

Manual Backflush Made Easy



MILKING EQUIPMENT

The Most Important Machine On The Dairy Farm

The most used and abused
machine on the dairy farm.

Milk time evaluation is a must!



The Milking Machine

Milk Path is most important

Non-restricted flow critical

No lift wanted in flow

**Rubber goods: Condition and
milk hose length**



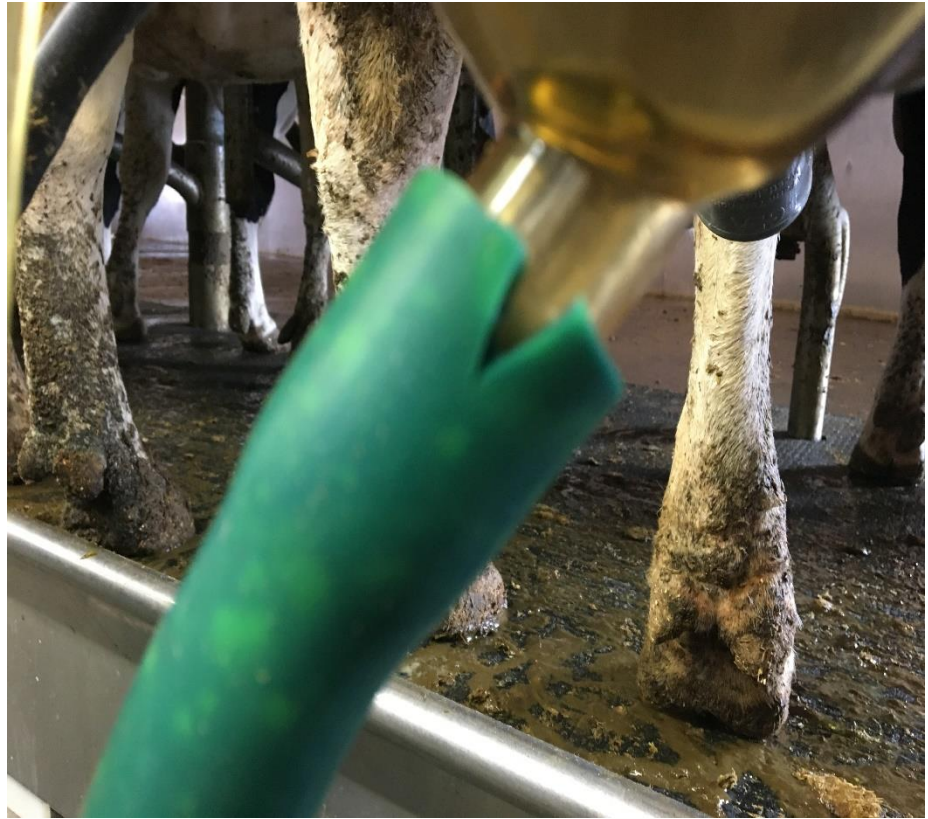
Milk Hose Length

- There are very few milking systems of any type that cannot benefit from shortening milk hoses.
- Does not have any negative impact and allows for faster milking.

Milk Hose



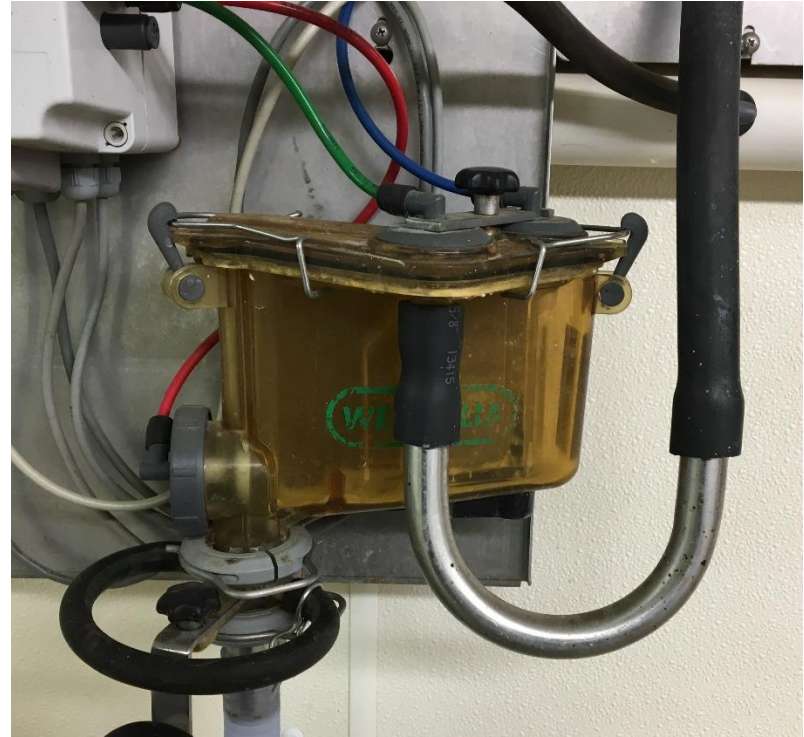
Milk Hose



Milk Hose



Milk Hose Fixes



Subway Parlors



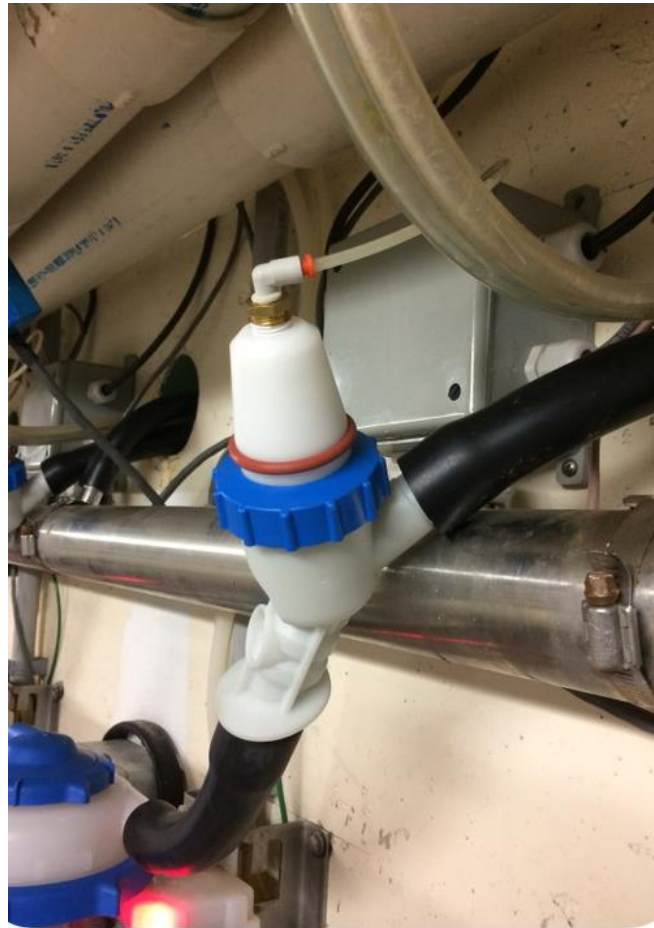
Old Shut Off Devices



Pinch valves are old technology



Flow Shut Offs



Less machine on time
Timely gasket change critical



Pulsator Hoses



Dynamic Testing

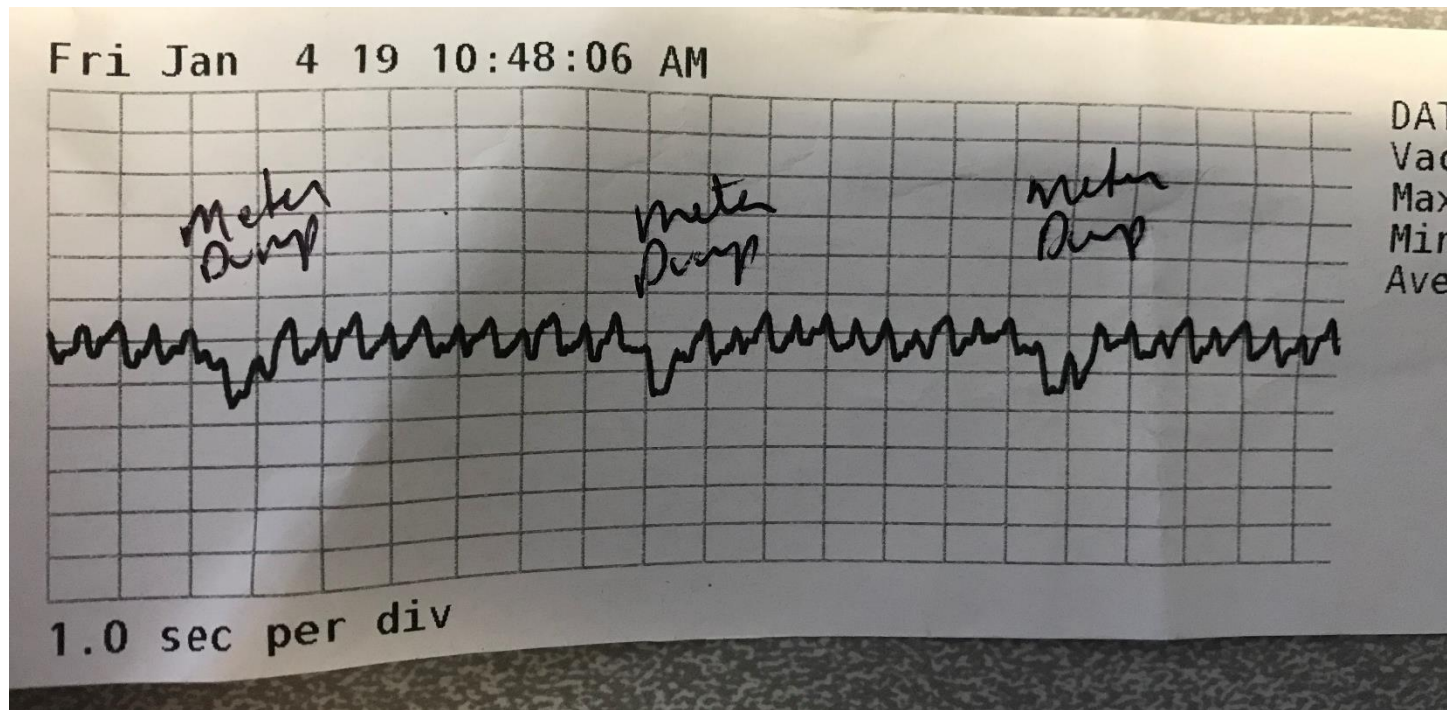
The only acceptable way to test a milking system is while the cows are actually milking.

