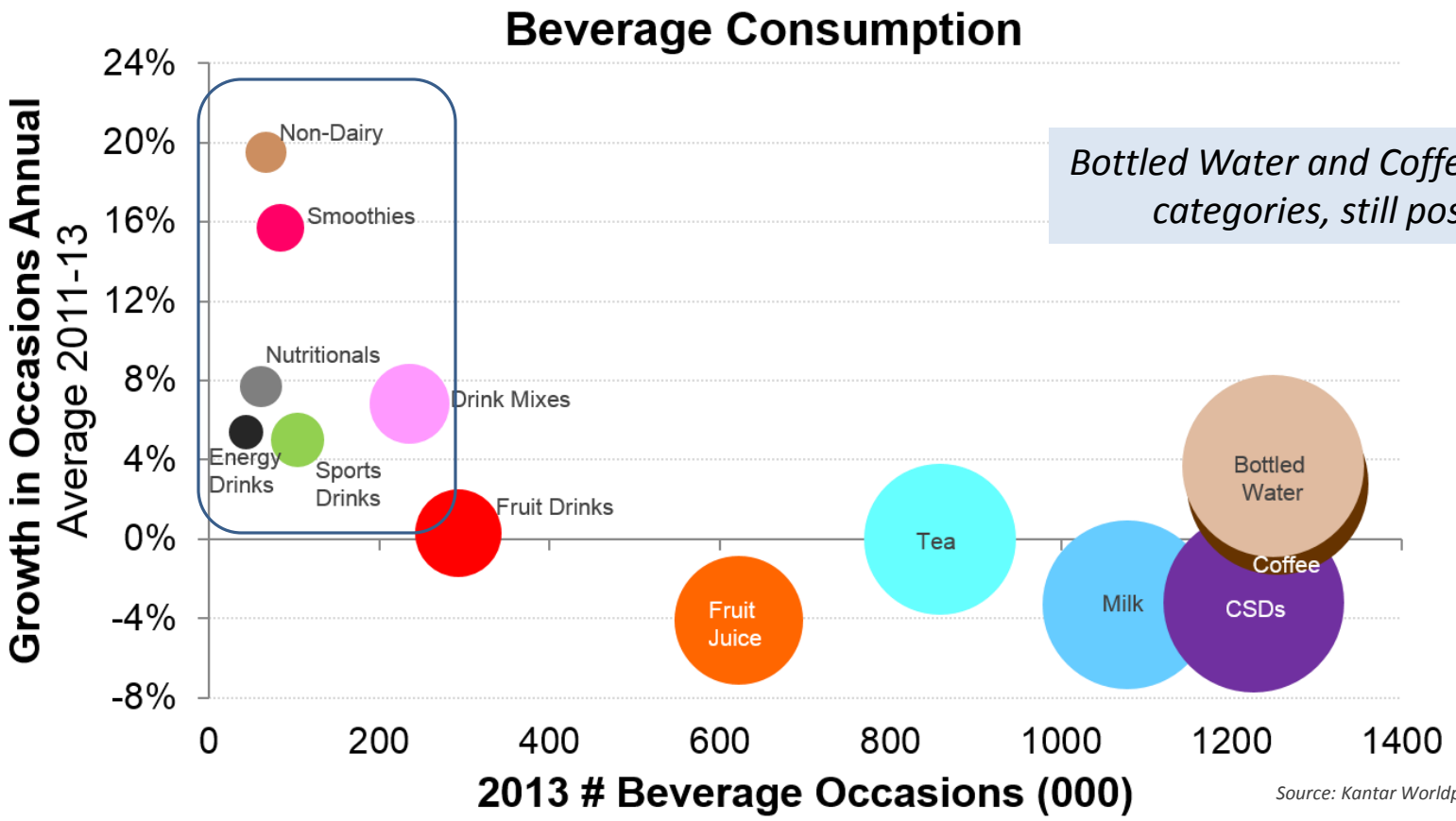
More Beverage Choices

Consider…

Today at retail, the consumer has
60,000 beverage UPC choices



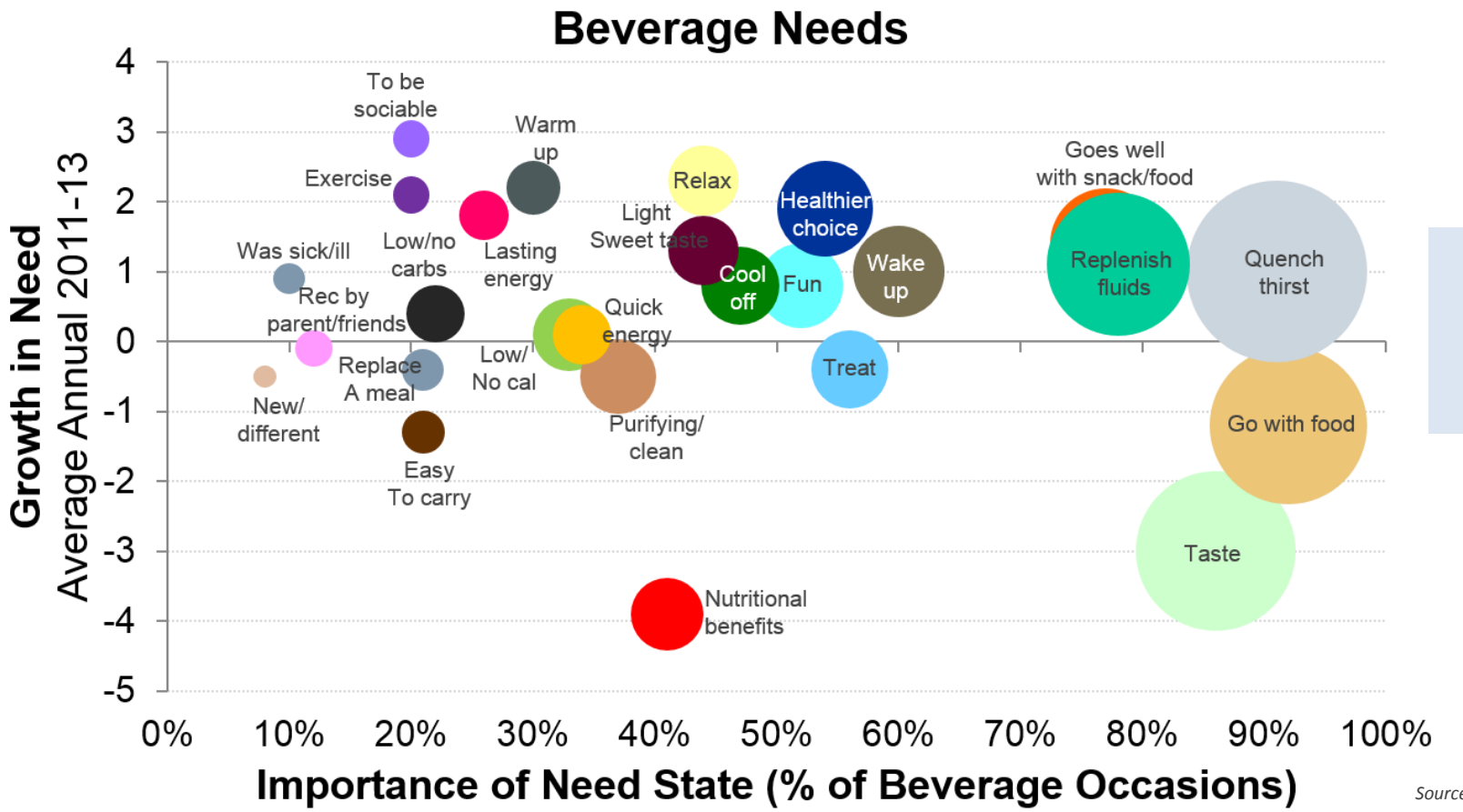
Strongest Beverage Consumption Growth Stemming From Smaller Categories



Bottled Water and Coffee, two very large categories, still posting growth

Source: Kantar Worldpanel U.S. Beverage; self-reported consumption age 1+

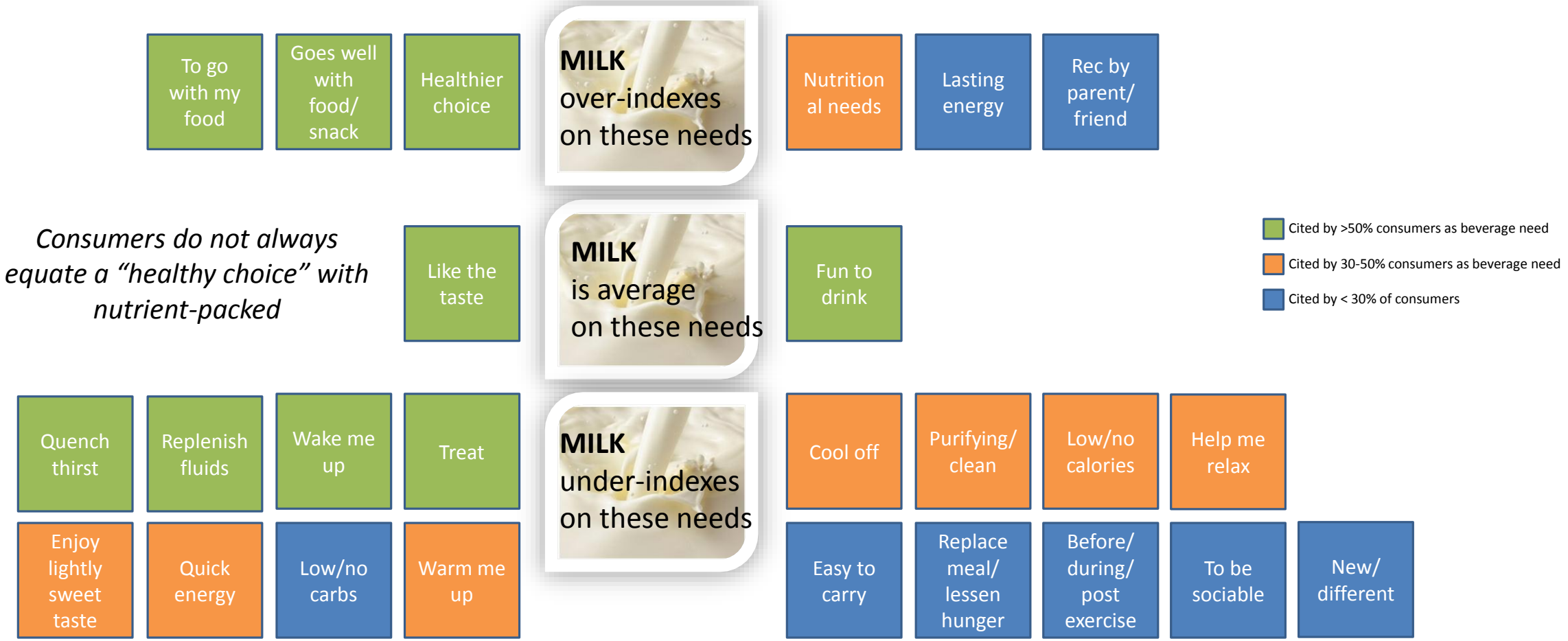
Large Needs of Thirst/Replenishment Continue to Grow; Smaller Needs Growing Quickly – Relax, Exercise, Social



Nutrition is less a factor in beverage selection than in previous years while perceived healthier choice grows

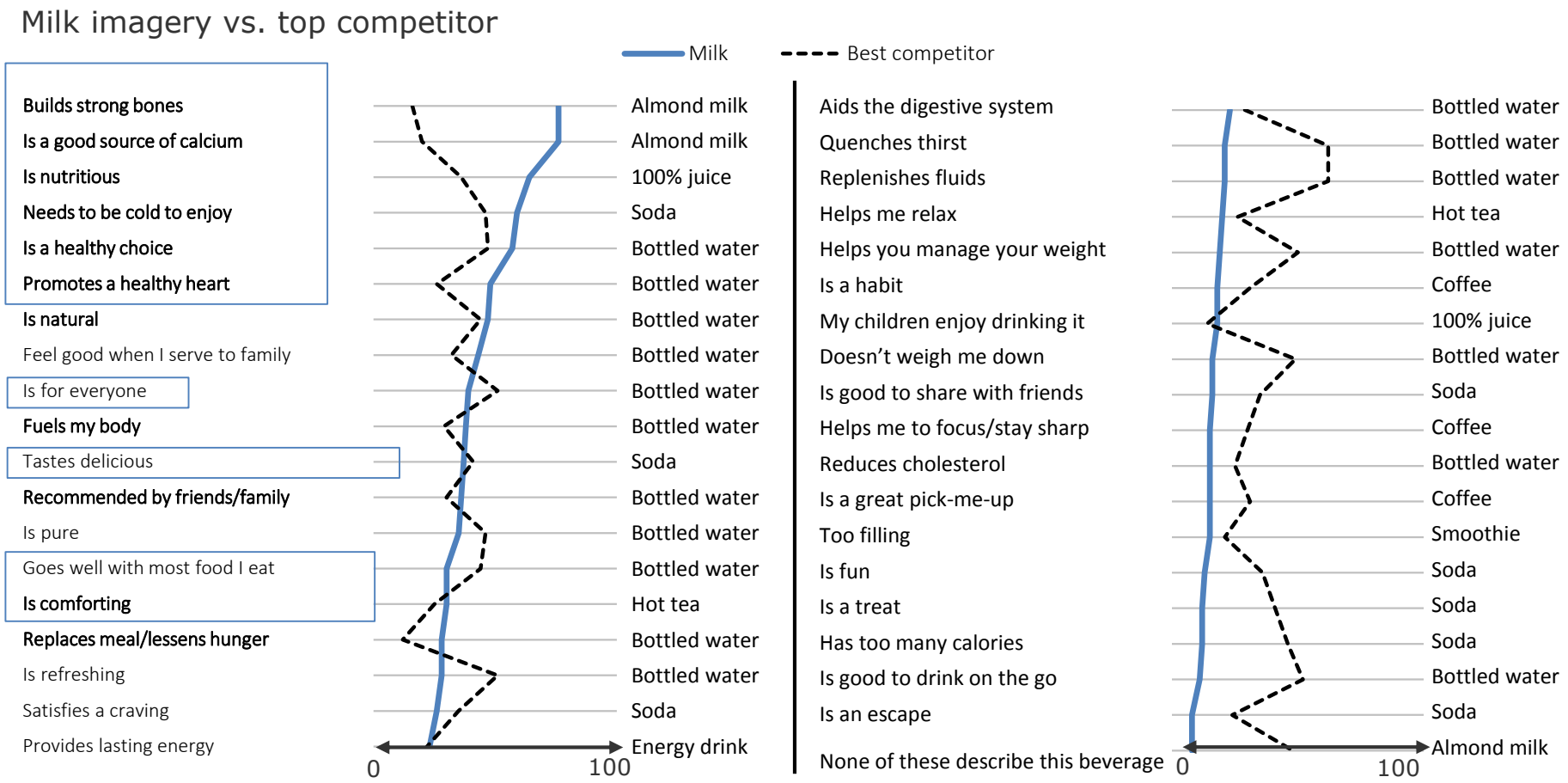
Source: Kantar Worldpanel U.S. Beverage; self-reported consumption age 1+

Milk Fills the Job of Food Accompaniment and Nutrition; It Doesn't Perform Well on Quenching/Replenishing



Source: Kantar Worldpanel U.S. Beverage; self-reported consumption age 1+

Bottled Water More Associated With Positive Characteristics than Other Beverages



Base: Total Respondents (n=5913)
C3a/b. Please indicate which beverages you most associate with each statement below.
BOLD/RED BOX: Milk is stronger than all other beverages

Pockets of Growth

Milk Growing in Non-Traditional Ways

Lattes/Specialty Coffee at QSRs

- +34% in servings 2009-2014
- Taps needs milk doesn't: wake up, treat, fun, energy

Smoothies/Yogurt Drinks at QSRs

- +27% in servings 2009-2014
- Delivers nutrition/healthier choice while also considered a treat/fun