All other vacuum readings are just guesses or estimations



Dynamic Testing

Only way to find real issues



Vacuum Level

The vacuum level of the milking system is not important!

The vacuum level in the claw while the cow is milking is critical!



Vacuum Level

Must be able to monitor



Not an issue until change greater 0.2 inches



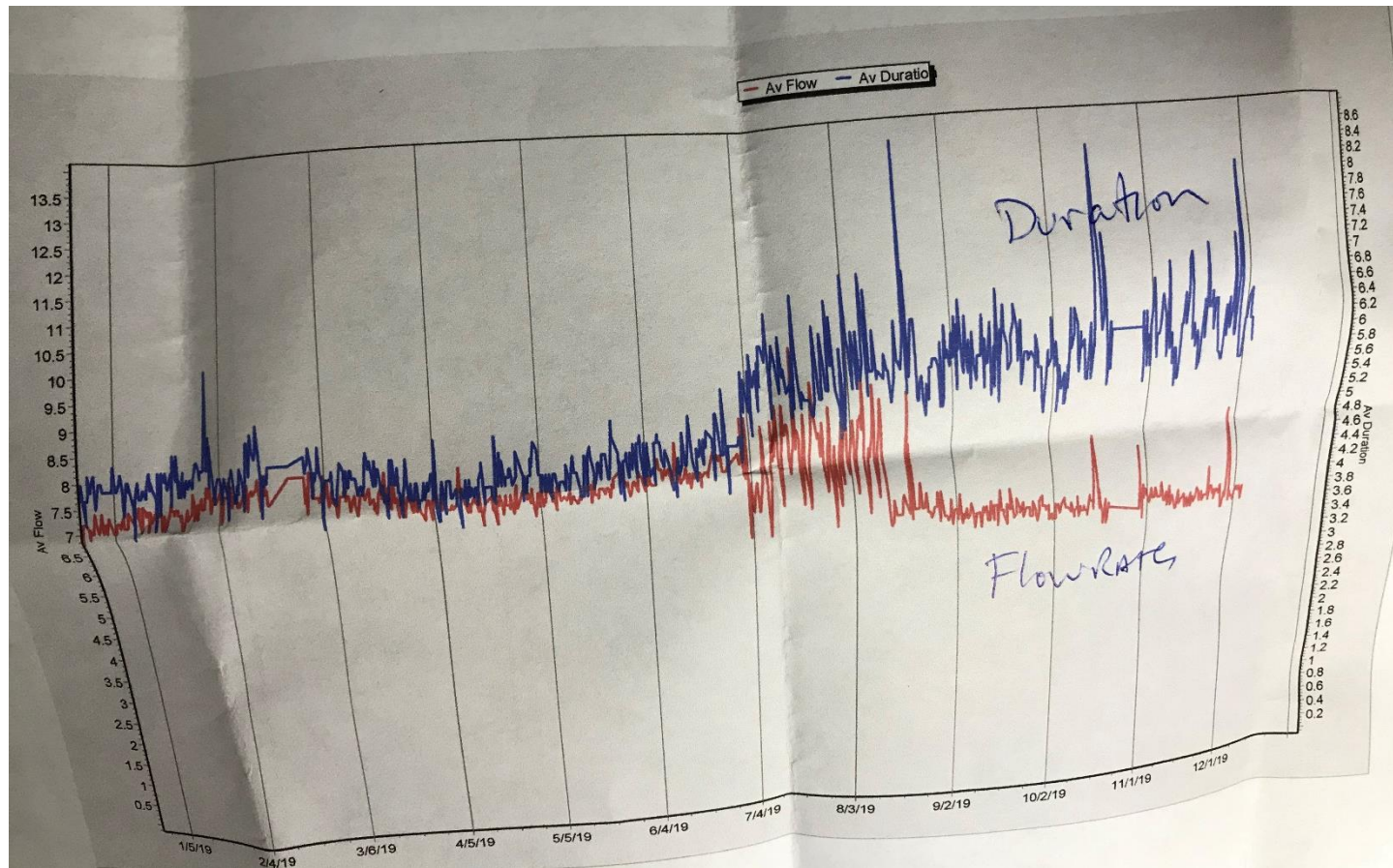
Vacuum Level

Most dairies do not monitor vacuum level each milking

Have no idea what the vacuum level really is and a very common problem is vacuum is much different than normal which leads to serious issues



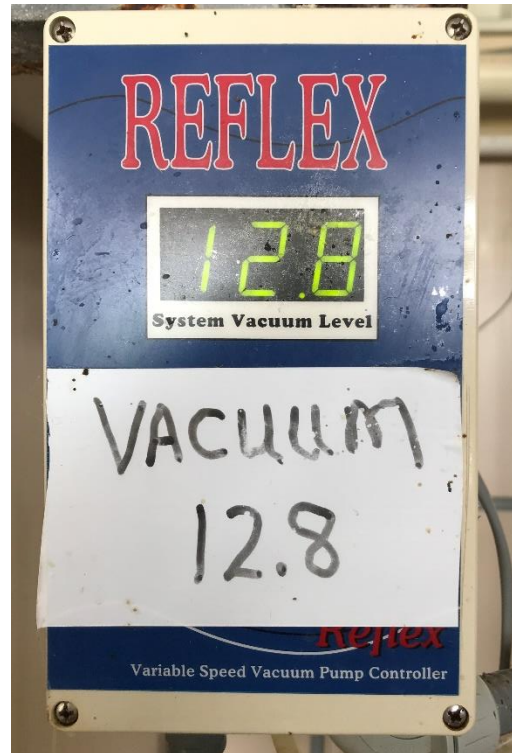
Vacuum Level



Dairy complains milking slowed down and records showed He was correct even though monthly testing by dealer Was supposed to be 13.4 Actually tested at 12.8 inches



Vacuum Level



Dairies are shocked when vacuum change is the issue



Vacuum Level

Vacuum Reading
MONTH: 3

Registro del nivel de vacío

Mes	Turno # 1	Turno # 2	Turno # 3
	Nivel del vacío	Nivel del vacío	Nivel del vacío
1/1/2020	13.6	X	13.6
1/2/2020	13.6	X	13.6
1/3/2020	13.6	X	13.6
1/4/2020	13.6	13.6	13.6
1/5/2020	13.6	13.6	13.6
1/6/2020	13.6	13.6	13.6
1/7/2020	13.6	13.6	13.6
1/8/2020	13.6	13.6	13.6
1/9/2020	13.6	13.6	13.6
1/10/2020	13.6	13.6	13.6
1/11/2020	13.6	13.6	13.6
1/12/2020	13.6	13.6	13.6
1/13/2020	13.6	13.6	13.6
1/14/2020	13.6	13.6	13.6
1/15/2020	13.6	13.6	13.6
1/16/2020	13.6	13.6	13.6
1/17/2020	13.6	13.6	13.6
1/18/2020	13.6	13.6	13.6
1/19/2020	13.6	13.6	13.6
1/20/2020	13.6	13.6	13.6
1/21/2020			
1/22/2020			
1/23/2020			
1/24/2020			
1/25/2020			
1/26/2020			
1/27/2020			
1/28/2020			
1/29/2020			
1/30/2020			
1/31/2020			

January 2020

Dairies do monitor and seems boring until a change occurs



Dynamic Testing

If the milking system has not
been tested while it is milking
COWS,

IT HAS NOT

been properly tested!



Proper Claw Vacuum

**Whatever Line Vacuum it Takes
to Provide 11.5-12.5 inches at
the Claw During Peak Flow**

**The Closer to 12-12.5 inches the
better!**



Liner

The real key is do you have the right vacuum and pulsation for the liner you are using?

Not all liners are the same and all have their own needs



Liner Performance Mapping

Claw Vacuum		b-phase (ms)						
Kpa	"Hg	300	350	400	450	500	550	600
34	10.0	65%	70%	74%	77%	80%	81%	81%
36	10.5	68%	73%	77%	80%	81%	82%	82%
37	11.0	71%	75%	79%	82%	84%	84%	84%
39	11.5	74%	78%	82%	84%	86%	86%	86%
41	12.0	77%	82%	85%	87%	88%	88%	88%
42	12.5	81%	85%	88%	90%	91%	91%	90%
44	13.0	85%	89%	91%	93%	94%	93%	92%
46	13.5	89%	93%	95%	96%	97%	96%	94%
47	14.0	93%	97%	99%	100%	100%	99%	97%
High/small teats		numbers indicate % of maximum average flow rate						