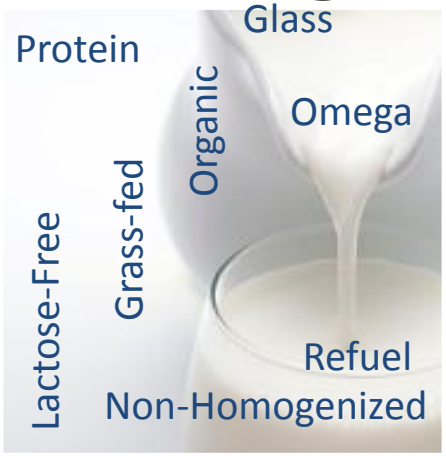
Specialty Coffees at Retail

- Double-digit growth in each of last 3 years
- Grows milk in new way

Breakfast Beverages at Retail

- Newly emerging - large cereal players; 43% dollar growth in 2014
- Brings milk to the on-the-go breakfast occasion

Milk has Growth Areas at Retail With Opportunity to Further Leverage



When additional benefits are incorporated into milk, sales grow

"VALUE-ADDED" MILKS GREW 28% 2009-2014

Value-added dairy beverages with grains, fruit, added nutrients and new packaging test well with consumers

AND THE MARKET IS BEGINNING TO COMMERCIALIZE

Source: IRI custom DMI milk database; NPC custom concept test 2013

Milk/Dairy Drives Success at Retail as “Go To” Source for Meal Solutions

Breakfast Zone

Fuel Your Day

Incremental Impact

+19%
Average Increase in Units of **All** Products

+29%
Average Increase in Units of **Dairy** Products

Dinner Tonight

Perfect Pairings

Chef’s Creation

Opportunities to Leverage

Millennial Opportunity Innovation Platforms: Health and Wellness

Health & Wellness Innovation Platforms

Feel like you did something good for yourself

- "Simple" and "Natural"

Millennial Opportunity Innovation Platforms: Tasty/Treat/Fun

Tasty/Treat/Fun Innovation Platforms

A shift out of the routine and into an emotionally and sensory satisfying moment

- Taste over Health is the rule

Millennial Opportunity Innovation Platforms: Energy/Sustained Energy

Redefined beverages for energy

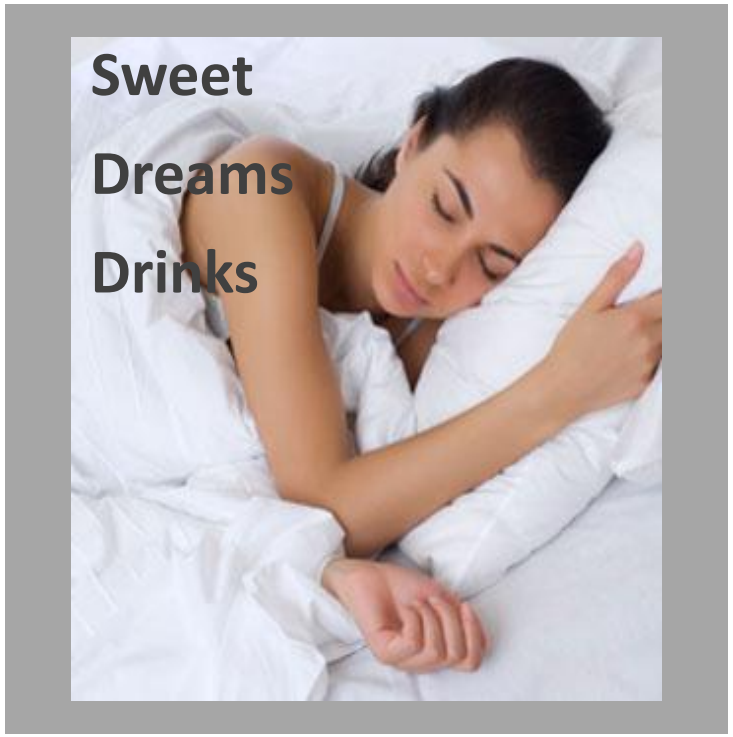
Long-lasting/ sustained energy

Energy Innovation Platforms

Not the traditional energy drink

- Safe, sustained, more natural energy

Millennial Opportunity Innovation Platforms: Relaxation



Relaxation Innovation Platforms

Beverages that calm you down, warm you up, and slow you down

- *"This is my time ...a little slice of me."*

Boomer Opportunity
Dairy Beverage Jobs Overview

Gets Me Going

With all its health & nutrition, **MILK should perfect little energy drink**

Daily Rituals

With its history as anchor at meals, **MILK should be one of the best parts of daily routines**

A Go To

With its history as a perfect complement to cookies & milk, **MILK should enhance more eating occasions**

Celebrate the Memories

With all of its comforting memories, **MILK should make me feel great today**

Boomer Opportunity
Dairy Beverage Jobs Overview

Ful-Filling

With its inherent richness, creaminess and protein,
MILK should be perfect satisfying snack

Safe Travels

With every culture having its own spin,
MILK should be a fun/easy way to explore & discover new flavors

Smart Solution

With its history as nature's perfect nutrition,
MILK'S inherent goodness should be celebrated and built upon

Bring it Home

With so many delicious milkshakes, smoothies, coffees available at restaurants,
MILK should be the most delicious beverage at home

Closing Thoughts

Milk category needs attention now

There are pockets of growth

Reenergize milk by

- Building the core product
- Leveraging current milk growth categories
- Creating new beverage segments to meet consumer needs

Innovation is a big umbrella

- New products
- New packaging
- New channels
- New merchandising at retail
- New claims

Thank You

Global Dairy Situation: What Does It Mean For Southern Dairy Producers?

Jerry Dryer, President
JDG Consulting, Inc.
JDryer@DairyMarketAnalyst.com
Madison, WI & Delray Beach, FL

Global Dairy Situation

What Does It Mean For Southern Dairy Producers?

- Global is a fairly new term in the USA dairy business
- How did we get here?
- Major structural changes in the dairy business worldwide
- Supply side changes in the marketplace
  - USA price supports reduced
  - EU export subsidies
  - NZ cost of production
- Demand side changes in the marketplace
- The USA response to these changes
- Large volumes of manufactured (Class III & Class IV) products are leaving the USA
- Why does it matter to a Class I milk producer?

Structural changes impacting dairy

- **Over the past decade major structural changes impacting the dairy business and effectively altering the "fundamentals" have occurred**
- **Changes in the key supply regions (NZ, EU, USA, AUS, CN, LatAm)**
- **Changes in key demand regions (CN, RUS, MX, MENA, SEAsia)**
  - **Regulatory changes**
  - **Business changes**
  - **Economic changes**
  - **Trade pacts; barriers**
- **Geopolitical events**
  - **Russian ban on dairy imports from EU, USA, Australia**
  - **China objects to bleached whey**
  - **Mexico & USA have a dispute over trucking**
  - **Numerous issues around the globe**

Structural changes impacting dairy

- Regulatory changes - USA
- USA dairy price support program effectively guaranteed farmers a minimum milk price (cost of production plus)
- Typically generated a "surplus" of milk as milk-based products (cheese, butter, nonfat dry milk)
  - These government-held inventories were a price ceiling
  - Limited price movement (volatility)
- Minimum price reduced from more than $13 to less than $10
  - Cost of production plunged
  - Helped USA become competitive in world market
  - 10 years ago: Less than 5% of USA milk exported
  - Last year: 15% or more

Structural changes impacting dairy

- Regulatory changes – EU
- Program not unlike USA dairy price support program (same bottom line)
- Typically generated a "surplus" of milk as milk-based products (cheese, butter, nonfat dry milk)
  - These government-held inventories were a price ceiling
  - Limited price movement (volatility)
- Surplus disposed of on world market via (export) subsidies to traders
  - Effectively lowered price of EU product to prevailing world price which was dictated by low-cost producer NZ
  - Budget constrains triggered elimination of subsidies
  - World prices rose
- Subsidies replaced with milk production quotas with "levies"
  - Effectively put a lid on production in EU; limiting supply moving into exports
  - Quotas go away 31 Mar 15; roller coaster until then

Structural changes impacting dairy

- Business changes
- Massive consolidation in most regions
- NZ created a near-monopoly via Fonterra; huge slice of NZ's GDP
- Major mergers in EU and USA
- Advent and coming-of-age for USA futures and options markets
  - Prices remained higher, longer in the USA this year because
    - International customers protected from current cash price spike
    - Domestic foodservice to a lessor degree
    - Retailer reluctance to pass thru higher price believing price level was short-term
  - Emerging futures/options markets in European and New Zealand
- Elimination of dairy programs; hence, elimination of surpluses
  - Industry still trying to learn how to manage inventories
  - Excess supply in the spring to meet "excess" demand in the autumn

Structural changes impacting dairy

- Economic changes –demand side
- Emergence of middle class
  - From third world to developing to emerging
  - Urban migration
  - Growing middle class
  - Two-bread winner households
  - Growth in foodservice sales
  - Infant formula
  - Life long consumers of dairy
- Much greater demand for dairy
    - Growth projected at or above 2% annually
    - Supply growth projection of 1.5% annually

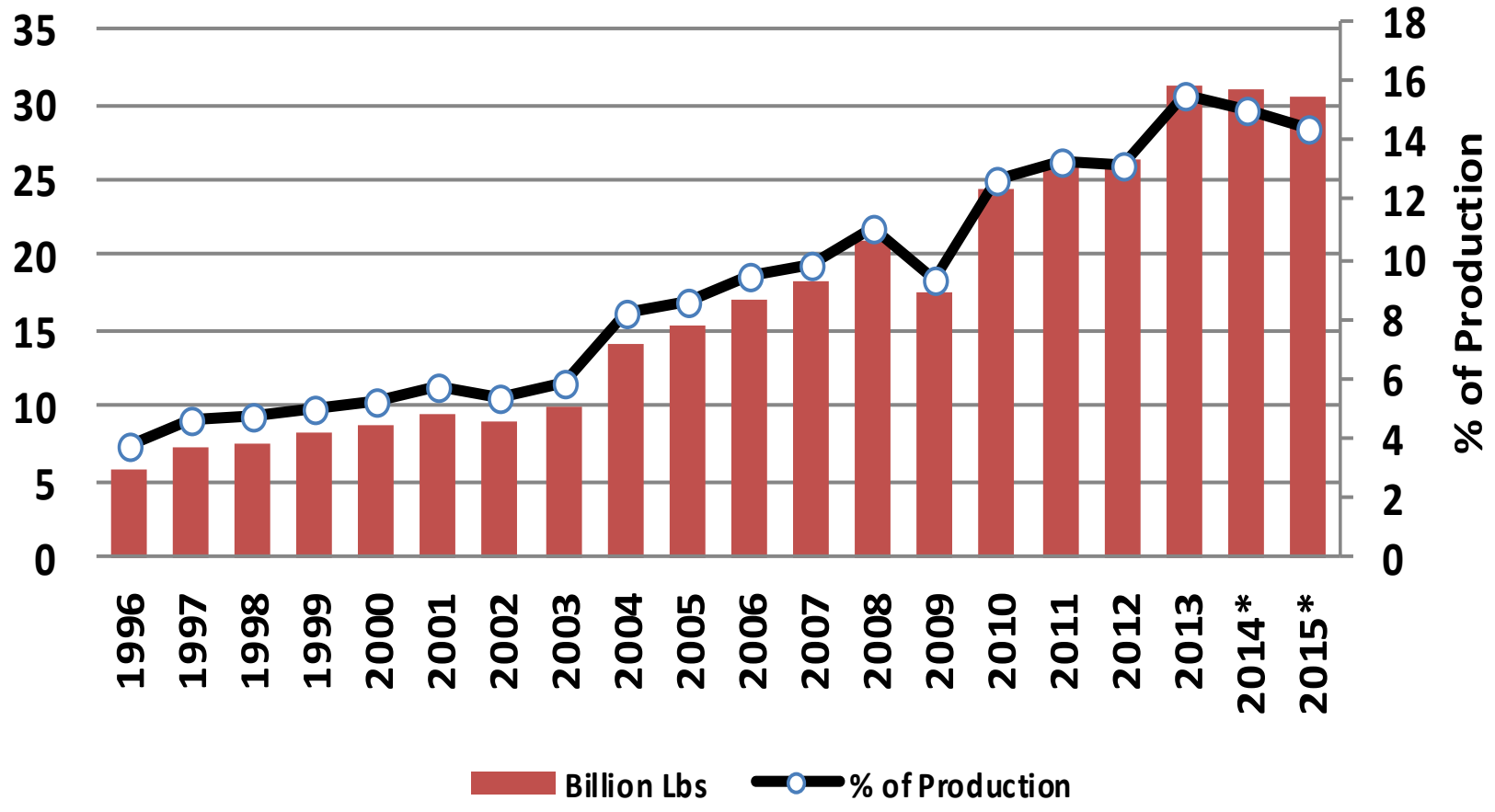
Structural changes impacting dairy

- **Trade pacts; barriers**
- **NAFTA help shift competitive advantage to USA from NZ**
- **Numerous Free Trade Agreements**
  - **USA with Latin America and Caribbean**
  - **NZ with China**
  - **AUS with China**
- **Barriers still protect USA and others**
  - **USA nonfat dry milk import quotas**
  - **USA Grade AA butter prevents most butter imports**
    - **Helps explain USA prices higher than world prices**
  - **Most countries use various issues to at least slow the flow of imports**
    - **China and the bleaching of whey, for example**

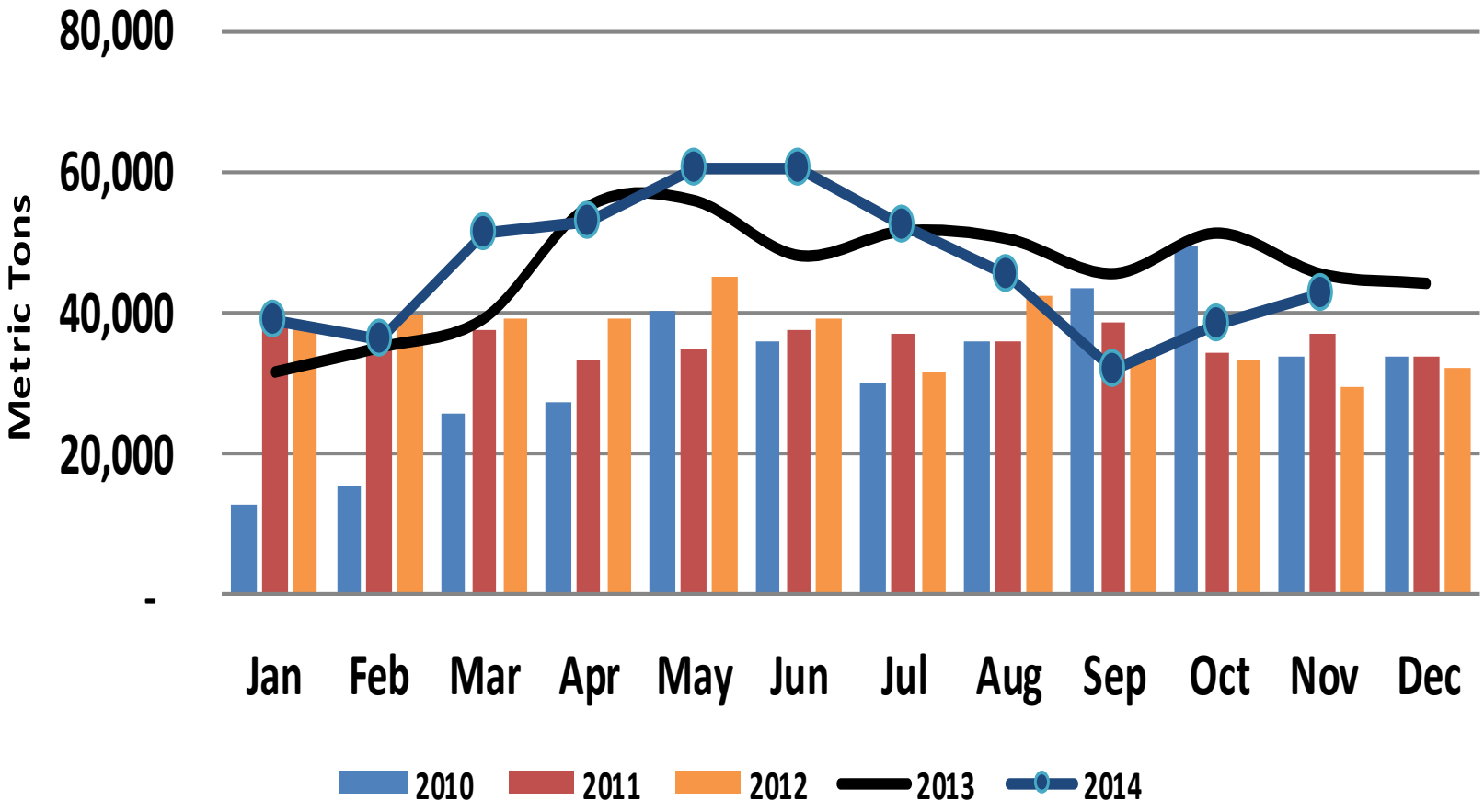
USA response to these changes

- U.S. Dairy Export Council
  - Your hard-earned money from the check-off
  - Early in the process it took a lot of hand holding
  - Strategic thinking
  - Bonding among competitors
  - Model trade association: Producers, processors, traders, suppliers
- Painful process; change is painful
- Breaking old habits takes time
  - Making skim milk powder
  - Making gouda cheese
  - Making whole milk powder
- Today: One day a week, all of “your” milk goes overseas

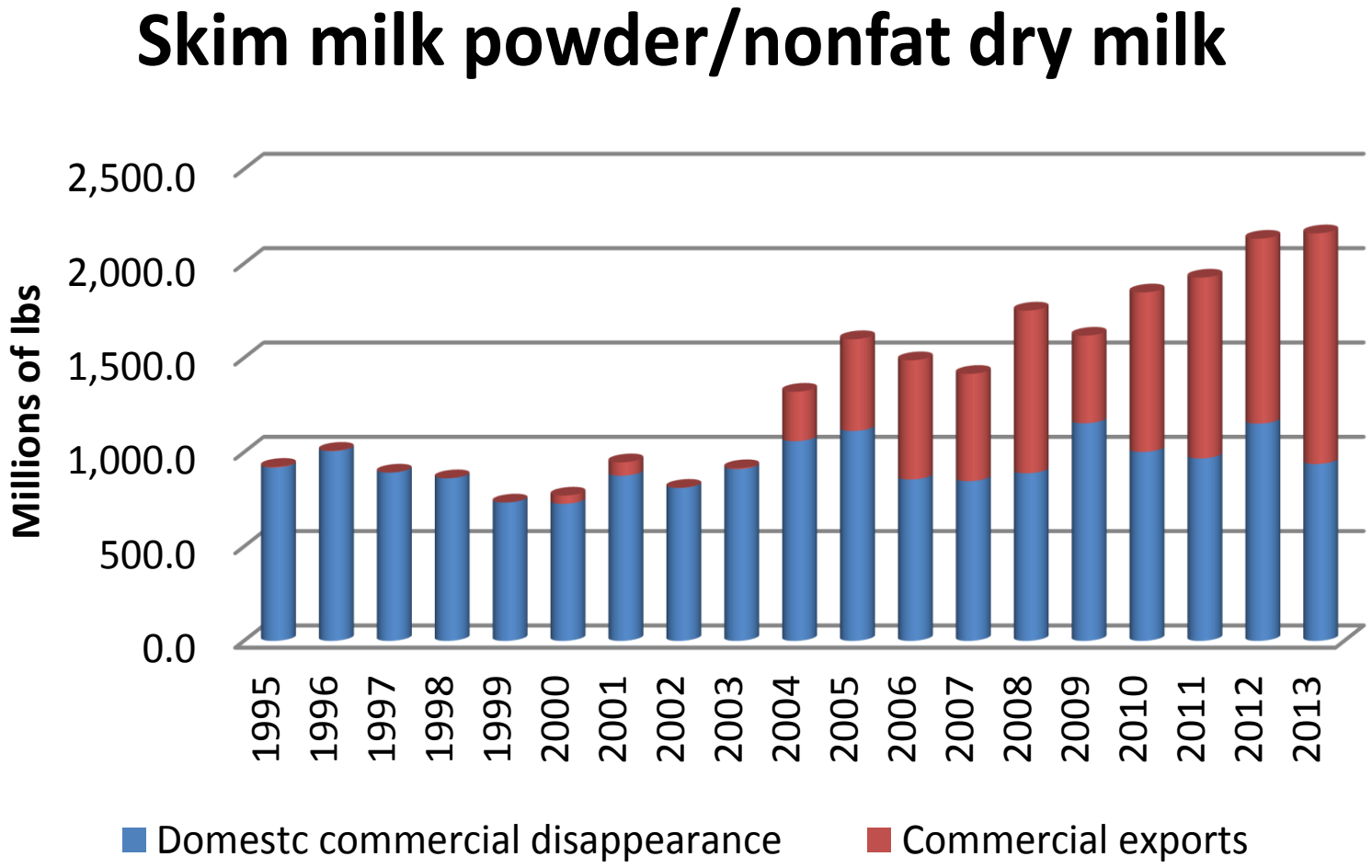
USA dairy exports



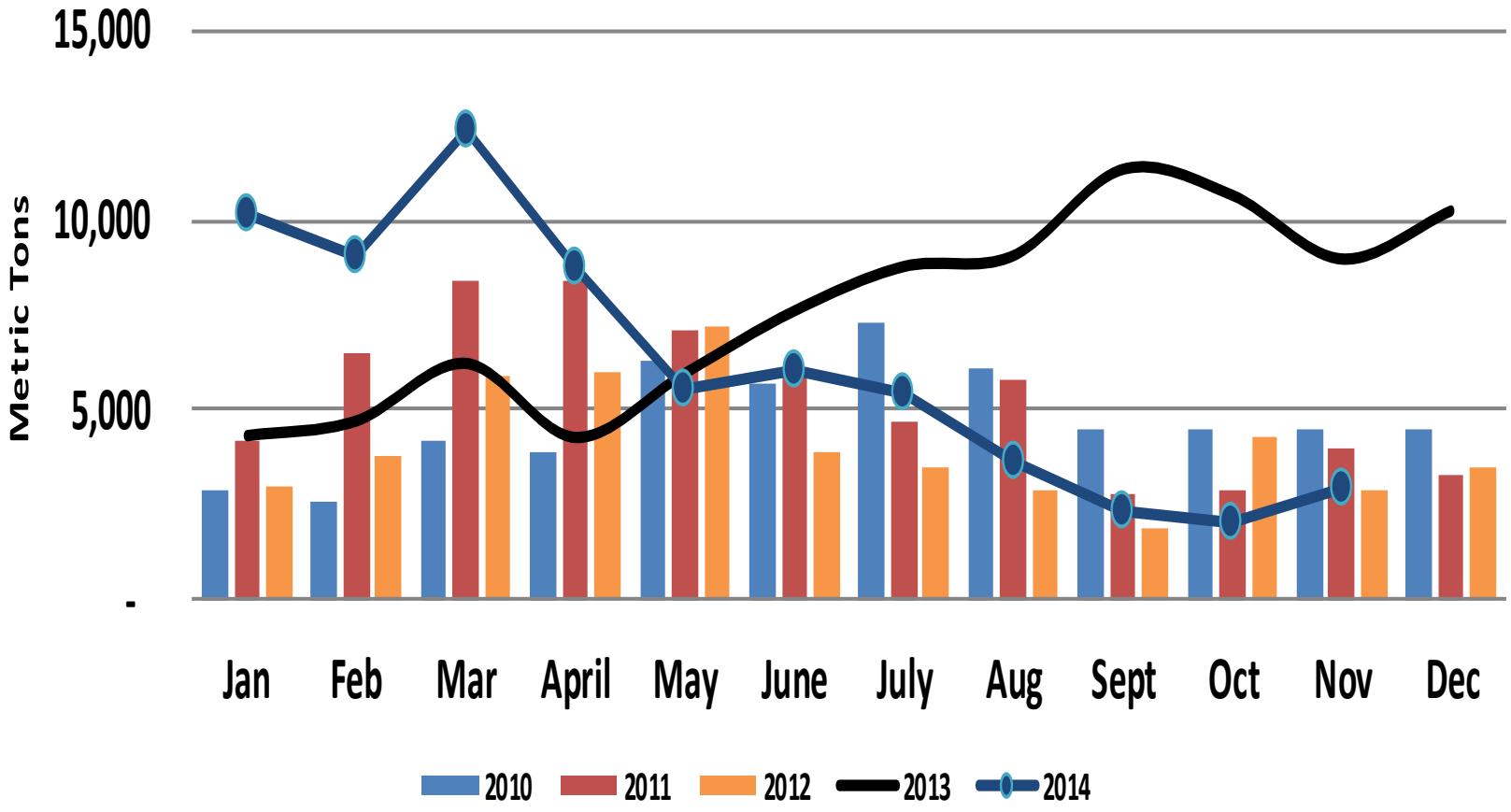
Milk powder exports



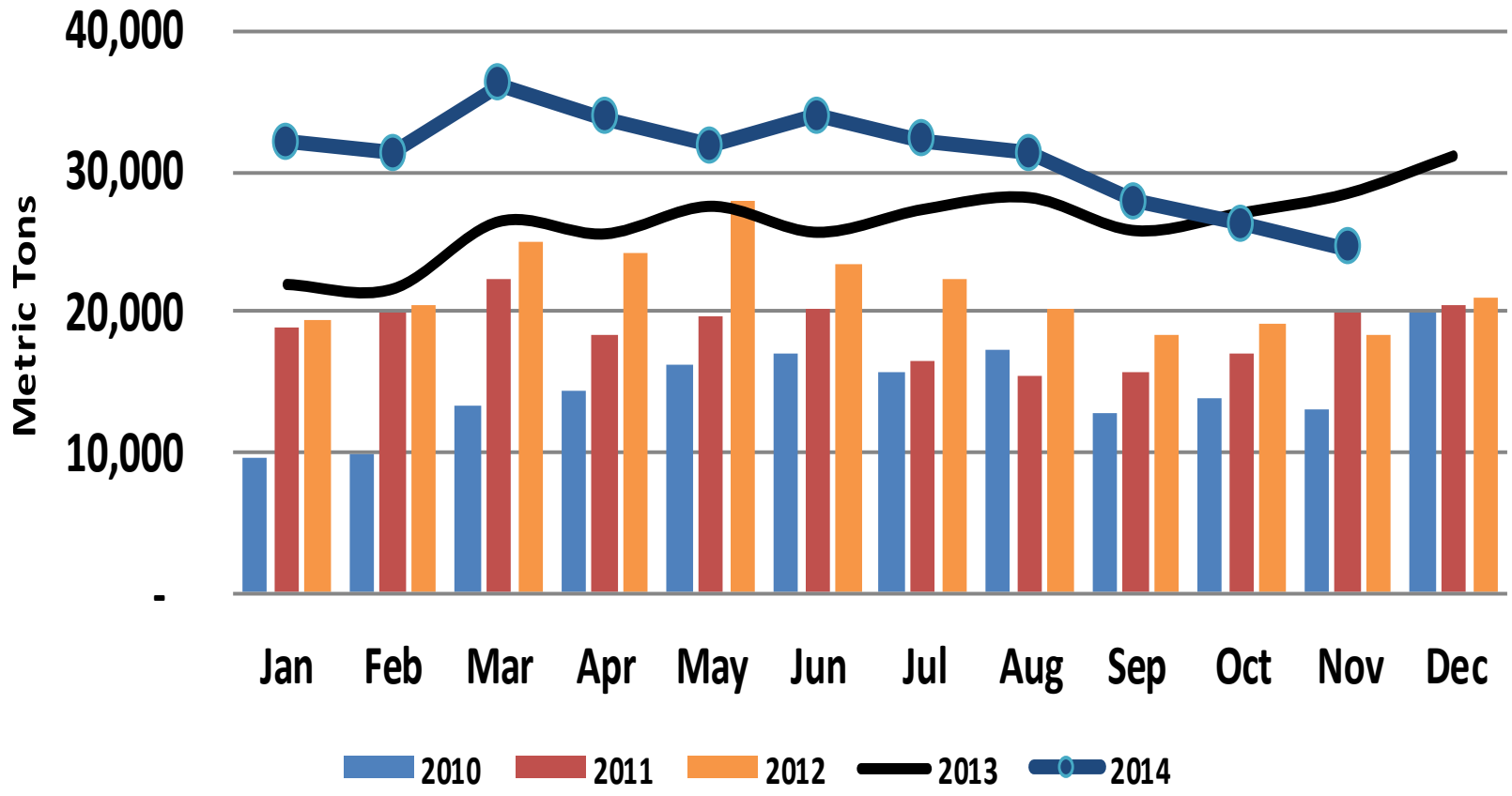
Making the correct product



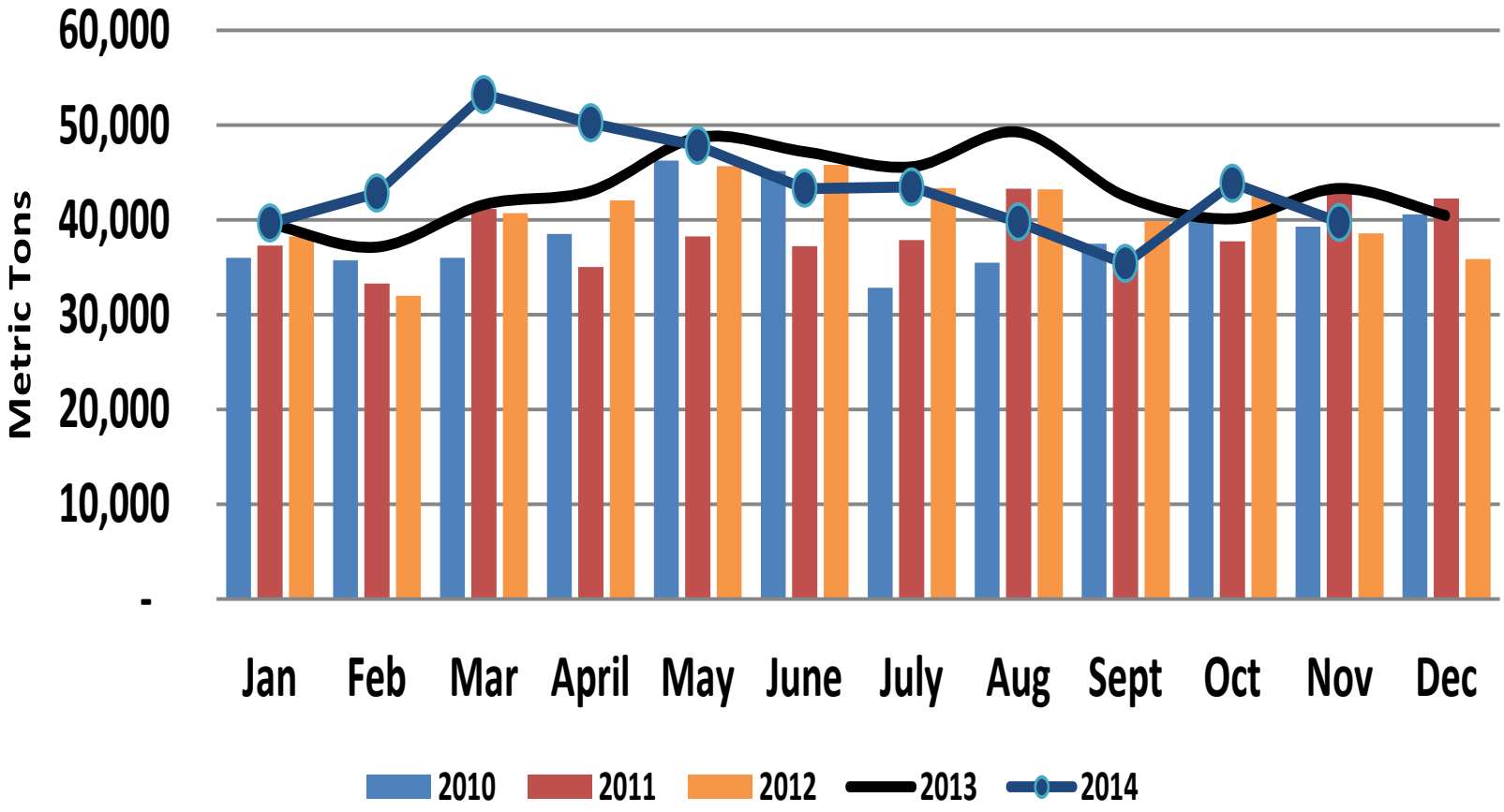
Butter/milkfat exports



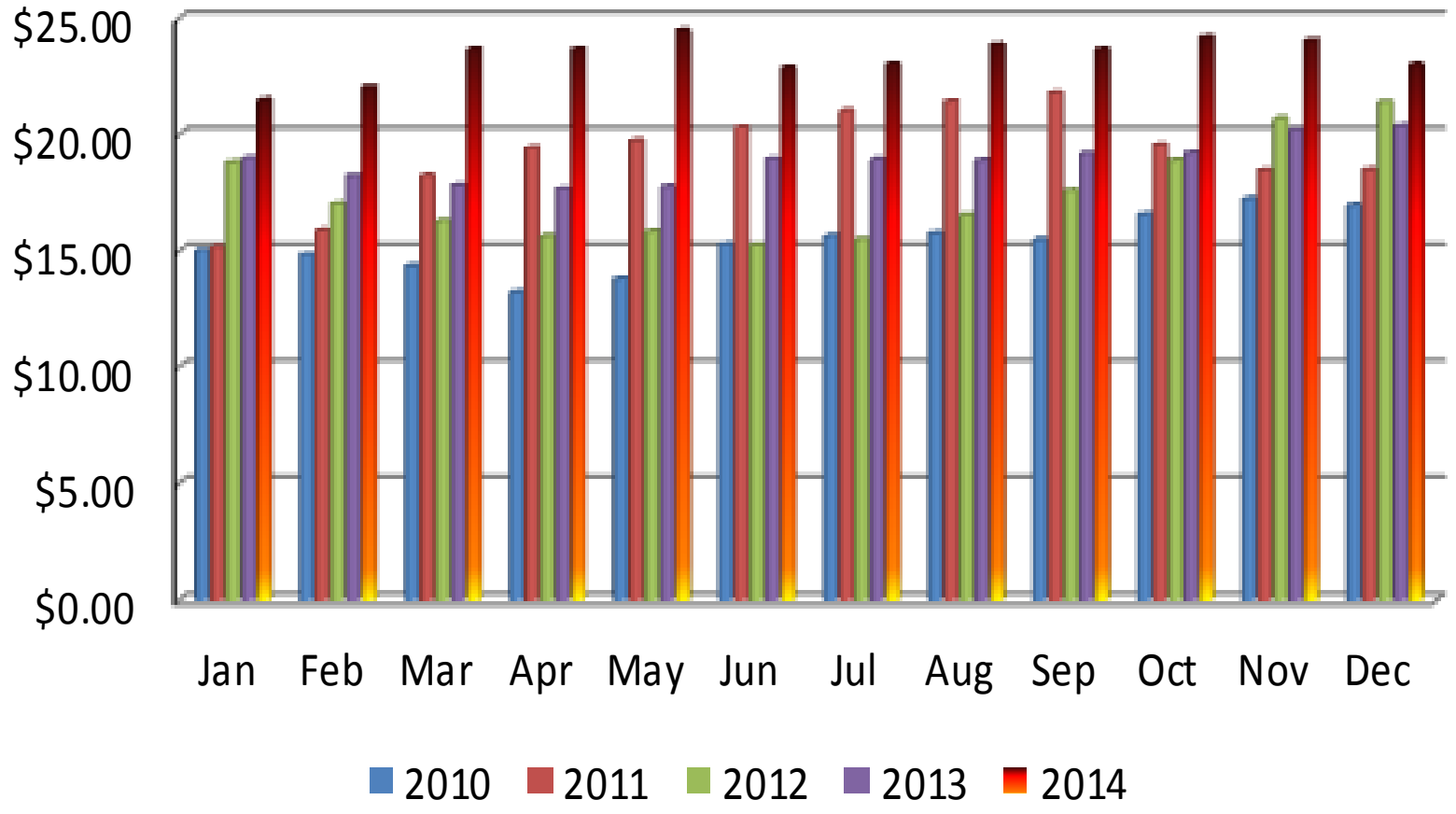
Cheese exports



Whey exports



Class I base price



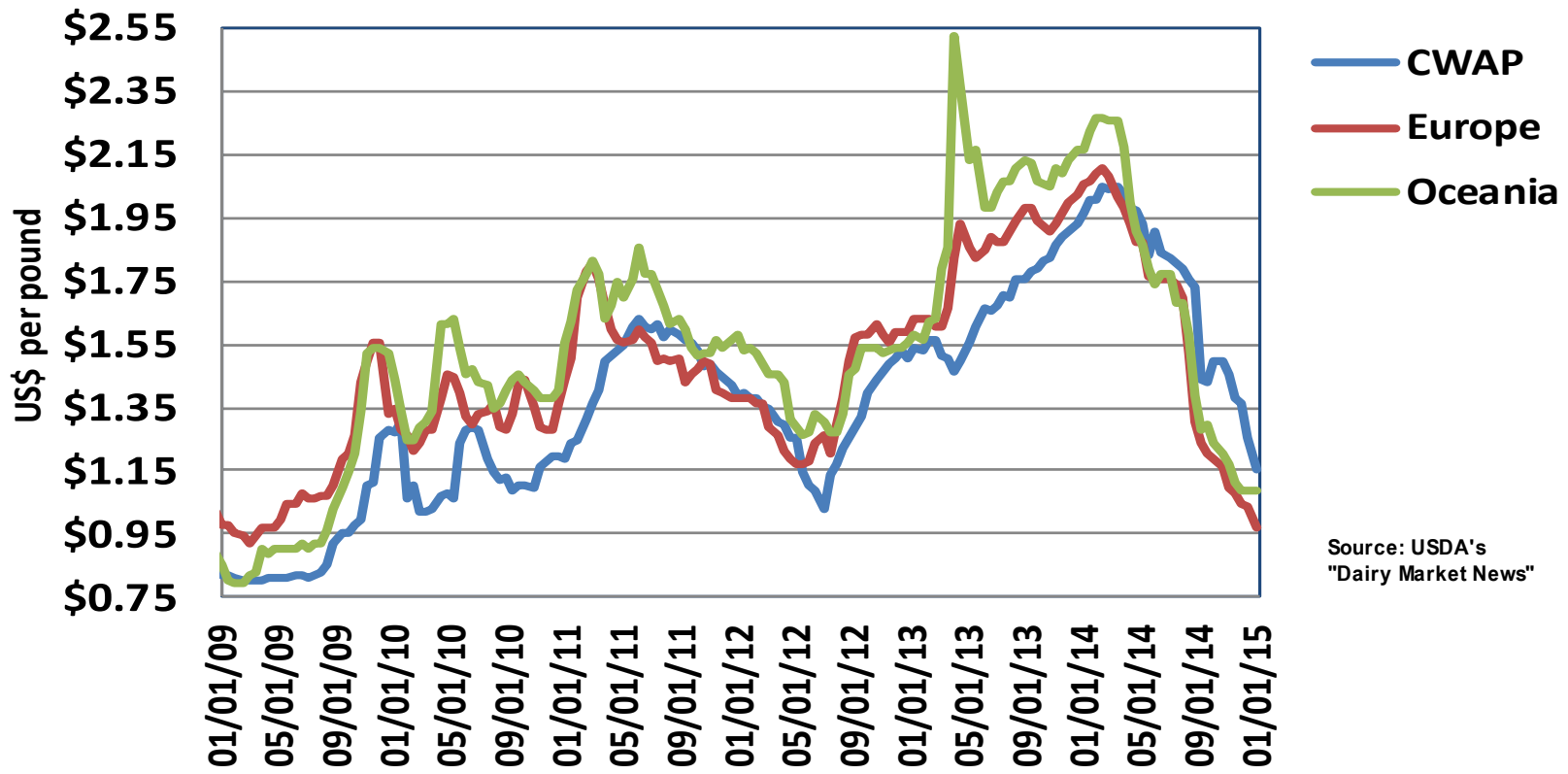
Global Dairy Situation

- **Exports certainly should not get all of the credit for $20+ for 13 months…**
- **Hark back to the structural changes**
  - **Supply**
    - **Milk production constrained by weather and or economics in all key regions**
  - **Demand**
    - **China on a buying binge**