Pulsation

B phase should be 485-550
milliseconds

D phase should be greater than
220 milliseconds

LOADED



Pulsation

Difference between loaded and
Unloaded inflations can be
20-50 milliseconds

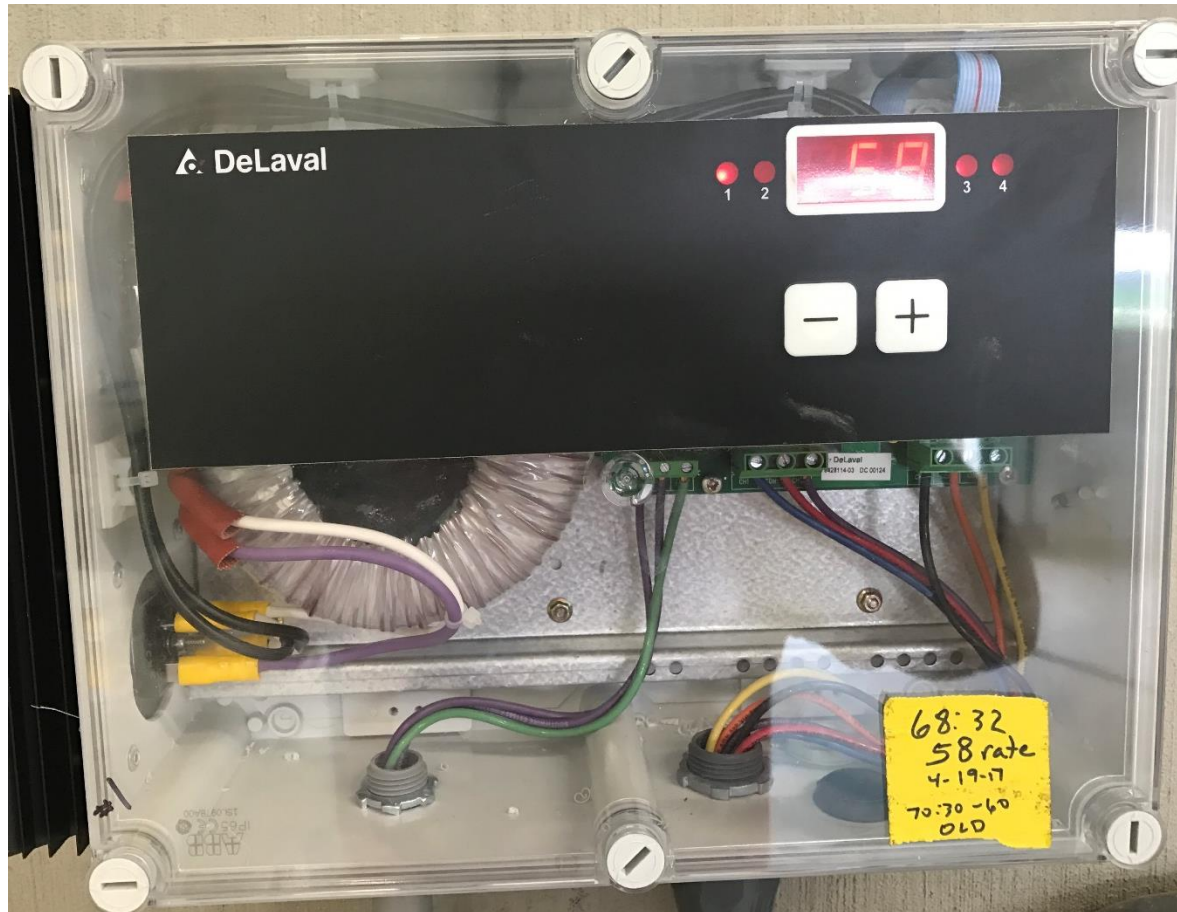
Must set pulsation ratio and
rate to achieve correct
B and D phases

Depends on liners too



Pulsation

New controllers allow lot of adjustment to rate and ratio



Pulsation

Decrease pulsator failure with proper sand filters



Not all fuel filters created equal



Pulsation

Proper filters for pulsators

- GEA
- Baldwin Fuel Filter BF-7736
- WIX Fuel Filter 33002
- Test pulsator D phase with and without to check for air restriction



Automation

Not just about quality milk
But efficient milking

- Milk cows fast
- Milk cows completely
- Milk cows gently



Automation

Not just about quality milk
But efficient milking

- Healthy teat ends
- More pounds milk per stall per hour
- Herds getting 35 to 40 pounds per cow per milking in less than 4 minutes



Automation

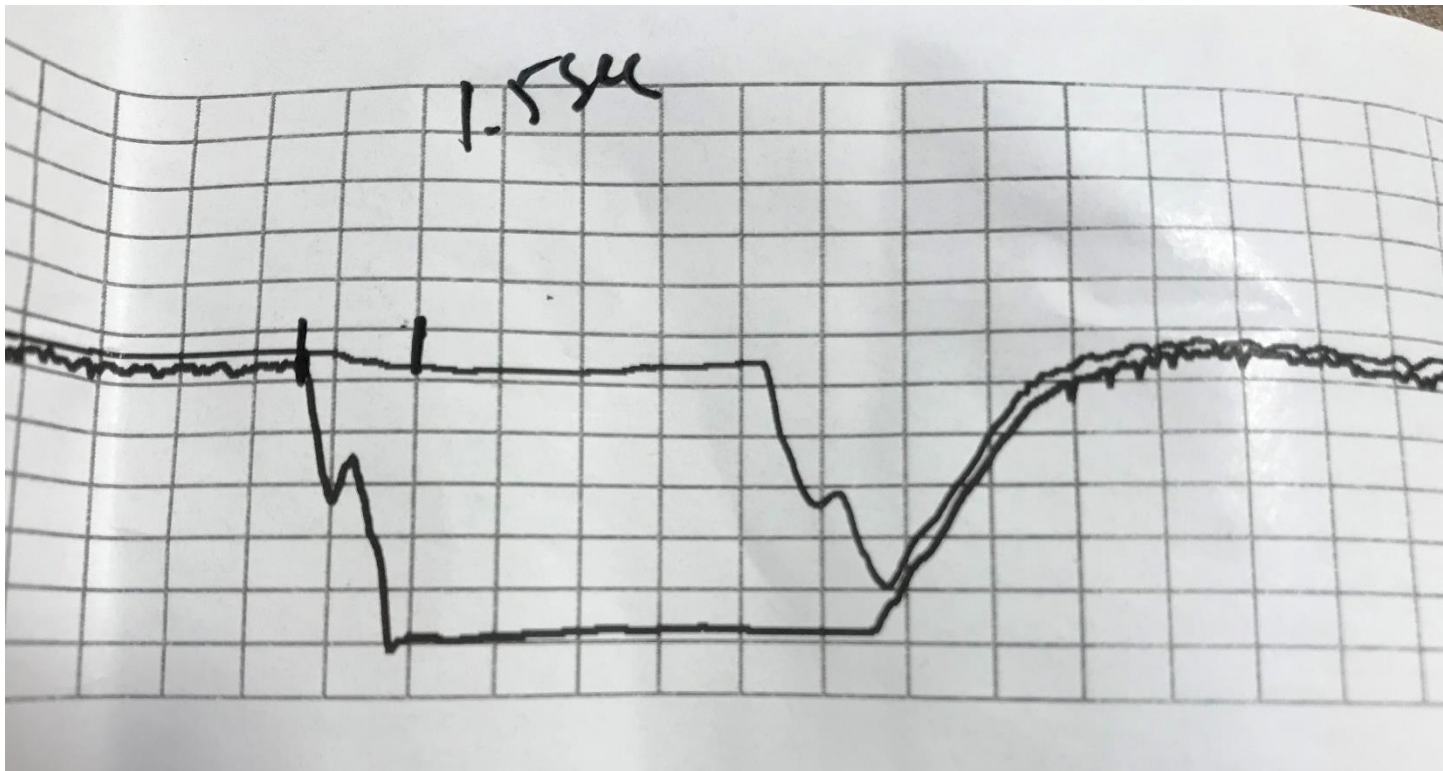
Pounds of milk per stall
Per hour critical

- One of three most important factors to a dairies' profitability
- Used to be 100 pounds/stall/hour
- Now dairies hitting 175 to 240 pounds per stall per hour



System Cleaning

LPC, SPC, Coliforms



Slug analysis still most forgotten



Days End

Sit down and enjoy a good cigar



Days End

OR Go fishing with a friend



Days End

OR Go for a Harley ride



Days End

OR my wife's idea

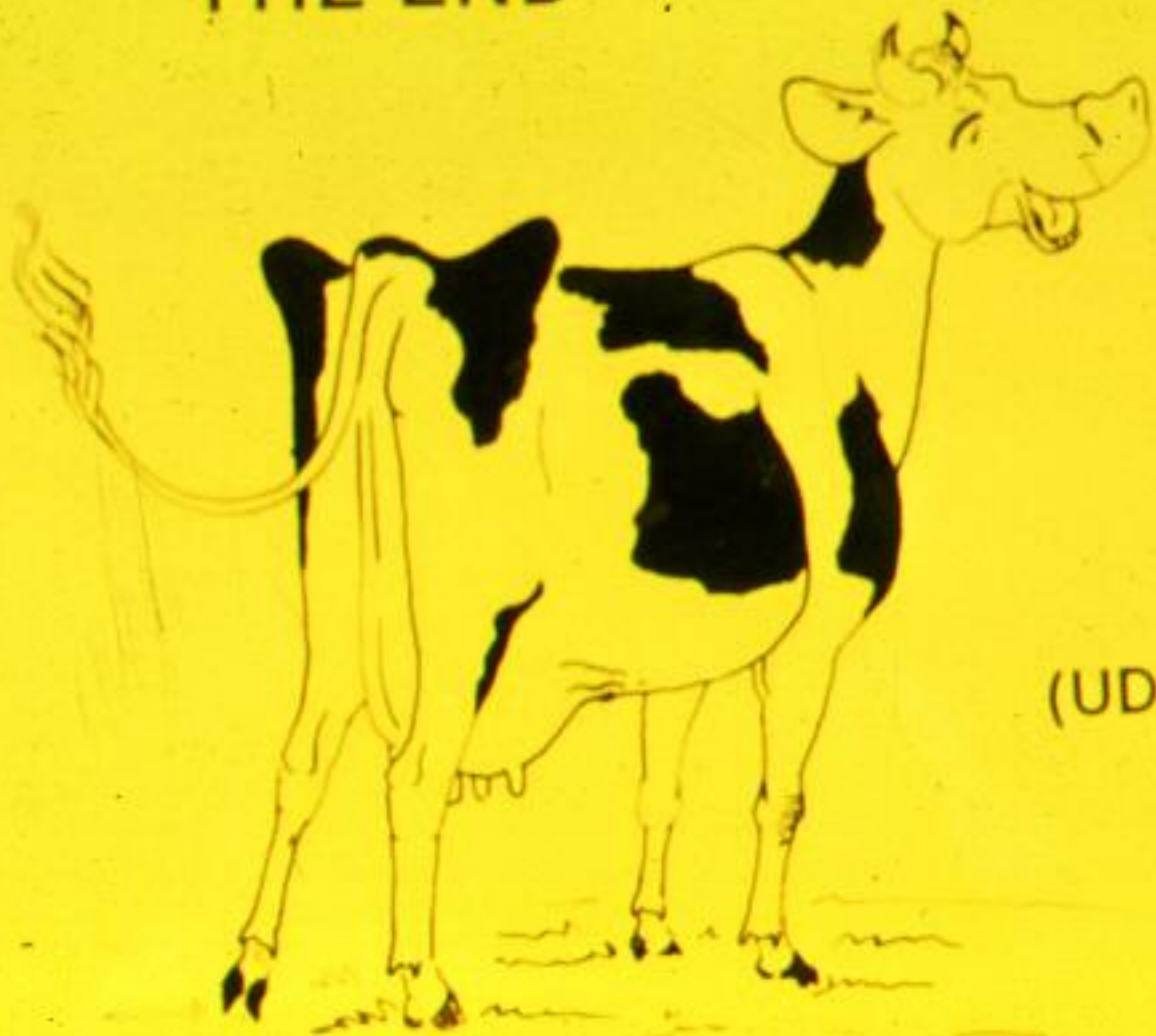


MOTTO FOR SUCCESS

“Whenever you lose interest
in being better at something,
chances are you have
already stopped being good
at it!”



THE END



(UDDERLY)

QUESTIONS



The shifting global dairy market



Ushering in a new era of dairy products

Nutritional content in products is strongly valued by consumers around the world, but it is now especially important in dairy and dairy alternative products that already have a perceived health halo.

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About this report

In this report, Cargill set out to better understand the relative importance of different factors in the decision-making process for purchasing dairy products (and dairy substitutes), including texture, sugar-reduction claims and clean labels for consumers worldwide. The goal was to gain a better understanding of the consumer decision-making process when buying dairy and dairy substitutes in 13 key global dairy markets.

Companion objectives were comparing results within regions and across regions, among label readers and clean-label seekers, understanding reasons for dairy avoidance and gathering information on perceptions of dairy vs. dairy alternatives.

Cargill conducted an online survey among decision makers for the purchase of at least one of the dairy categories of interest.

- Yogurt (all countries)
- Ice cream (all countries)
- Flavored milk (North American/South American/Asian countries)
- Dairy-alternative products (North American/South American/Asian countries)
- Cream cheese (European countries)
- Dairy desserts, excluding ice cream (European countries)

Respondents assessed (ranked and rated) different attributes in terms of how important they were in their purchase decision for that category.

Cargill has taken this proprietary research, coupled with dairy insights and data from a variety of sources, to provide the reader with an in-depth look at where the market is going based on unique consumer attitudes and insight and how these factors are driving industry trends.



The global dairy market: Understanding how consumers think about dairy products



Consumer attitudes about dairy are changing around the world. Once heralded as an essential part of a balanced diet in many cultures, dairy usage in some categories has been in decline over the past two decades as consumers—particularly in dairy’s most prominent markets—act in response to worries over allergens, hormone usage and perceived unhealthfulness of some dairy products.^{1,2,3}

This is changing the landscape for dairy producers all around the world, as they work to keep up with these evolving attitudes and the nuances in consumer attitudes from region to region, while capitalizing on potential opportunities in dairy consumption. At the same time, there are some trends that are helping to drive dairy consumption worldwide that tend not to be strongly tied specifically to a regional market and may be driving general growth of dairy products overall. For example, interest in label-friendly products is on the rise in varied regions, but also playing out differently depending on its overall prevalence. Paradoxically, in countries where the clean label trend is more established (like the United States and Denmark) and where manufacturers have already started including label-friendly ingredients in their products, consumers appear to care less about the number of ingredients on dairy product labels. In countries where the trend may be less established, checking for label-friendly ingredients on dairy products is more common. It is most important for consumers in China, Russia, Mexico and Indonesia, with Indonesia having the highest incidence of consumers looking for label-friendly ingredients. This tendency is moderate in Brazil, Spain, France and Argentina, and even less common in the United States and Denmark.^{4,5,6,7}

Nutritional value is also strongly important for most dairy consumers around the world, but especially so in dairy and dairy alternative products that already have a perceived health halo. So purchasers in all regions are becoming more diligent about checking the ingredients list and Nutrition Facts box of their dairy products.^{8,9,10,11}

Europe: Emerging dairy ideals

Beyond these broad trends, regional attitudes are often more subtle. A good example of such shifts is in Western Europe, which is the second-largest market for dairy products in the world—second only to Asia-Pacific.¹² Dairy consumption in Western Europe is mature in comparison to other regions, with high per-capita consumption throughout the region



and a strong dairy culture in many countries. That said, the dairy market has been in decline for a number of years, as consumers there seek to change their diets due to growing concerns about fat intake and animal rights issues, which are driving some of these changing attitudes.¹³

Western European dairy sales between 2012 and 2017 saw a loss of \$3.6 billion, according to data from Euromonitor International. Despite this decline, there are growth possibilities for dairy products in Western Europe as the market sees continued fluctuation between categories and continued premiumization. In addition, ongoing development of new health-related products, such as milk alternatives, are a bright spot for brands in the region. Germany and the Scandinavian countries are expected to drive growth for dairy products in the region, while Italy is expected to see the largest decline in usage due to decreasing consumption of products containing lactose.¹⁴

Asia: Contrasting forces

By comparison, the market for dairy products in Asia-Pacific is a study in contrasts. It is the largest region for dairy consumption in the world by value, but has the lowest per-capita spending on dairy, in part because many rural areas are just developing modern infrastructure to make chilled dairy products more accessible.¹⁵

Overall, the region saw robust dairy sales between 2012 and 2017. The majority of sales stem from China, but other developing markets with large populations, such as India and Indonesia, are seeing rapid growth as well. Several smaller countries posted double-digit expansion, including Pakistan (14% CAGR), Laos and Vietnam (both 12% CAGR) and India (11% CAGR), according to data from Euromonitor International. The category is expected to strengthen through 2022.¹⁶

Growth in these regions is being driven by modern trade development, changing consumer habits and dynamic product development, which makes them ripe for growth potential in the dairy segment. Shifting preferences towards packaged, branded dairy is propelling expansion in emerging markets, while mature urban areas are more impacted by product trends.

The Americas: A growing opportunity

Consumption of dairy is also distinct and variable in the Americas. Latin America, for example, is one of the fastest-growing dairy markets in the world. But with sales of \$430 billion in 2017, the market makes up a relatively small piece of the global dairy market, according to Euromonitor.

Dairy is widely consumed in the Americas, but shoppers spend less than half on these products as compared to consumers in North America and Europe. The most relevant Latin American markets for dairy are Argentina, Brazil, Chile and Mexico, all of which have seen positive growth rates since 2012, with Brazil being the largest market and making up 37% of revenues for the region.¹⁷ The Americas also differ in that the region remains largely fragmented, as opposed to more developed markets like Western Europe where private label products have a commanding presence.¹⁸

Consumers in this region are looking for more convenience when they shop—seeking to purchase groceries in a single location, which is now driving growth of hypermarkets and large supermarkets in Latin America. However, inflation in the overall market and lower purchasing power are creating high sensitivity to prices and causing consumers to cut back and seek promotional deals.

Lifestyle trends will be key to the growth of dairy consumption throughout this region, but especially in the bigger markets like Brazil and Mexico. Brazil will continue to be a strong dairy market in terms of volume for the Americas over the next few years, but it is also likely to

be one of the slower markets in terms of growth. Opportunities in the region will be at both ends of the spectrum, from premium dairy items (such as flavored milks and added-value drinking yogurts) to core staple products (like powdered milks and yogurt) representing key categories.¹⁹

United States: An evolving market

The picture is substantially different in North America, which has seen one of the most dramatic shifts for the dairy category in the declining per-capita consumption of milk in the United States. Long considered an essential and ideal food for families, overall milk consumption has fallen 22% from 2000–2016, while intake of non-dairy alternatives has increased by triple digits, according to data from the Packaged Facts report.²⁰

Though this downturn is certainly dramatic, milk consumption is still significant, with usage common in 90% of American households. However, the shift is undeniable, with a number of important trends driving interest and growing popularity of dairy alternative products. An aging population has growing concerns related to health and weight management, while consumers as a whole are leaning toward the belief that plant-based products are healthier overall than animal-based products, both in terms of their personal health and for animal rights. These plant-based products are also perceived as more sustainable and better for the environment than animal-based products.²¹ Such attitudes are behind the growing number of individuals following vegetarian and vegan diets, as well as those taking a more flexitarian (or casual/flexible vegetarian) approach to eating.²²

The stakes are high in a category expected to reach \$28 billion in the U.S. by 2021, with alternative products by then predicted to make up 40% of that total.²³ The recalibration is significant enough that the dairy industry launched a campaign to challenge the notion that plant-based milk can even be called a milk. Federal courts have ruled against the effort, however, noting that reasonable consumers understand there is no dairy element in plant-based

milks, and indeed, this is one of the reasons they purchase alternative products.²⁴

These changes leave global producers and marketers of dairy products with a challenge to understand how consumers view dairy products and what attributes are important for their purchase. To shed light on these issues, Cargill has conducted expansive global research to help understand the importance of different factors in the decision-making process for both real-dairy segments and alternative dairy products, including important product attributes such as texture and sugar reduction.

This report includes research findings from the United States and Mexico, as well as six countries in Europe, three countries in Asia-Pacific and two countries in South America. It looks at purchasers of dairy in numerous categories, including yogurt, ice cream, flavored milk, dairy alternative products, cream cheese and dairy desserts.



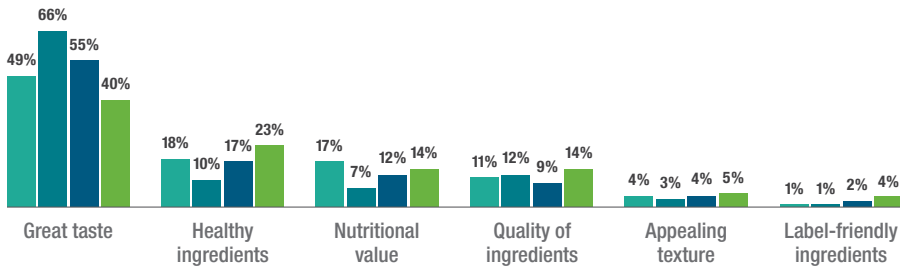
U.S. dairy consumption: A consumer recalibration

Dairy consumption overall remains strong in the United States, with two-thirds of respondents calling real dairy a regular part of their diet, while absolute dairy avoidance is comparatively low at just more than one in ten shoppers. What is perhaps most interesting now is that half of these respondents say they consume both real dairy and alternative products.