    - **MENA had high oil prices**
- **…However, export sales/shipments certainly made a major contribution to record-high prices and your bottom line**

Global Dairy Situation

- **Exports did help drive the price sharply higher**
- **Exports did help hold the price higher for longer**
  - **Hedging**
  - **Proven source; right product**
  - **Gained market share in some products**
    - **In some markets**

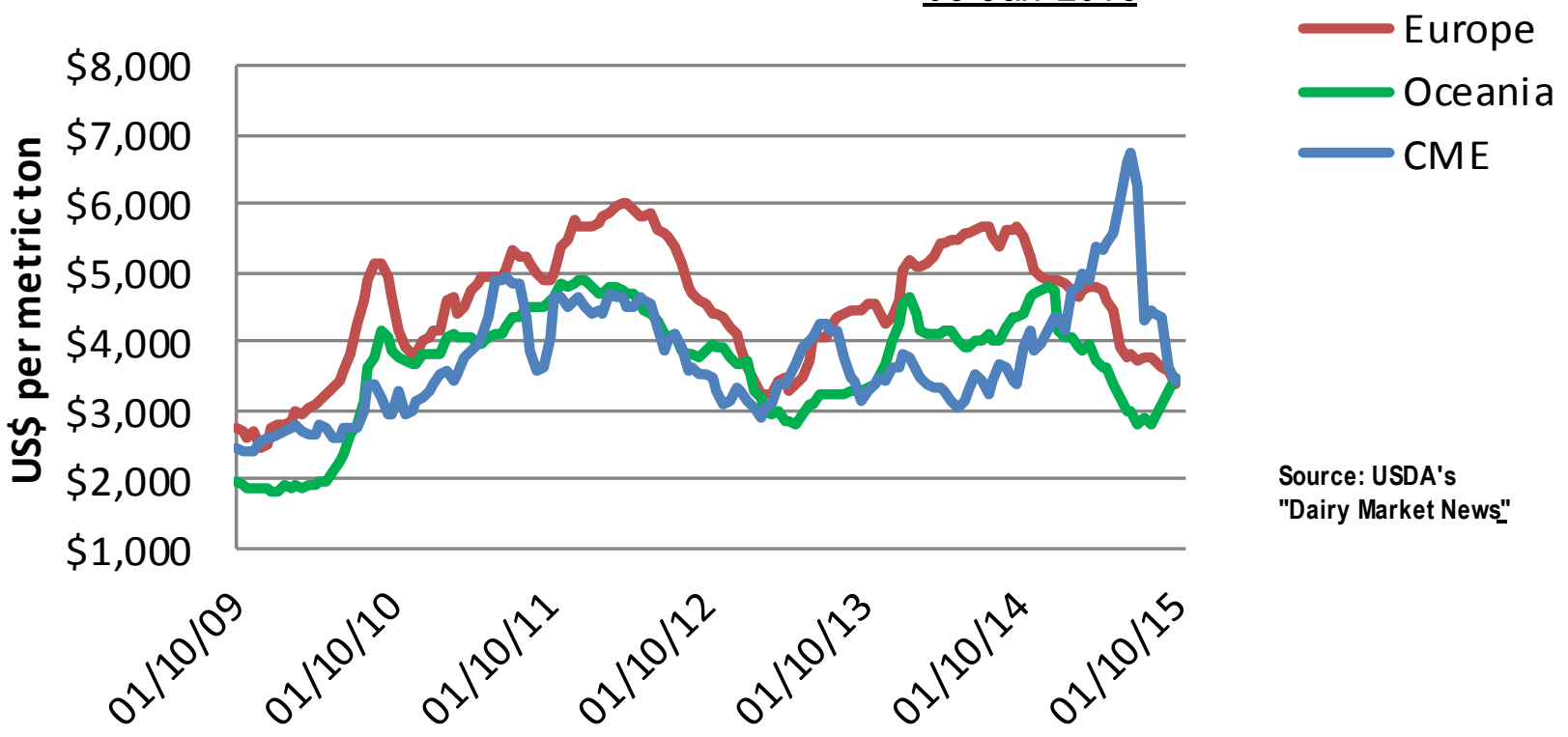
Global Dairy Situation



Global Dairy Situation

Butter price trends

08 Jan 2015

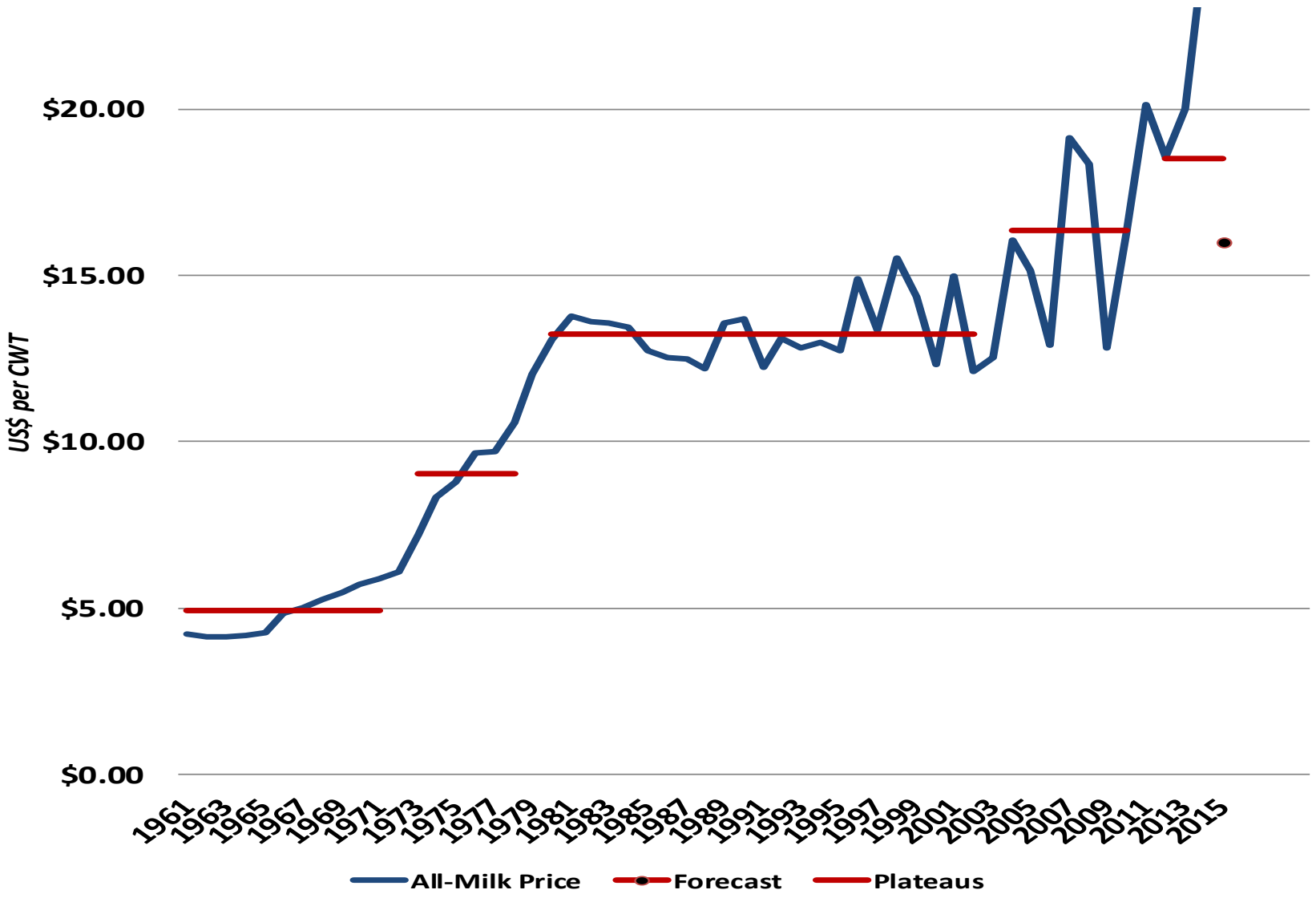


Source: USDA's "Dairy Market News"

What Does It Mean For Southern Dairy Producers?