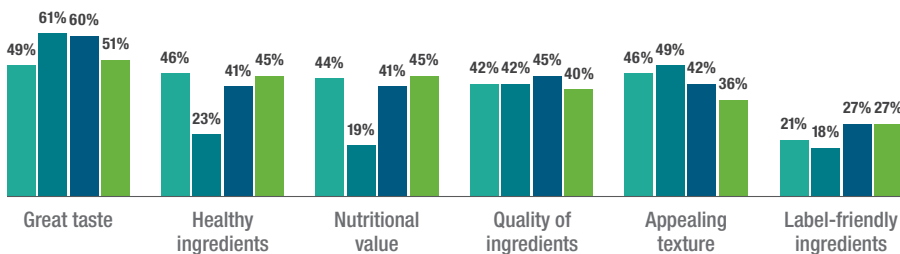
Overall, great taste tends to be the most important product attribute in purchase of all four dairy product segments analyzed in the U.S. by a margin of nearly double that of other product qualities (see chart below). Taste also tends to be more important for dairy than in other food categories, but other attributes are influential too, including healthy ingredients, nutritional value and ingredient quality. In general, about a third or more of these respondents do check the nutritional information on products in all dairy categories, although these rates are lower for ice cream.



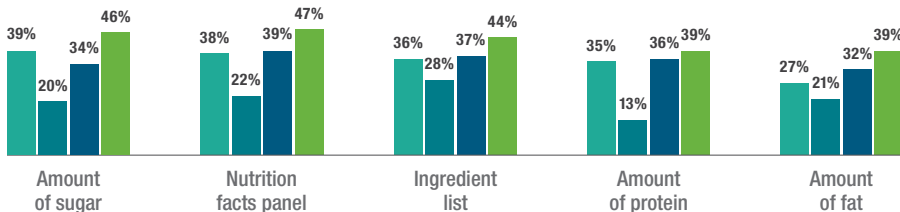
Most important factor in purchase



More important in this category than other categories (top-two box)



Extremely likely to check



YOGURT ICE CREAM FLAVORED MILK DAIRY ALTERNATIVES

Source: Cargill Proprietary Research, March 2018

Ingredients are especially important in the dairy category, with two-thirds of these purchasers saying they expect dairy products to have few ingredients, and over half using the ingredient list to determine if a dairy product is healthy or highly processed.

60% seek dairy products for bone-health benefits (e.g., calcium)

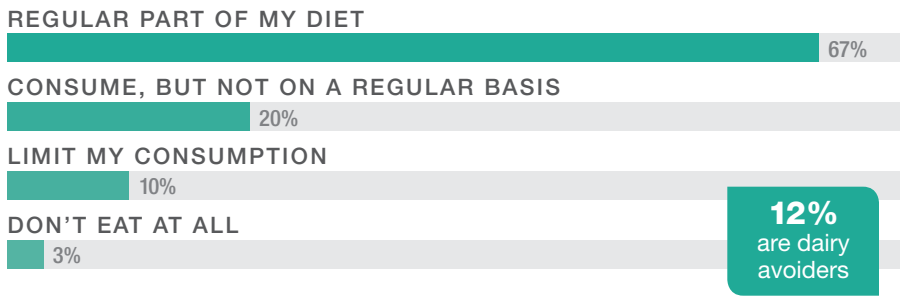
56% say real dairy is a necessary part of a balanced diet

48% say you can eat a balanced diet without real dairy

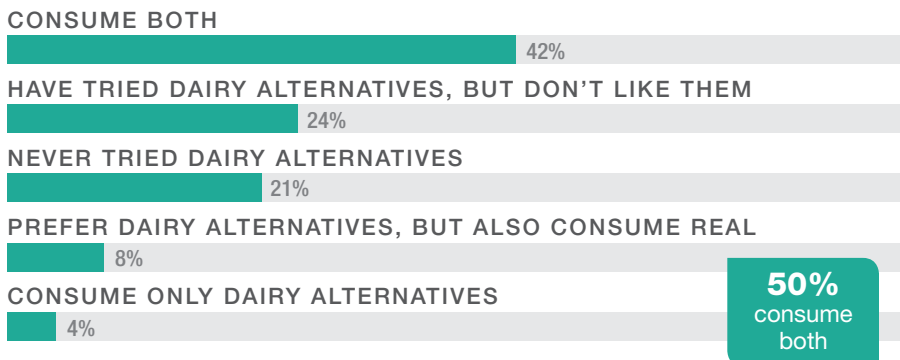
38% seek dairy products for digestive-health benefits

While there is an overall preference for real dairy products among these U.S. shoppers, many consumers do not tend to think real dairy is the only choice, and they are relatively open to dairy alternatives:

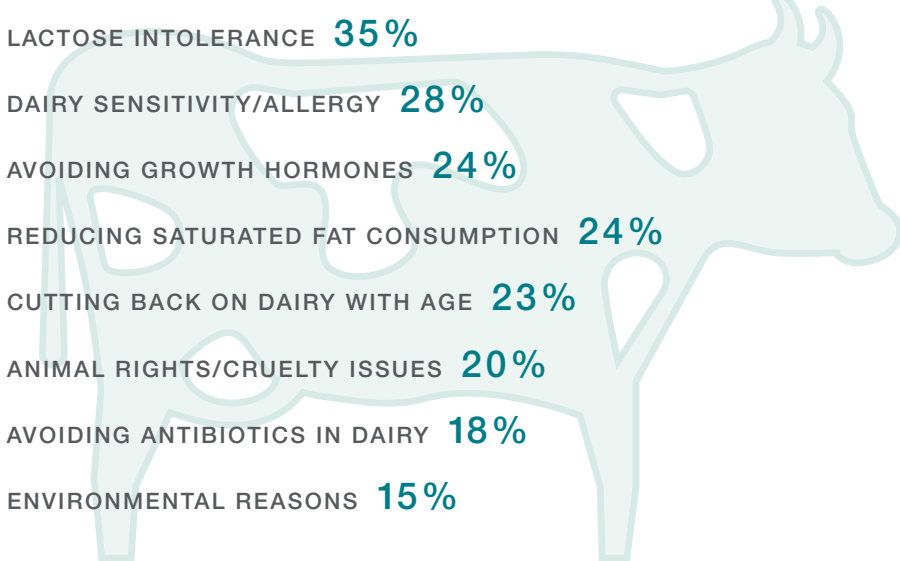
Real dairy consumption



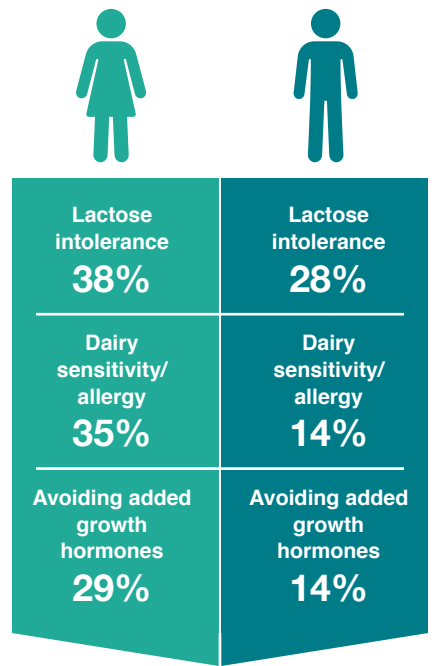
Dairy alternatives consumption



Reasons for dairy avoidance



U.S. dairy purchasers avoid dairy products most often because of lactose intolerance or a dairy sensitivity or allergy, although numerous other issues are important for at least one in five shoppers.



Gender and age factors

Real dairy usage tends to skew higher among men and shoppers age 35–54, while women are more than twice as likely as men to avoid dairy for reasons like dairy allergies and added growth hormones. Older shoppers most commonly cited nutritional reasons (reducing cholesterol or calories) for dairy avoidance, while younger respondents more often mentioned animal rights or environment issues as reasons to skip dairy products.

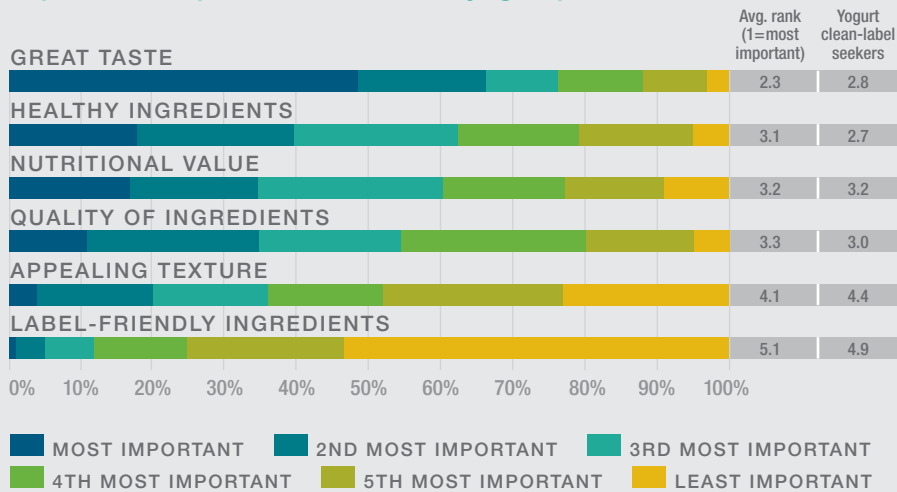
Dairy insights by category—it's all about expectations

Of the four dairy product categories studied, ice cream is the most popular, followed by yogurt; but dairy

Yogurt snapshot—A fine balance

Even with yogurt's strong health credentials in major food trends like digestive wellness and protein demand, taste still trumps all other product attributes—even though shoppers tend to express its importance a bit less emphatically than for other dairy categories. But this creates a tricky landscape for yogurt manufacturers who must walk a fine line to balance the value of their products' taste and nutrition for consumers. Nutritional value remains an important characteristic for yogurt purchasers; therefore, these shoppers tend to be more on the lookout for ingredients they don't want, such as chemical-sounding ingredients and excess sugar.

Importance of product attributes in yogurt purchases



Nutritional value remains an important characteristic for yogurt purchasers.



purchasers overall do tend to buy from more than one category, especially among the indulgent products.

As the new kid on the block, dairy alternatives seem to be held to a higher standard than other more mature segments, though flavored milks are also scrutinized. Interestingly, those who have tried dairy alternatives are more likely to say they prefer the taste of real dairy over alternatives by a wide margin. But it is also a matter of expectations. Many consumers expect dairy alternatives (and to a lesser degree, yogurt) to be healthy, so they have a higher bar to pass.

- 45% of respondents expect dairy alternatives to provide the same experience as real dairy.
- Compared to purchasers of the other three product types, dairy alternatives tend to see the most label scrutiny, with respondents noting that they are extremely likely to check the amount of sugar, Nutrition Facts, ingredient list, protein and fat content than for any of the other dairy categories.
- The sugar preference threshold for yogurt and dairy is lower: 9.2 grams and 11.5 grams, respectively.

- GMOs are avoided by more purchasers of yogurt and dairy alternatives than by buyers of ice cream and flavored milks.
- Almond is by far the most preferred dairy alternative source, with 80% noting this preference. Coconut runs a distant second, at 59%.

Overall, across all of these dairy categories, shoppers tend to use brands as a filter and rely on trusted brands to use healthy ingredients.

Dairy alternatives snapshot: Here to stay

One of the most striking findings in this report is that up to half of shoppers now

say they consume both dairy and dairy alternative products, but still purchase and consume real dairy products. Only 12% are true dairy avoiders. By far, almond milk is the most commonly tried and liked of the alternative dairy products, with 80% of consumers saying they have tried it. Coconut milk ranks second in popularity at 59%, followed by soy at 50%.

Despite its disruptive status, the alternative dairy category does have similarities to other key dairy segments. For example, taste is still the most important attribute, but its lead is not as high as in other categories.

Given that health considerations have been one of the key drivers in the rise of alternative dairy, it is not surprising to see that total purchasers of dairy alternatives are more likely to check all of the nutritional aspects on the package, compared to purchasers of other dairy products.

Flavored milks snapshot: Between treat and function

Flavored milk may be a beacon of light for the overall milk category, which has continued to see declining sales. Brands in this category are on the rise, and the segment reached \$1.5 billion in 2017.²⁷ But even with its recent success, flavored milk is caught in the middle between the realm of treat and dairy staple.

Shoppers have high standards for flavored milks when it comes to repeat purchase, with taste again the top factor for three out of four purchasers.

More than half of dairy alternative shoppers say the following attributes . . .

- Taste
 - Feeling good about serving the product to their children
 - Product doesn't separate into water or thicker parts
- . . . are extremely important to repurchase.

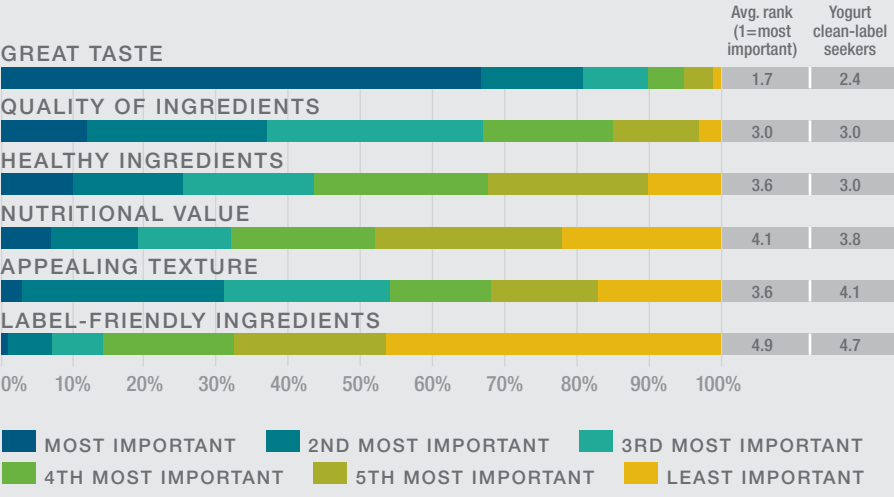
Consistency and texture also rank as extremely important for a majority of shoppers in product repurchase.

This is not to say that purchasers of flavored milks are not paying attention to nutrition. They are, and more than a third say they are extremely likely to check all of the informational items on the product package.

Ice cream—taste still reigns, but quality is crucial

U.S. shoppers are demanding more from their ice cream than ever. This means recognizable ingredients that are both healthful and taste good, while being devoid of ingredients that are perceived as negative, such as sugar and sometimes even dairy-based ingredients themselves.²⁵ The segment is now seeing products enhanced with plant-based proteins and prebiotic fibers. Younger, millennial shoppers are driving the growth of these alternative ice creams, seeing them as a good fit with their lifestyles and families.²⁶

Importance of product attributes in purchase of ice cream



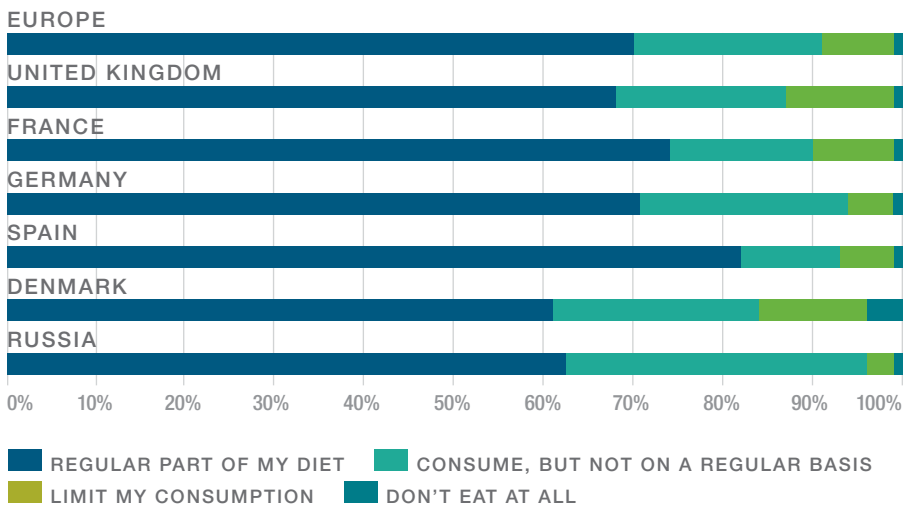
Europe: Clinging to dairy culture, but seeking new alternatives



To provide a deeper understanding of dairy usage among European shoppers, this study looked at the dairy purchase habits and preferences, as well as ingredient perceptions, of 1,806 shoppers in six countries: the United Kingdom, France, Germany, Spain, Denmark and Russia.

As a whole, Europe is a region in transition—holding fast to dairy traditions, while also seeking health-related alternatives. One of the most interesting findings in this report is that usage of both real dairy and dairy alternatives are both still relatively high in Europe. True dairy avoidance is also relatively low, at 1 in 10 shoppers, with the highest avoidance in Denmark and the UK; while shoppers in Spain are most likely to consume real dairy as part of their diet. Key reasons for dairy avoidance are health-related (reducing saturated fat intake) or tied to animal rights and cruelty issues.

Real dairy consumption in Europe

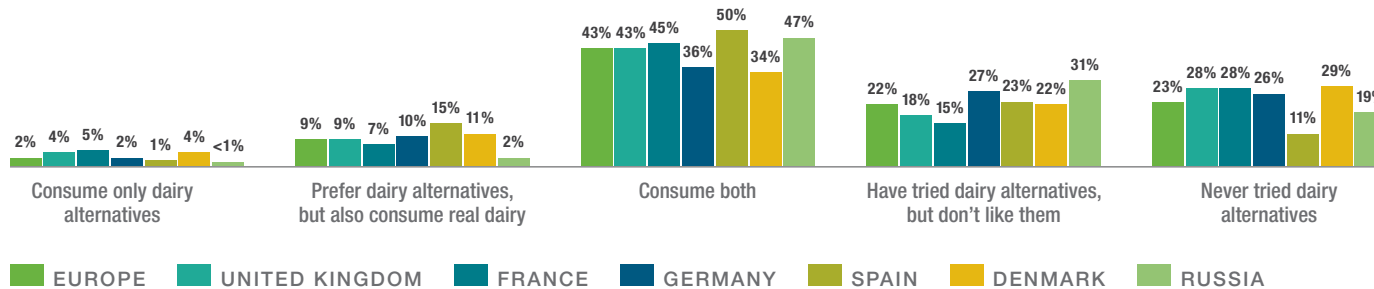


European dairy consumers—a snapshot

While yogurt is the most commonly purchased dairy product among the categories studied, use of dairy alternatives is on the rise in Europe, either exclusively or in addition to consumption of real dairy. Among those who have tried dairy alternatives, a preference for the taste of real dairy remains and is about double that of those who prefer the taste of alternative products (based on top-two box agreement). In Russia, where dairy avoidance is lowest, this taste preference for real dairy is almost eight times that of alternative products. Spain has the highest rate of alternative dairy consumption among the European countries surveyed, with two-thirds of 307 Spanish shoppers surveyed saying they purchase alternative dairy exclusively or in combination with real dairy products.

There is an opportunity for dairy alternatives to grow further. While 22% of European shoppers claim they have tried but do not like dairy alternatives,

Dairy alternative consumption



23% claim they have never tried them. The price premium of dairy alternatives may be limiting their growth, as more than 4 out of 10 European shoppers surveyed think that dairy alternatives are too expensive.

Overall, taste is universally important in the purchase of all dairy products, but especially in the UK, France, Germany and Denmark. This is less true in Spain and Russia, where the importance of great taste is on par with healthy ingredients and ingredient quality in many categories—the one exception is ice cream, where great taste is always ranked as highly important.

Nutrition is also generally important for European consumers when purchasing dairy products. Shoppers in all six countries say they are at least likely (top two boxes) to check some part of the nutritional information (the ingredients list or Nutrition Facts Panel) on most dairy products at rates near 50% or greater. That said, shoppers in all six European countries are less likely to check nutritional information when buying ice cream.

When it comes to dairy product attributes, avoiding GMOs and chemical-sounding ingredients is common for all dairy categories at rates of close to two-

thirds, although these attributes tend to rank as more troubling for nearly 80% of shoppers in Russia. Russian respondents also more often say they seek out organic ingredients in dairy than shoppers in the other European countries surveyed.

Overall, European shoppers pay attention to ingredients, with close to 60% in most countries saying they are an indicator of how healthy a dairy product is.

Negative opinions on certain ingredients are more pronounced in **yogurt** than in other categories with less of a “health halo.” This is especially the case in the UK, France and Spain, and to a lesser extent in Denmark and Germany.



Shoppers in Europe are at least somewhat likely (top four boxes in a five-point scale) to check for **sugar content** in most dairy products at rates of more than 8 in 10. Overall desired sugar content is lowest in dairy desserts and highest in ice cream. Sugar preferences are highest in Denmark, followed by Germany.