- **Market for more milk**
- **15% more**
  - **Not going into a government warehouse**
  - **Able to grow your business**
  - **Not a ceiling on the milk price**
  - **You had the floor taken away from you**
  - **Should at least get rid of the ceiling**

Historic USA all-milk prices



Global Dairy Situation: What Does It Mean For Southern Dairy Producers?

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20 January 2015

Reinventing the Fluid Milk Category

Cheryl Hayn
General Manager
SUDIA

SUDIA
The Southeast United Dairy Industry Association, Inc

DMI DAIRY MANAGEMENT INC.™

Checkoff's Role in Revitalization

Be a **catalyst** for sales through a consumer-relevant, growing, and profitable fluid milk segment that effectively **competes in the broader beverage category** with strong brands and meaningful innovation

SUDIA
The Southeast United Dairy Industry Association, Inc

DMI DAIRY MANAGEMENT INC.™

Fluid Milk Revitalization:

A long-term strategy to address key barriers

- Fluid consumption patterns have shifted
  - Need modern infrastructure and innovation to address consumers' needs
- Financial constraints limit innovation and brand marketing
  - Need a healthy, growing, sustainable business model
- Generic advertising alone isn't enough
  - Will not change the fundamental issues leading to reduced consumption
- A modernized framework is needed
  - Regulatory, standards of identity, pricing must be addressed
- Requires a trustee mentality
  - Compete against other beverages, not each other

Strategy designed to help address fundamental factors resulting from decades of category neglect

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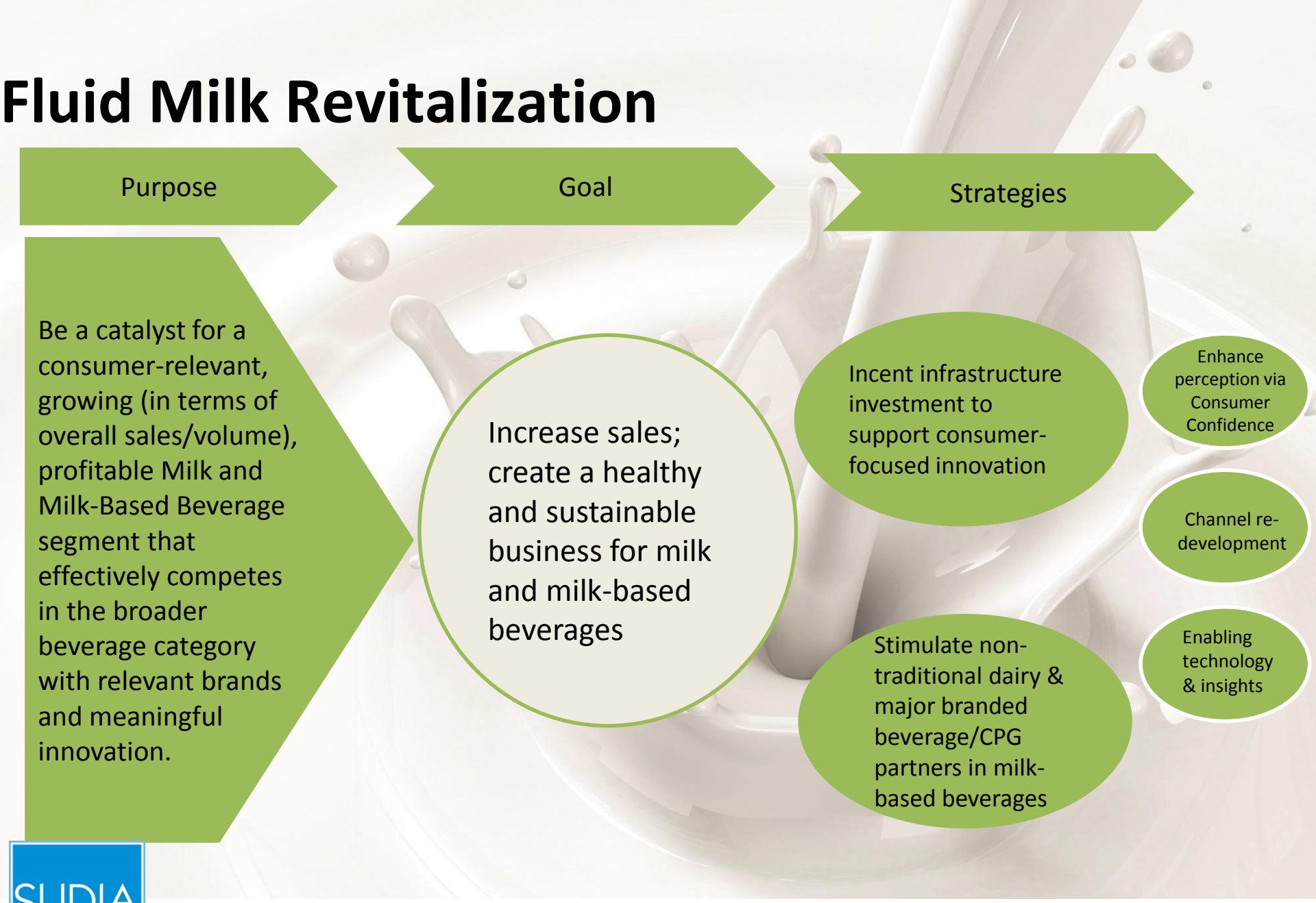
Fluid Milk Revitalization



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DMI DAIRY MANAGEMENT INC.™

DMI Strategic Fit/Partner Criteria

- Shared strategic objectives and values
- Processor/partner intent to invest in new technologies, infrastructure, brand development
  - ESL or aseptic infrastructure
- Top management commitment and ownership
- Top tier retail and other marketplace relationships
- Marketing, advertising and distribution investments and assets

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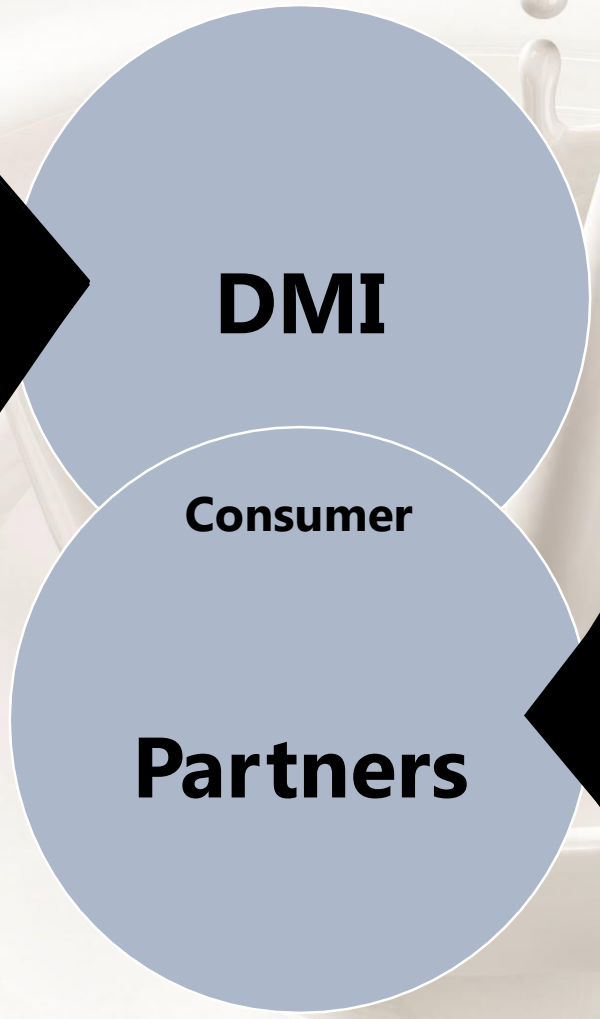
Partnership Framework Gives and Gets

- Research and insights
- Concept development and testing
- Product development
- Formulation support

Staff Expertise:
- Innovation
- Science
- Health professionals

Partner Introductions:
- Marketplace
- Dairy



- Cross-functional teams
- Proprietary product formulation; R&D
- Plant/equipment capital
- Branding/ Packaging design & assessment
- Plant trials
- Trade promotion/sell-in
- Export market
- Marketing/ advertising

SUDIA
The Southeast United Dairy Industry Association, Inc

DMI DAIRY MANAGEMENT INC.™

Unprecedented Investment in Fluid Milk

Short-Term 2012 - 2013	Mid-Term 2014 - 2015	Long-Term 2016 - 2020

7 Fluid Partnerships
$500M+

Exports

- Retail
- Foodservice

Eight short-term processor projects

Well over half a billion dollars in industry investment in fluid milk

DMI DAIRY MANAGEMENT INC.™

Fluid Milk Revitalization
7 Partnerships Announced

Unprecedented investment of more than $500 million in infrastructure, consumer-focused innovation and marketing to revitalize the category

Coca-Cola

fairlife

DARIGOLD SINCE 1918

SOUTHEAST MILK

Shamrock Farms
Real Farm. Real Fresh.

Maryland & Virginia Milk Producers Cooperative Association, Inc.

Kroger

DFA
Dairy Farmers of America

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7 New Partnerships

- Create new, innovative dairy products
- Breakfast, digestive health, nutrition supplement innovation
- Explore new channels, including export
- Zero waste dairy aisle

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Coca-Cola and the Dairy Industry:

Investing in Partnership and Opportunity

The Coca-Cola Company

fairlife structure and purpose

Select/ Continental

42.5% Ownership

42.5% Ownership

The Coca-Cola Company

100% Ownership

Minute Maid

fairlife LLC

15% Employee Ownership

Fairlife is a value added dairy business that sells the highest quality milk with the Health & Wellness benefit of naturally higher protein and calcium

Value-Added Dairy Nutrition Proposition

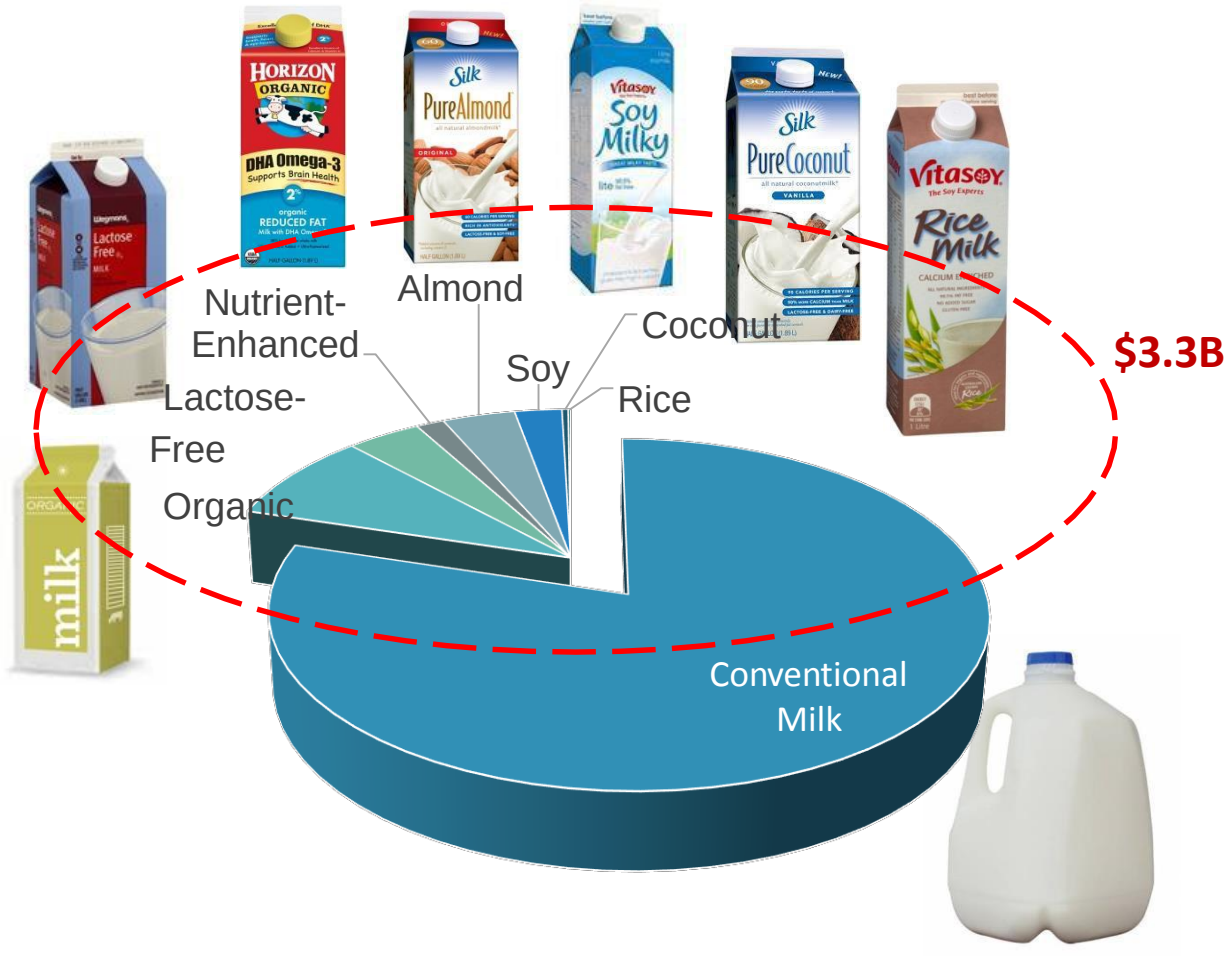
High Quality Milk w/Superior Nutrition

Conscientious Consumers

Able & willing to pay more for products that better align to her views of herself and the world

A Brand with Dairy Family Values

Where Will fairlife Compete?



fairlife will compete and measure its success in $3.3B Value-Added Dairy space

Source: IRI Multi-Outlet 52wks thru 12/23/13

Chilled warehouse distribution & merchandising system

Minute Maid warehouse

ACOSTA SALES & MARKETING

14,500 associates in stores daily

McLANE

100K+ c-stores
30,000 Large & Box stores

CCR reaches <u>38K</u> retail outlets + food service

Test Market Performance Summary

Going National

- Optimized portfolio
- New packaging graphics
- New communications strategy
- 360º marketing campaign

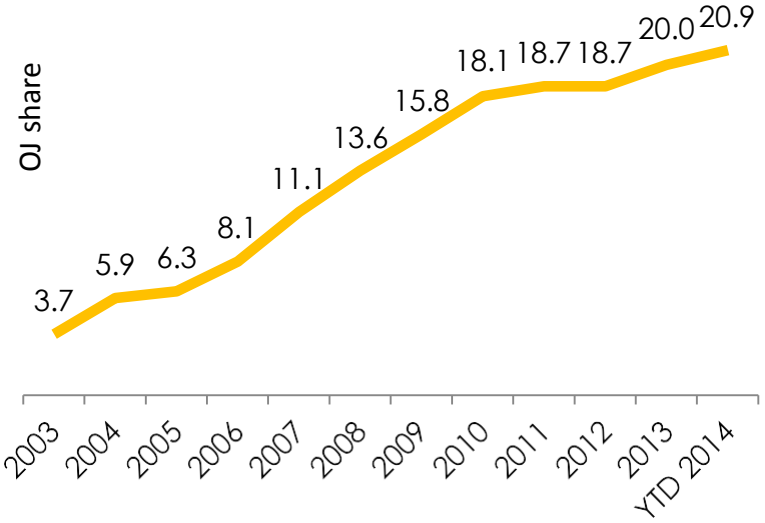
52oz	11.5oz single serve
Chocolate 2%	Chocolate 2% *NEW!*
2%	2% *NEW!*
Skim	
Whole *NEW!*	

Proof that it's Possible to Differentiate in a Commodity Category

Coca-Cola's 13th Billion Dollar Brand!