There does, however, tend to be a wide variance across countries when it comes to the purchase impact of certain ingredients:

Germans prefer real dairy



Real dairy is popular in Germany, with over two-thirds of German shoppers preferring the taste of real dairy over dairy alternatives, and a similar number agreeing that real dairy is a necessary part of a balanced diet. A majority of German shoppers expect dairy products to have few ingredients and are willing to pay more for those dairy products they consider to be healthier. However, when compared to other Europeans, German shoppers appear to rely less on ingredient labels, with only 38% looking at ingredients to help them determine whether a dairy product is healthy (as opposed to 58% for all European shoppers).

- 65%** prefer the taste of real dairy over dairy alternatives**
- 65%** expect dairy products to have few ingredients
- 58%** say they will pay more for dairy products that they consider to be healthier

Brits find dairy alternatives too expensive



As in other European countries, a majority of UK shoppers prefer real dairy over dairy alternatives. However, British shoppers appear to be rather price sensitive, with only 40% claiming they are willing to pay more for dairy products they consider to be healthier (as opposed to 58% of all European shoppers). Moreover, about half of British shoppers think dairy alternatives are too expensive. At the same time, a lot of British shoppers have high expectations of dairy alternatives, comparing them with real dairy and expecting a similar experience from them.

- 60%** prefer the taste of real dairy over dairy alternatives**
- 59%** expect dairy products to have few ingredients
- 47%** expect dairy alternatives to provide the same experience as real dairy

French shoppers read the ingredient list



French shoppers have high expectations of dairy when it comes to health, and more than half of them expect dairy products to be healthier than other foods. Compared to shoppers in most other European countries surveyed, they are more likely to check the ingredient list on dairy products, and to use the ingredient list to determine whether a product is healthy. More than 60% are willing to pay more for those dairy products they consider to be healthier, and an equal number look at the ingredients in dairy products to determine how healthy these dairy products are.

- 72%** expect dairy products to have few ingredients
- 62%** say ingredients help them determine if a dairy product is healthy
- 62%** use ingredients to determine whether a dairy product is highly processed

**Among those who have tried dairy alternatives

Spanish shoppers on the lookout for sugar



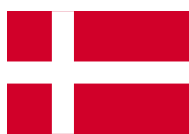
About half of Spanish shoppers claim they pay more attention to the amount of sugar in dairy products than in other types of food, which is considerably more than the average of European shoppers. While more than half of Spanish shoppers claim that dairy alternatives are too expensive, dairy alternatives seem relatively popular in Spain. About half of Spanish shoppers believe that plant-based foods are healthier than animal-based foods, and about one quarter prefer the taste of dairy alternatives over real dairy.

70% say ingredients help them determine whether a dairy product is healthy

66% expect dairy to have few ingredients

49% claim they pay more attention to the amount of sugar in dairy products than in other types of food

Danes are more moderate about dairy



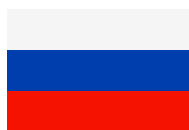
Danish shoppers seem to be the least opinionated about their dairy products, with only half agreeing that real dairy is a necessary part of a balanced diet (whereas 64% of all Europeans surveyed think this is the case). Probably as a consequence of the “clean label” trend being more established in Denmark, Danish consumers appear to give less scrutiny to the number of ingredients in dairy. Also, much like British shoppers, Danish shoppers tend to be price-sensitive about dairy alternatives, with about half of shoppers noting that dairy alternatives are too expensive.

58% prefer the taste of real dairy over dairy alternatives

54% expect dairy products to have few ingredients

54% say they will pay more for dairy products they consider to be healthier

Strong dairy perceptions in Russia



Of all the shoppers surveyed, those in Russia tend to have the strongest opinions about their dairy products. Of those who have tried dairy alternatives, more than 8 in 10 note that they prefer the taste of real dairy to alternatives, and find real dairy to be more satisfying than dairy alternatives. About the same number of shoppers believe that dairy is a necessary part of a balanced diet. Russian shoppers are generally more likely than purchasers in other countries surveyed to check for nutritional information, especially the ingredient list and Nutrition Facts panel.

83% think real dairy is a necessary part of a balanced diet

73% expect dairy products to have few ingredients

72% say ingredients help them determine if a dairy product is healthy

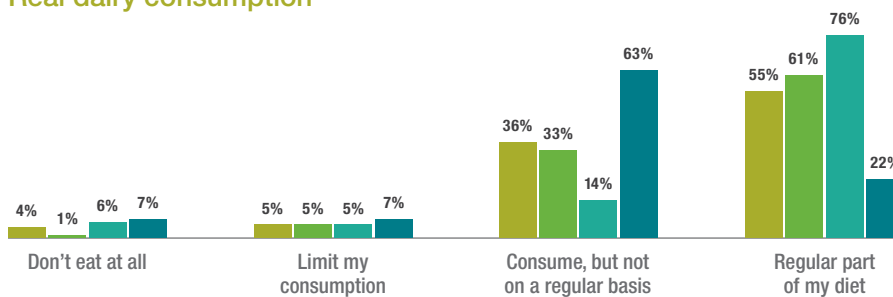
Asia-Pacific: Potential for explosive growth



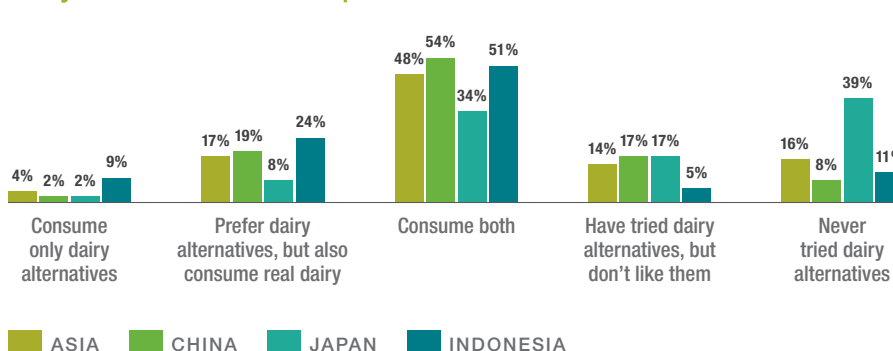
Urbanization and the rise of modern trade will benefit the overall dairy segment in Asia-Pacific, as supermarkets and independent grocers play a key role in providing access to chilled dairy products like yogurt and fresh milk. Product freshness is also playing an essential role in the growth of dairy here—providing nutritious, shelf-stable products as health consciousness gains traction for consumers in this region.²⁸

In this study, Cargill research delves deeper into Asian dairy consumption, looking at three key countries: China, Japan and Indonesia. Respondents were asked about their consumption habits, dairy preferences, perceptions of dairy ingredients and how they impact shoppers' purchasing behavior. Among the key findings, dairy category purchasers in Asia-Pacific (like consumers in both Western Europe and the United States) report high usage of both real dairy and dairy alternatives. However, what is different in this region is that a majority of shoppers consume dairy alternatives, either solely or in addition to real dairy. This is particularly true in Indonesia, where 24% of respondents prefer dairy alternatives. Consumption of alternative dairy products is lowest in Japan.

Real dairy consumption



Dairy alternatives consumption



The Asia-Pacific dairy consumer

More than half of dairy purchasers in the region tend to rate nutritional value, healthy ingredients and ingre-

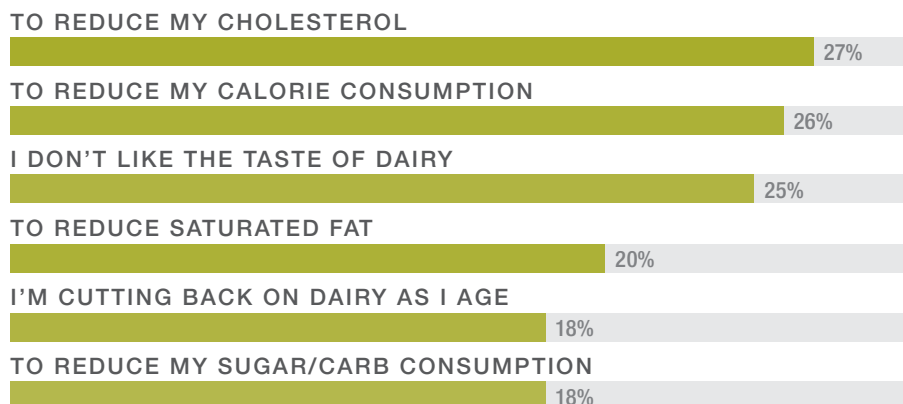
dient quality as highly important to their product purchase in all of the dairy segments analyzed, with the exception of ice cream, where these attributes rated lower. Taste is also an important factor in all dairy products, but Japanese shoppers place more value on great taste as compared to shoppers in China and Indonesia, especially when it comes to ice cream. In China and Japan, label-friendly ingredients rank as the least-important product attribute, whereas in Indonesia, appealing texture ranked lowest.

Of the four dairy categories, yogurt is most commonly purchased in Japan and China, while flavored milks are less popular.

Shoppers in all three countries tend to check both the ingredient list and the Nutrition Facts Panel when buying dairy. That said, Japanese shoppers tend to be less likely to check any of the nutritional information sources.

Products' sugar content is on the radar for most shoppers in the region, with nearly all of those surveyed in Asia saying they are at least somewhat likely (top four boxes) to check the amount of sugar in dairy products. Among the four categories, Chinese consumers prefer the most sugar in flavored milk; Indonesian shoppers' preferences are similar across the categories, except for dairy alternatives, where the threshold was lowest.

Asia-Pacific: Reasons for dairy avoidance



Chinese shoppers move toward healthful dairy



Consumption of both dairy and dairy alternatives is relatively common in China, with 54% saying they consume both types of products. But their consumption habits and perceptions of dairy products are also somewhat contradictory. One in three dairy purchasers say they consume dairy products, but not on a regular basis, yet nearly two-thirds call these products a regular part of their diet (61%).

All-out dairy avoidance in China is low, with only 1% saying they don't consume these products at all. However, when they do avoid dairy, it is most often for health-related reasons. Just over 25% say they avoid dairy to reduce cholesterol, calories, saturated fat or because they want to cut back on dairy as they age.

In general, Chinese shoppers have high expectations for dairy products of all types, with 77% saying they expect them to be healthier than other types of food. More than 70% note these products should have few ingredients, and 74% say ingredients help them determine if a dairy product is healthy or not. But they also put their money where their mouth is.