"As Close to Fresh Squeezed As Possible Without Squeezing it Yourself"

Launched in 2003, reached 20% share in 10 years



Line extensions all lead their segments

Case Study: Coffee Category

From

Large commodity category in slow decline,
Focused on in-home

STARBUCKS COFFEE

New entrant creates new value-added way to experience category: customization

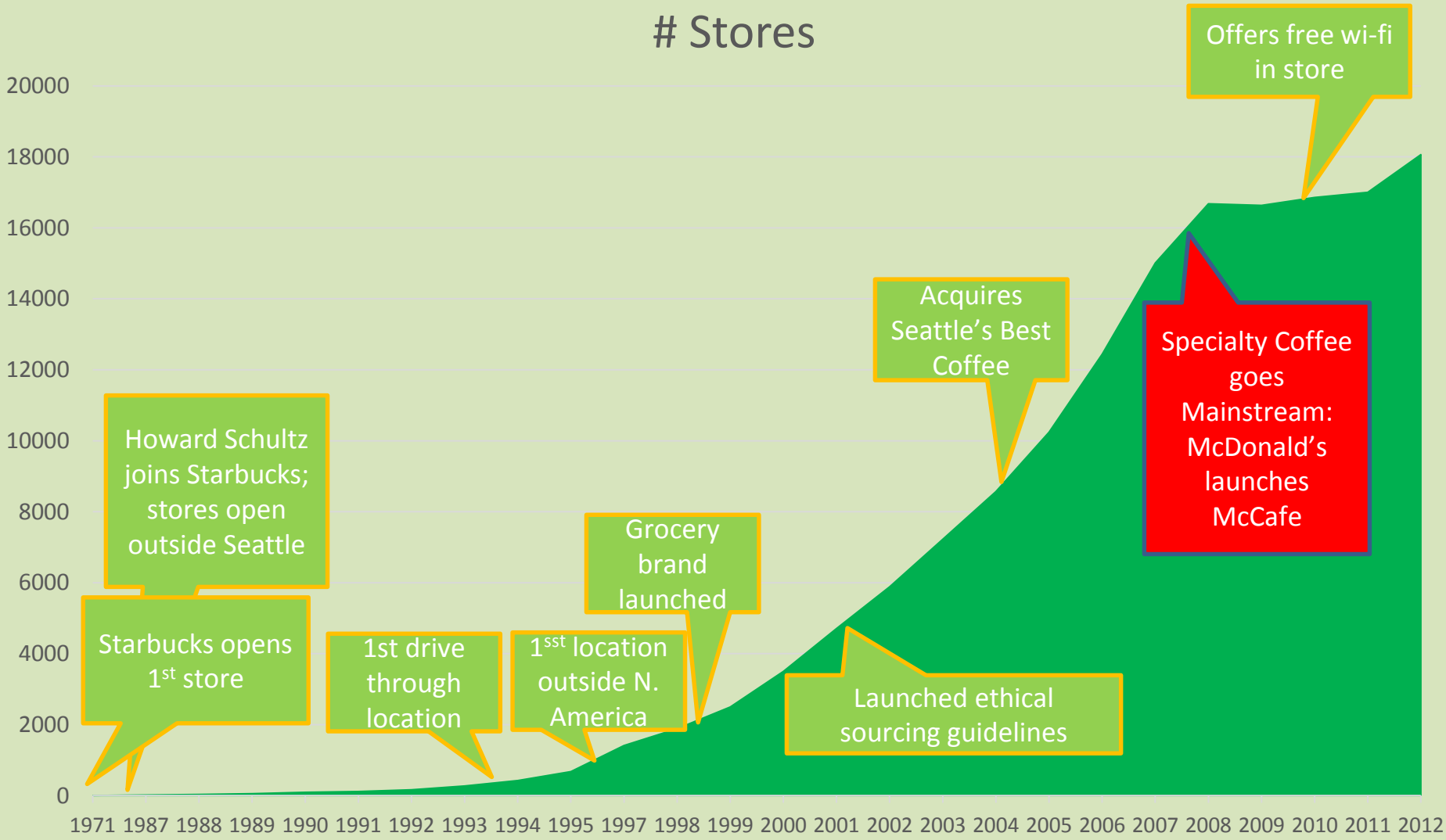
KEURIG

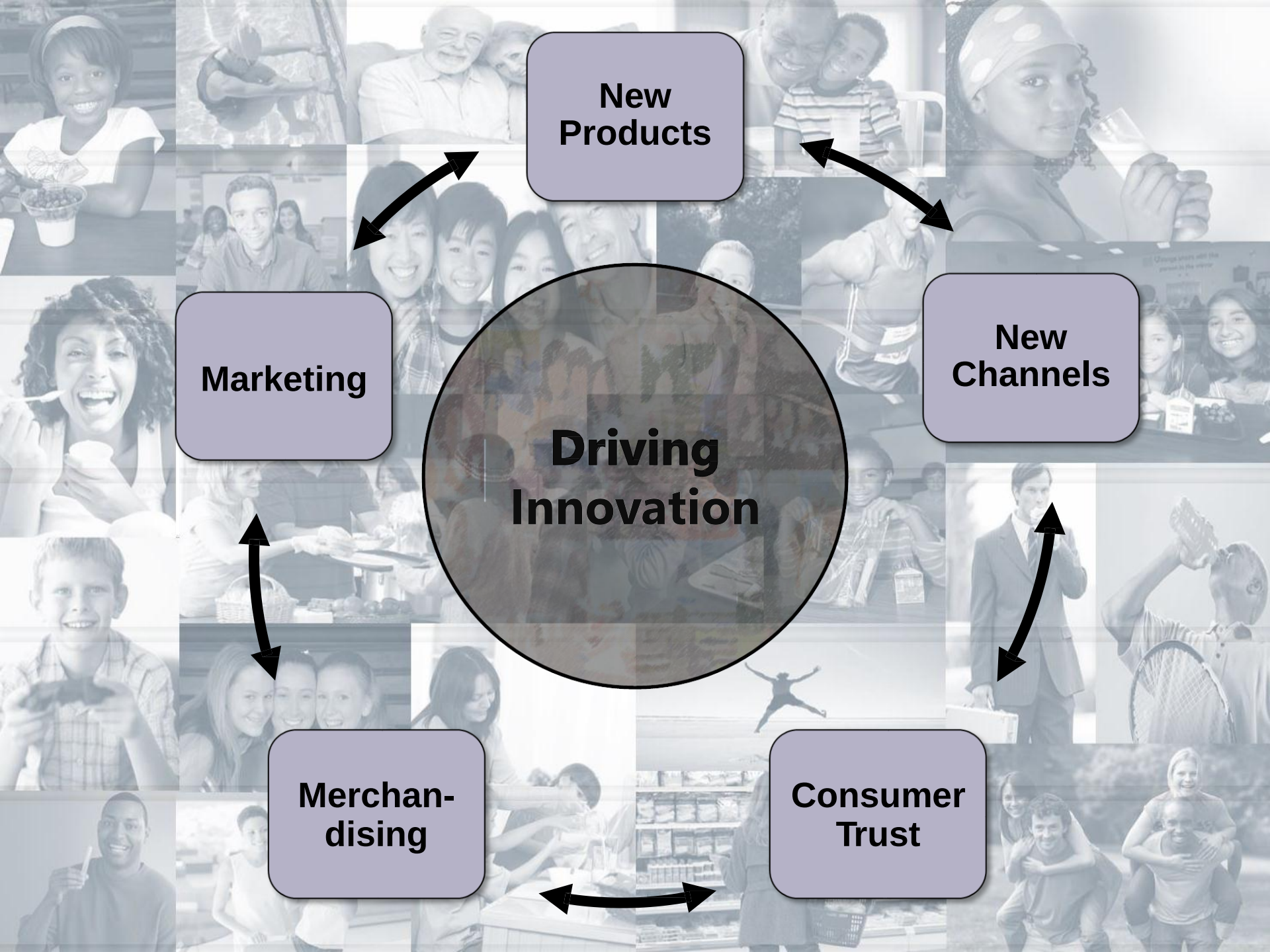
Other entrants come in and grow specialty coffee segment

To

Innovation even at commodity part of the category; core brands still lead sales

Starbucks: An Overnight Success 30+ Years in the Making




New Products
New Channels
Consumer Trust
Merchan-dising
Marketing
Driving Innovation

Reinventing the Fluid Milk Category

Thank you!

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WELL-BEING OF DAIRY CALVES

Feeding and Housing Considerations

Dr. Stephanie Hill Ward
Department of Animal and Dairy Sciences
Mississippi State University


3709

What do we need to consider?

- Are we doing it right?
  - Calf health
  - Calf performance (gains, subsequent lactation)
  - Cost of raising replacements
- What does the consumer think?
  - Do our standard practices measure up?
- What is the ultimate goal for the heifer?
  - Are we feeding her to meet her genetic potential?

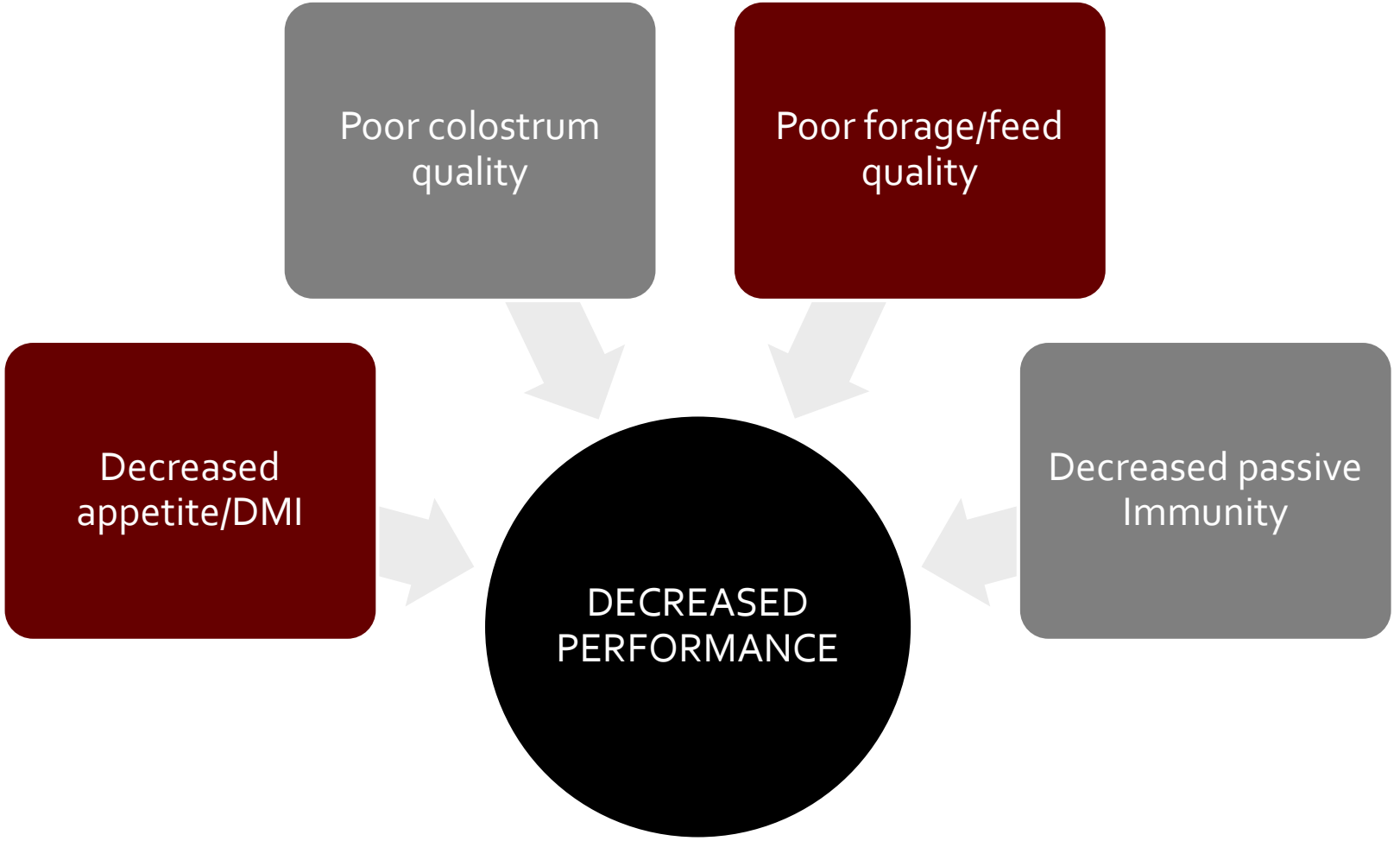
Considerations

- Calf Environment
  - Housing type
  - Heat/Cold stress
- Calf Behavior
  - Group feeding
  - Auto-feeders
  - Feed amounts

Is heat stress a problem?

- Potential negative impacts of heat stress on dairy calves and heifers not realized immediately
  - Greater observations in cold stressed animals
- Decreased ADG and mature body weight (16%: West, 2003)
- Decreased first lactation potential
- Great deal of money, time, and labor spent on improved genetics
  - Can they live up to their potential in hot, humid climates?

Heat Stress Factors



Best Practices for Alleviation

Nutritional Management

Physical modification of environment

Improved genetic selection

Beede and Collier, 1986

Housing Strategy: Calves

- Hutches are most common housing type on dairies in SE
  - Followed by calf barns and pasture
- Extremely hot in summer time but only way to escape solar radiation
- Air flow can be limited
- Some options for cows are just not feasible for calves in hutches
  - i.e. fans or misters
  - Could be utilized in calf barns
- Pasture rearing presents entire new set of concerns

Hutches: with and without shade

Spain and Spiers, 1996	Shade	Unshaded	P<
Ambient, °C	29.5	31.5	0.001
Hutch, °C	29.7	32.0	0.001
Rectal, °C	38.8	39	0.131
Ear Skin, °C	34.3	36.9	0.001
Rump Skin, °C	35.7	38.0	0.004
Respiration Rate, bpm	47.3	57.7	0.007

Coleman et al., 1996	Shade	Unshaded	P<
Ambient, °C	31.5	32.7	>0.05
Hutch, °C	31.8	33.1	0.01
Rectal, °C	39.7	40.0	0.05
DMI, kg/d	0.28	0.42	0.05
ADG, kg/d	0.51	0.61	0.06
FE (f:g)	0.53	0.70	0.10

Hutches: Insulated vs. not

- Shade over hutches provided better control of temperatures and lessened the impact of ambient temperature changes on hutch environment
- Results are conflicting on rectal temperature and respirations rates
  - No impacts on ADG
- Insulating hutches may provide greater control of immediate hutch environment
- Aluminum foil/polyethylene insulation to determine effects on hutch environment
- Insulation decreased respiration rates in one experiment, but not in the second (Carter et al., 2014)
  - No effect on ADG
- Mean daily peak temperatures were decreased in insulated hutches and interior hutch temperature was less effected by ambient temperature (Binion, et al., 2014)

Carter et al., 2014; Binion et al., 2014

Housing Strategy: Calves

	Hutches	Nursery	P<	Nursery, Straw	Nursery, sand	Hutch, sand	P<	Nursery - Fan	Nursery + Fan	P<
ADG, kg/d	0.56	0.60	0.05	0.53	0.48	0.46	0.02	0.40	0.50	0.04
DMI, kg/d	0.79	0.83	0.29	0.69	0.62	0.52	0.03	0.58	0.60	0.78
MR Intake, kg/d	0.47	0.47	-	0.47	0.47	0.47	-	0.47	0.47	-
Feed Efficiency (F:G)	0.44	0.46	0.05	0.45	0.44	0.46	0.01	0.38	0.46	0.02
Fecal Scores	1.5	1.6	0.13	2.1	2.2	2.5	0.07	2.1	2.1	0.89

Hill et al., 2011

Housing Strategy: Calves on pasture

- Cooling strategies? Is it necessary?

Housing Strategies: Heifers

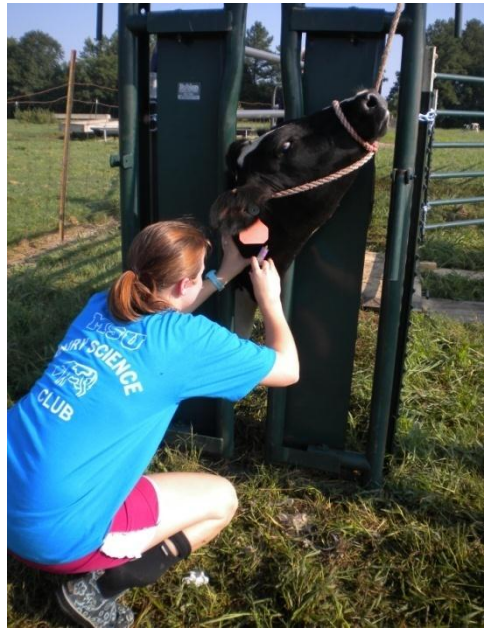
- Case study on different shade types for yearling heifers
- Trees
- Super hutch, corrugated metal super hutch
- Shade cloth

Housing Strategies: Heifers

- Each heifer was fed ~ 3.3kg grain/day of a commercial heifer mix
  - 23 kg/d/paddock
  - 98% DM, 19% CP, 36% NDF, 13% ADF
- In addition to grain, heifers had access to grass and hay for grazing
- Each heifer had access to free choice water

Housing Strategies: Heifers

- **Weekly measurements**
  - BW, WH, HH
  - Rectal temperature
  - Jugular blood
    - Hematocrit
    - Total Protein (TP)
  - Feed and orts samples
    - Proximate analysis



Housing Strategies: Heifers

- **Heifers were observed twice weekly for 12 hours**
  - Thursdays and Fridays
  - 6:00am to 6:00pm
  - Ambient temperature measured every two hours
- **Every 30 minutes each heifer's activity was recorded**
  - In shade or not
  - Laying, grazing, or drinking
- **Total heifer shade hours**
  - # of heifers in shade X # of hours spent in shade
  - Brown-Brandl et al., (2005)

Results: Measurements

Item	Trees	Hutch	Cloth	SEm	P<		
					SH	WK	SHxWK
BW (kg)	242.7	**247.9**	232.8	4.76	**0.08**	0.01	0.01
ADG (kg/d)	0.74	0.62	0.55	0.07	0.22	0.22	0.22
WH (cm)	114.95	115.28	112.38	1.45	0.31	0.01	0.73
HH (cm)	123.37	122.45	120.21	1.40	0.27	0.01	0.65

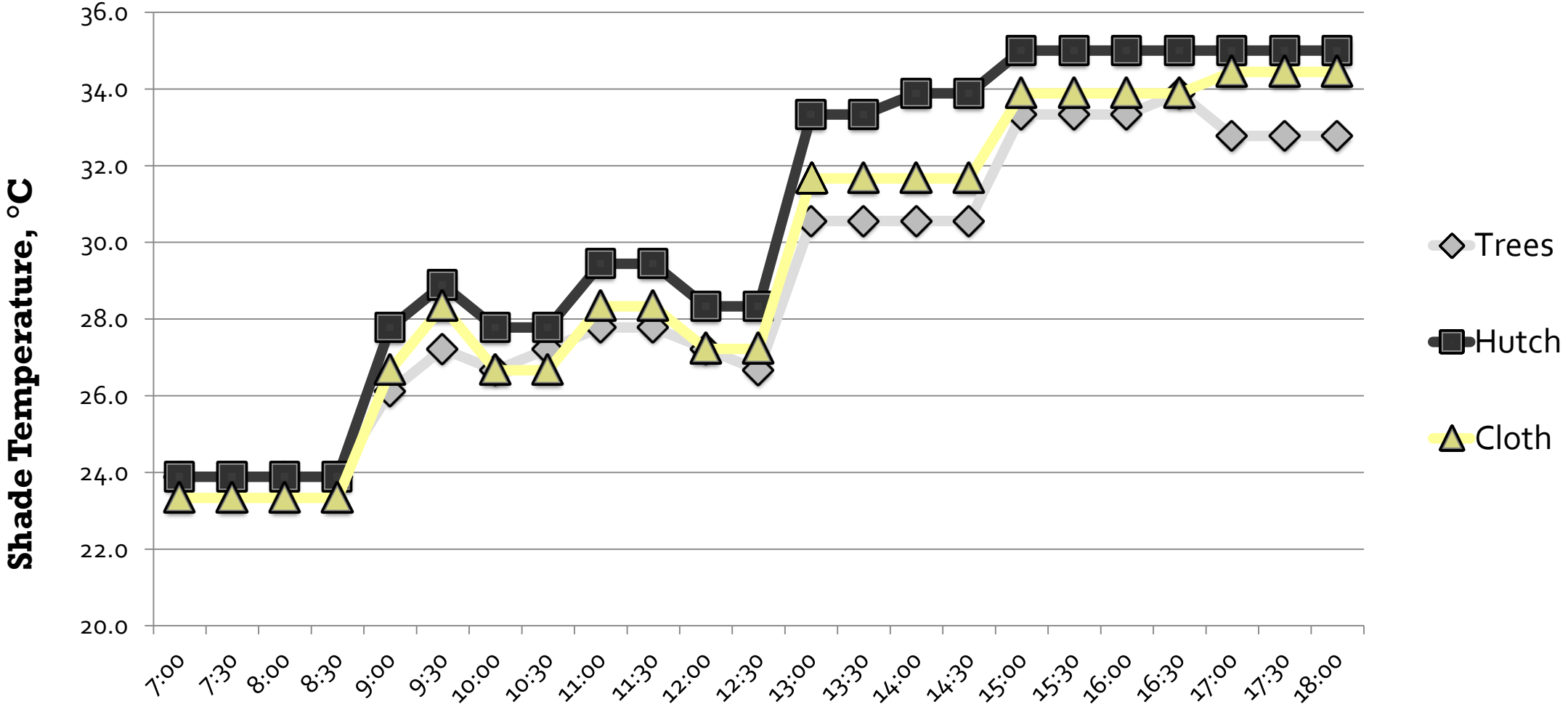
- Shade type had no significant effect on BW, ADG, WH, or HH

Results: Blood Samples

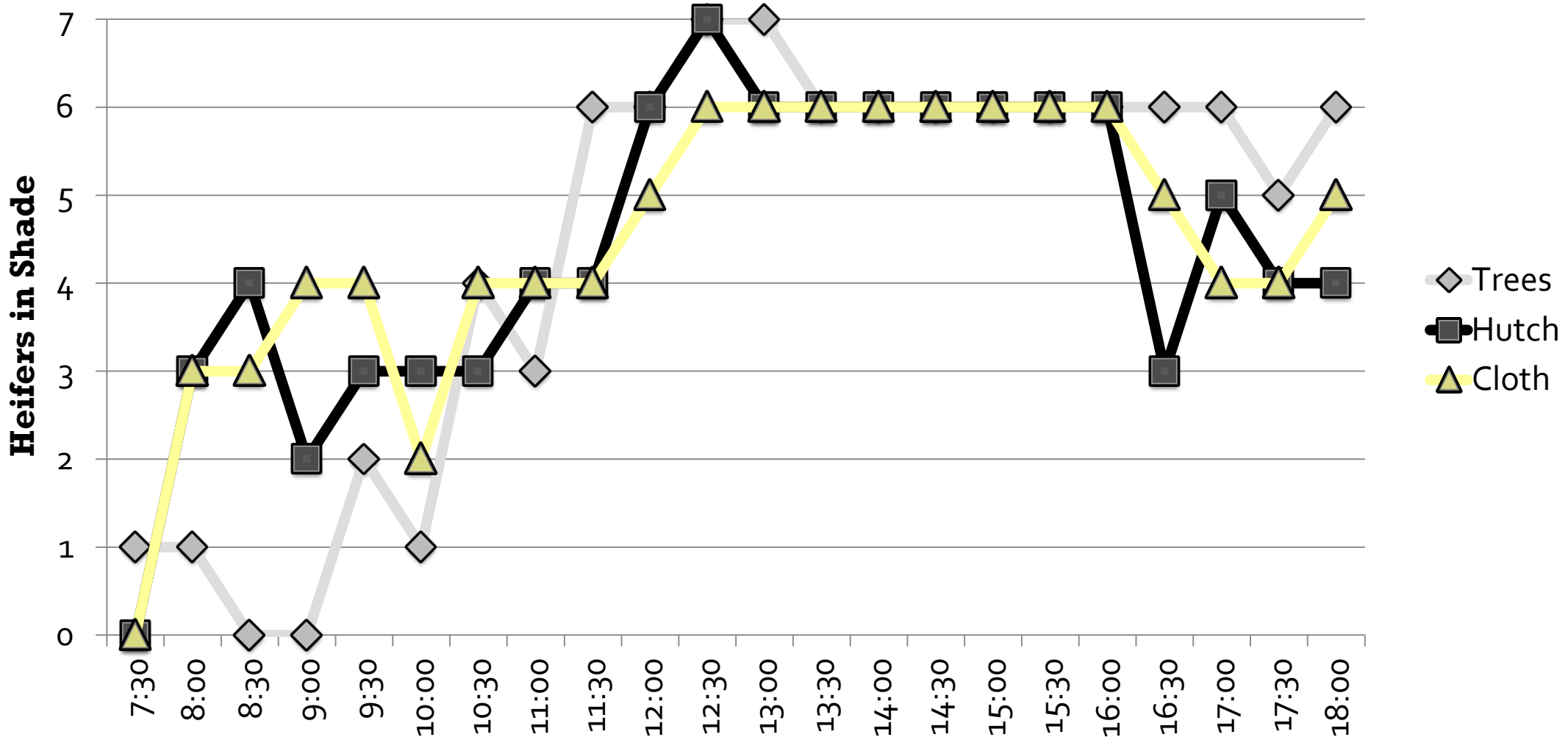
Item	Trees	Hutch	Cloth	SEm	P<		
					SH	WK	SH*WK
Hematocrit, %	33.6	32.8	33.5	0.7	0.74	0.09	0.36
Total Protein	7.13	7.35	7.11	0.12	0.22	0.09	0.27
Rectal Temp (°C)	38.8	38.8	38.8	0.06	0.89	0.01	0.01

- Shade type had no significant effect on HT or TP

Results: Shade Temperature



Results: Observations



Results: Observations

Item	Trees	Hutch	Cloth	SEm	P<		
					SH	Time	SHxTime
SH Temp (°C)	28.9	30.4	29.4	0.51	0.01	0.01	1.00
Lying Time (hrs)	**1.38**	**0.96**	**1.14**	**0.09**	**0.004**	**0.01**	**0.34**
Drinking Time (hrs)	0.13	0.23	0.20	0.04	0.25	0.01	0.99
Grazing Time (hrs)	1.48	1.79	1.69	0.10	0.13	0.01	0.77

- Heifers in TREES spent the most time lying and heifers in HUTCH spent the least

Housing Strategies: Heifers

- Cooling dry cows, even if only during hottest time of day/season, has resulted in:
  - Greater calf birth weights
  - Improved colostrum quality
  - Decreased metabolic disorders
- The same could be the case for older heifers
  - Heifers housed in hot environment had lowered IgG in colostrum (by 23%, Nardone, et al., 1997) compared to those in a cool environment
  - Heifers sprayed with water at the hottest part of the day had decreased respiration rates and increased gains (26%) compared to those not cooled (Marai et al., 1995)

Summary

- Options for cooling animals typically housed on pasture are limited and heifers seem to prefer natural sources of shade
  - Concerns on mud and increased risk for teat damage or mastitis during lactation
- Modification of hutches to allow for better ventilation or to reduce solar radiation improves hutch temperatures, but has little effect on growth or intake
  - Impact on subsequent lactation performance?
- Removing calves from hutches and housing in barn could alleviate heat stress issues, but increase risk for respiratory disease
- No silver bullet.
  - Combination of nutritional, environmental, and genetic modification to address issue

Housing 'Must Have's'

- Comfort
- Good ventilation
- Labor Efficient
  - Easy to clean during and between calves
- Cost efficient

Considerations

- Calf Environment
  - Housing type
  - Heat/Cold stress
- Calf Behavior
  - Group feeding
  - Auto-feeders
  - Feed amounts

What is biologically normal calf?

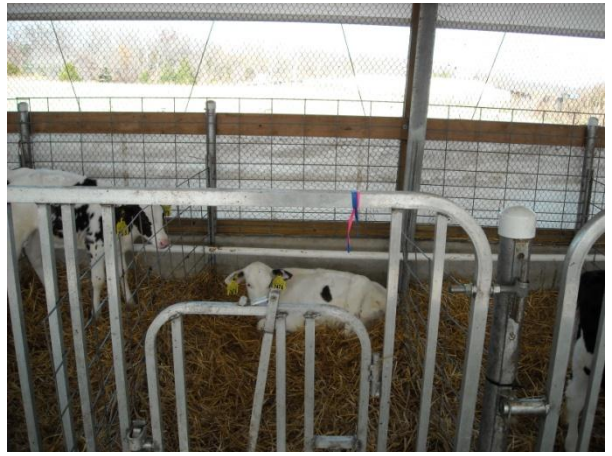
- Allowed to suckle from mother
- Consumes many meals per day
- No limit on milk consumption (within reason)

Why do we…?

- Remove from the mother after birth?
- Hand feed, 1 to 3 x per day
- Limit milk consumption

Housing- Group vs Individual

- Research has shown that behavior is different
- Calves in group housing spend more time standing up and moving around
- Socialize more
  - Helps with post weaning intake



- Individual and isolated calves harder transition after weaning

Housing- Group vs Individual

- Research has also shown that weight gains are improved with group (paired) housing

- Defeat the ‘weaning slump’ in group housing
  - Period post weaning when calves transition to dry, group feeding
  - Tend to decrease intake and lose BW

- Still potential to increase risk for disease in not well managed

Group v. Individual Housing

- Calves housed in small space, singly were not as active as others
- Calves housed in groups remained more active in weeks 4 and 6
- Calves housed individually were more active when space increased

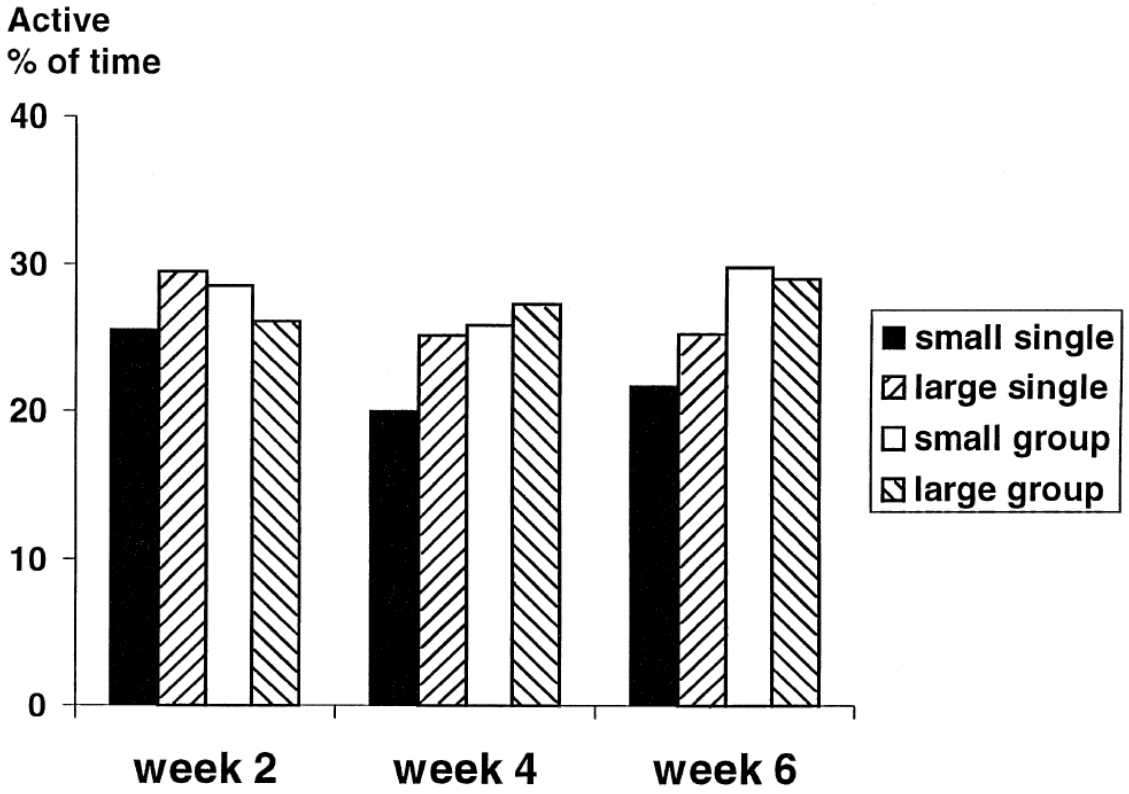


Fig. 2. Active time (% of total time) in the four types of pens in weeks 2, 4 and 6.

M.B. Jensen et al., Applied Animal Behaviour Science 56 (1998) 97–108

Group v. Individual Housing

- Calves were either paired or housed individually
  - One hutch or two
- Fed 2x or 3x per day
  - All fed 1.5 ga of whole milk daily
- Measured growth and behavior
- Funded through undergraduate research program

Paired, Fed 2 or 3 x/d- Intake

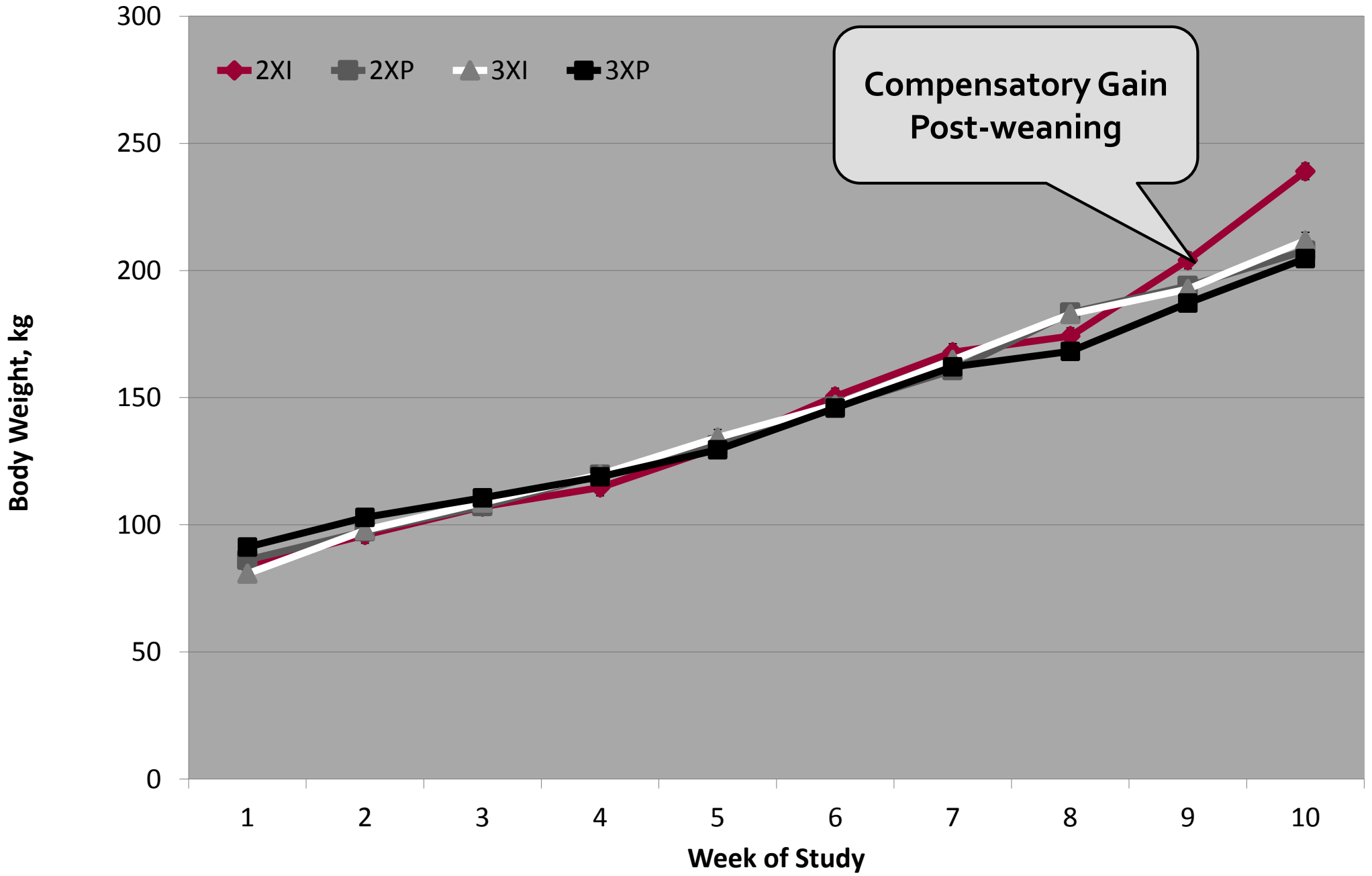
	Individual			Paired			P<		
	2X	3X	SEm	2X	3X	SEm	Freq	Housing	Frq*Hse
Total DMI, kg/d	1.37	1.40	0.04	1.37	1.29	0.03	0.47	0.13	0.15
Starter DMI, kg/d	0.76[a]	0.83[a]	0.03	0.88[b]	0.81[a]	0.02	0.91	0.10	0.01
Milk replacer intake, kg/d	0.56[a]	0.58[a]	0.005	0.58[b]	0.59[b]	0.004	0.22	0.01	0.90

- Calves housed individually refused more milk than those housed in pairs
- Speaks to competition aspect of having a hutch mate

Paired, Fed 2x or 3x/d - Health

	Individual			Paired			P<		
	2X	3X	SEm	2X	3X	SEm	Freq	Housing	Frq*Hse
Fecal Score	1.10[a]	1.24[c]	0.04	1.54[b]	1.52[b]	0.04	0.18	0.01	0.05
Respiratory Score	1.03[a]	1.04[a]	0.01	1.01[b]	1.01[b]	0.01	0.81	0.04	0.47

- Scale 1 to 5, 1 = no problem, 5 = severe problem
- Calves paired had greater fecal scores
- Calves fed 2X had greater # days of a score of 3
- Respiratory scores were not different


300
250
200
150
100
50
0
2XI
2XP
3XI
3XP
Compensatory Gain
Post-weaning
Body Weight, kg
1
2
3
4
5
6
7
8
9
10
Week of Study

Paired, Fed 2x or 3x/d - Behavior

- Latency to feed once weaned
- No difference in calves housed in pairs
- Calves fed 3x per day found and consumed feed faster than those fed 2x/d
  - both groups found feed within 40 min of release

- Calves housed in pairs:
  - Spent more time at feeder
  - Increased starter intake
  - Had greater # visits to feeder
  - Demonstrated consistent weight gains
- Calves housed individually:
  - Lost weight initially
  - Did not compete well for feed

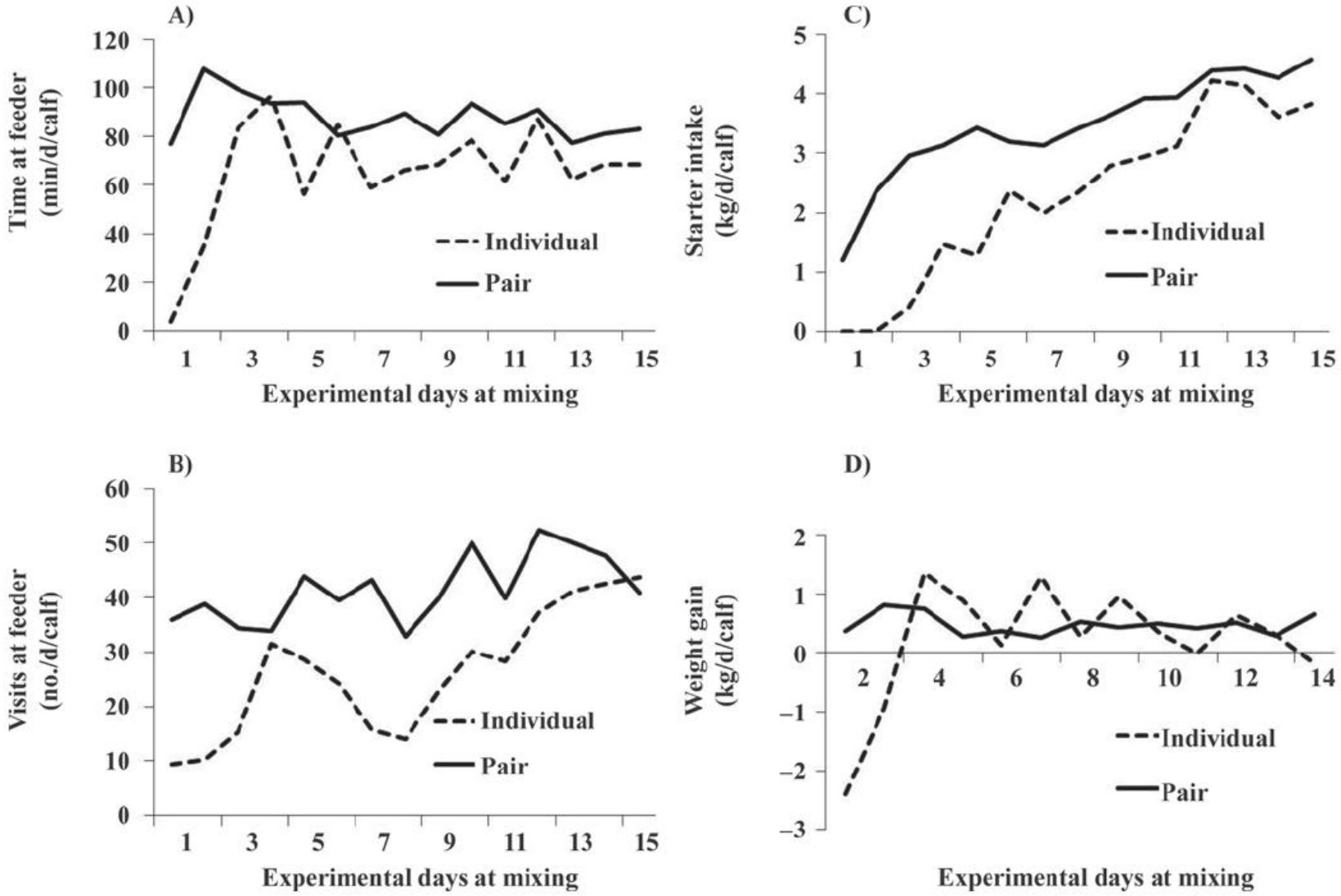


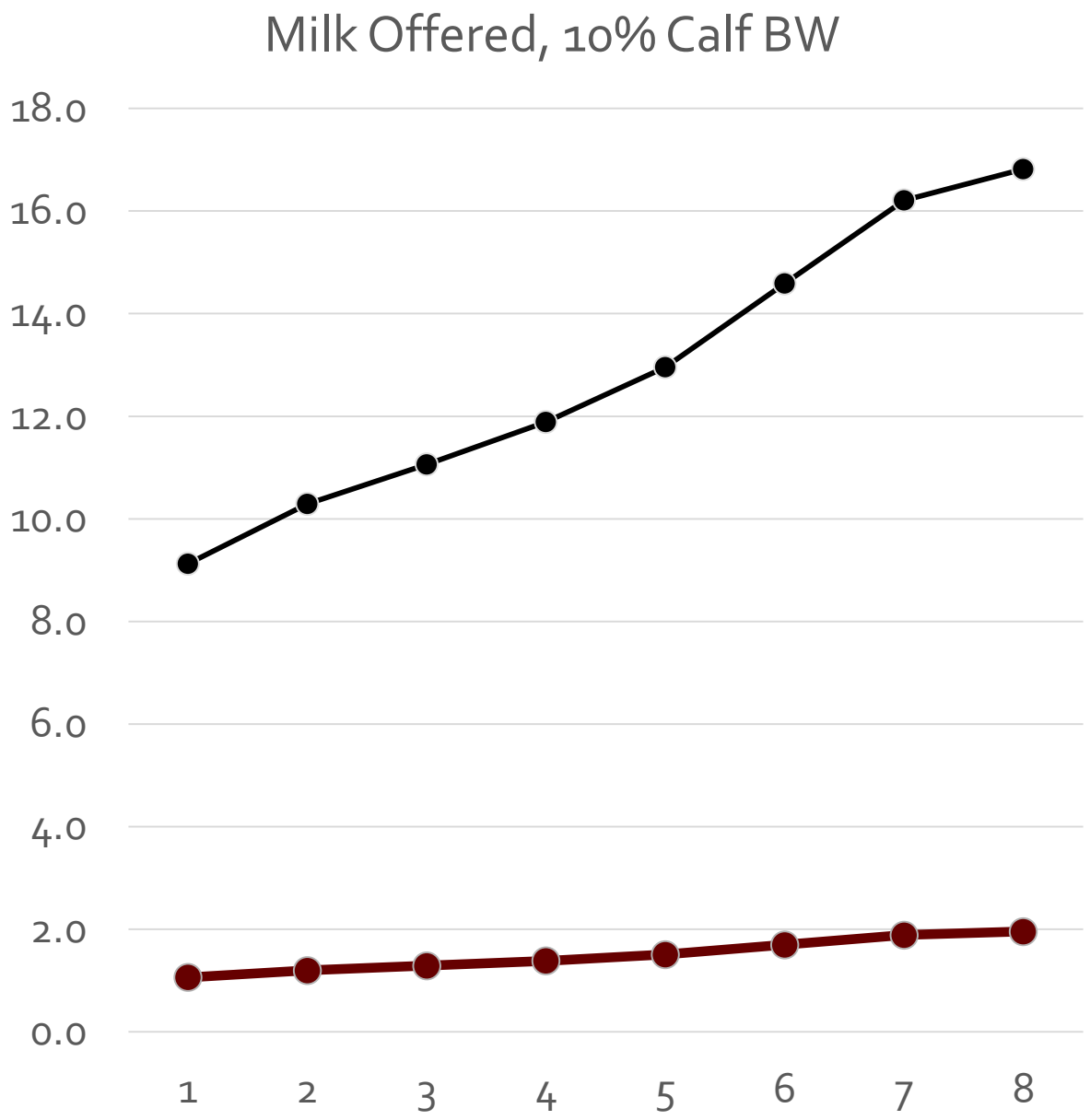
Figure 3. The effect of mixing (d 56 to 70) for pair (n = 6 pairs) and individually (n = 6 calves) housed dairy calves on A) mean duration of visits to the starter feeder (min/d per calf); B) mean number of visits to the starter feeder (no./d per calf); C) mean starter intake/visit (kg/d per calf); and D) mean growth rate (kg/d per calf).

How many is too many?

- Most research shows groups under 10 are least likely to increase risk for respiratory disease
- Svensson and Lieberg (2006) showed that groups of 12-18 had greater incidence of diarrhea and risk for respiratory diseases
- Housing in pairs gives social benefits, but will decrease risk of spreading respiratory disease

Feeding

- Milk replacer v. whole milk v. waste milk
- How much should you feed?
- 1lb milk solids, on average, is not enough
- If we feed according to BW



Auto Feeders

- Auto feeders allow calves to suckle as often as they want, but still control intake amount
- Reduce labor, in theory
- Feed greater number of calves in less time
- Provides social setting
- Starter machines may not be as reliable as milk feeders
- Necessary to keep machine clean and maintained
  - Could add more skilled labor needs

Auto Feeders

- Studies conducted by Land O' Lakes showed:
- Type of milk fed still makes a difference
  - Calves fed a 20/20 approached the feeder more often than those fed 28/20
- Same calves vocalized more often and waited for more milk
  - Similar to Danish and Canadian research with auto feeders
- Less error in milk replacer mixing and delivery
- Can spend more time managing calves than just feeding calves

Earleywine, Johnson, Stephas; Hoard's Dairyman: Heifer & Calf

Thank You!

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