79% say they will pay more for dairy products they consider healthier

77% seek dairy products for bone-health benefits (e.g., calcium)

75% seek dairy products for digestive health benefits

Indonesia: The next big market

Just more than 50 percent of Indonesian dairy respondents say they consume both real dairy and dairy alternatives, but this country also boasts the highest rates of dairy alternative-only consumption amongst consumers in the Asian countries surveyed, 9%, as well as the highest rates of real dairy avoidance or limited consumption, at 7%. Like the Chinese consumers, they cite health reasons for avoiding real dairy, but for these purchasers

it is also about taste, with one in three saying they avoid dairy because they dislike the taste. Among Indonesian shoppers who have tried both products, the gap between the preference for the taste of real dairy (56%) and the preference for the taste of dairy alternatives (42%) is less pronounced than in other Asian countries.

Overall, shoppers in Indonesia are the most opinionated about dairy products in this region. They emphasize the importance of nutritional value, healthy ingredients and quality ingredients at rates higher than their counterparts. They are also most likely to care about label-friendly ingredients, noting their importance in all categories at rates of more than half.

When it comes to dairy alternatives, soy is by far most preferred by shoppers, with 77% saying they most commonly tried and liked products from this source. Indonesian dairy purchasers tend to be fairly positive about most ingredients, with only one having a net-negative purchase impact—glucose syrup in dairy alternatives. Indonesian shoppers react most favorably to dairy products with wheat protein and natural flavors.

82% seek dairy products for bone health benefits (e.g., calcium)

81% say ingredients help them determine if a dairy product is healthy

81% seek dairy products for digestive health benefits

Japanese are variable in dairy consumption



Among those surveyed, Japanese shoppers were more variable than Chinese and Indonesian category purchasers. They typically rate great taste in all categories as the most important attribute, and describe it as more important to purchase than do shoppers in the other two countries. That said, more than half of Japanese shoppers say that nutritional value, healthy ingredients and ingredient quality are important in all dairy categories except for ice cream, although they are less inclined to check nutritional information.

Real dairy consumption is highest among Japanese purchasers, with 76% calling these products a regular part of their diet. In turn, alternative dairy usage is lowest in Japan, with only one-third noting they consume both real and alternative dairy, and 39% saying they have never tried alternative products, a rate more than double that in the other two countries.

It follows that dairy avoidance is comparatively low, although the reasoning behind it tends to be comparable to other countries—with the highest rates of shoppers noting a reduction of cholesterol and calories and a dislike of the taste as top reasons for avoidance. Category purchasers in Japan note a preference for



almond as the source of alternative products over soy-based products, but overall, they indicate a net negative purchase impact regarding most dairy ingredients.

A majority of Japanese respondents expect dairy products to be healthier than other types of food.

64% say they seek dairy products for digestive health benefits

60% say real dairy is a necessary part of a balanced diet

58% seek dairy for bone-health benefits (e.g., calcium)

Latin America: Poised for dairy growth

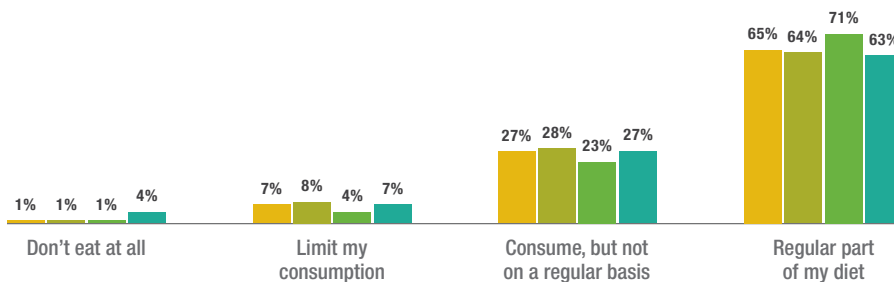


The market for dairy products in Latin America is less mature than in the other regions studied for this report, but it has the potential for significant growth in the next few years. Traditionally, cheese products and yogurt have been among the strongest dairy players in this region, but, as consumers here recognize the health virtues of alternative dairy products, this market is likely to see some shift away from the established attitudes that make milk and cheese such a common dietary staple.

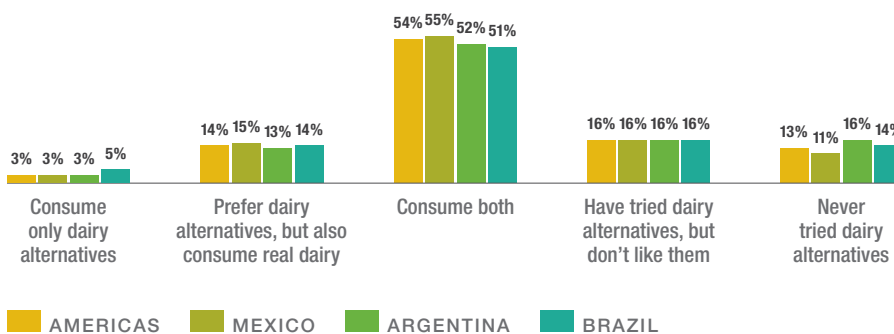
Growth of dairy products in the region does tend to be polarized. Brazil is the largest dairy market in Latin America, driven by the popularity of milk, which made up 40% of 2017 dairy sales in that country.²⁹ It is a popular staple enjoyed by adults as well as children throughout the day. In other Latin American countries, such as Argentina and Mexico, cheese has seen increasing popularity and overtaken milk as the most popular dairy item. However, as consumers here seek more shopping convenience and support modern grocery stores, the alternative dairy market is also on the rise and may challenge these dairy consumption habits.

To better understand these shifts in consumer attitudes, Cargill looked more deeply at dairy consumption habits in three of the major dairy markets for the Americas: Brazil, Mexico and Argentina. While this dairy market is less modern than regions in other parts of the world, it is interesting to note that consumption

Real dairy consumption



Dairy alternatives consumption





patterns here are moving in the same direction, with growing use of both real dairy and dairy alternatives, expanding interest in dairy products for health benefits, and similar levels of interest in nutritional aspects of dairy products.

The Americas dairy consumer

Shoppers in the Latin American countries surveyed typically consume dairy products for health benefits, such as healthy bones and digestion. In Mexico and Argentina, dairy products are more often sought for bone health than digestive benefits, while these benefits are more equally sought after in Brazil. Of the four dairy categories, yogurt is most commonly purchased in all three of these coun-

tries, followed by ice cream. Flavored milks are more popular in Mexico than Argentina and Brazil, and those with children in the home—regardless of country—skew higher on purchasing flavored milk than shoppers in households without children.

Great taste is, not surprisingly, very important for shoppers here and an important factor in product purchase for all dairy categories, but this is especially true for ice cream. Appealing texture and label-friendly ingredients tend to be less important and are almost always ranked last in product purchase relevance, although this attribute tends to be more important for ice cream than other categories.

Nearly two-thirds of respondents in the Americas do note high expectations for dairy products overall.

- 68% expect dairy products to have few ingredients (they should be mostly milk)
- Real dairy is a necessary part of a balanced diet
- Ingredients help them determine if a dairy product is healthy

Factors in purchase decision

Nutrition Facts	
8 servings per container	
Serving Size 2/3 cup (85g)	
Amount per serving	
Calories	230
% Daily Value*	
Total Fat 5g	10%
Saturated Fat 1g	2%
Total Fat 5g	10%
Cholesterol 10mg	20%

Shoppers in all three countries are most likely to check the **Nutrition Facts panel** when buying flavored milks.



More than **two-thirds of shoppers** in Argentina and Mexico check the Nutrition Facts panel for yogurt and alternative dairy products.



Sugar preferences for dairy products are similar for all three countries.



Shoppers in all three countries most often check **ice cream** for the amount of sugar it contains.

- They prefer the taste of real dairy over dairy alternatives
- They will pay more for dairy products they consider to be healthy
- They expect dairy products to be healthier than other types of food

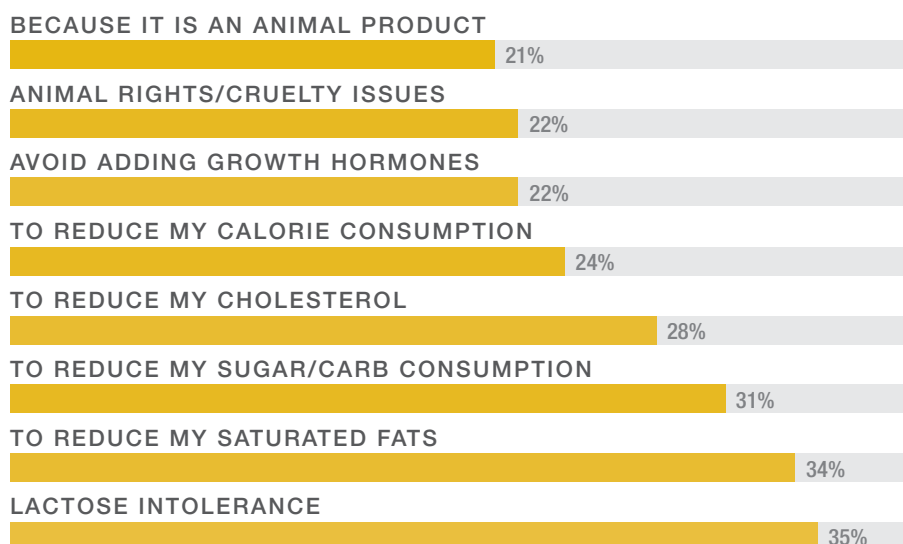
In dairy products, nutritional value, healthfulness, and high-quality ingredients tend to be important for at least half of shoppers surveyed in the Americas, although these attributes are a bit less important for ice cream.

Dairy alternative use on the rise


More than half of dairy category purchasers surveyed in the Americas consume both real dairy and dairy alternative products, but close to 60% of shoppers in all three countries consider real dairy more satisfying than dairy alternatives. That said, across all three countries, as many as 7 in 10 shoppers do use dairy alternatives, either solely or in addition to real dairy. Usage of dairy alternative products is highest in Mexico and lowest in Argentina. Dairy shoppers in the Americas have tried a number of dairy alternative products from various sources, with the most popular being products made from almond, coconut and soy. Shoppers in Mexico and Argentina more often prefer products made with almond, while those in Brazil note a slight preference for coconut-based dairy alternatives.

Like their counterparts in the other regions surveyed, avoidance of real dairy is relatively low in the Americas, as 1 in 10 shoppers say they avoid dairy altogether or try to limit it. Real dairy avoidance is highest in Brazil and lowest in Argentina. The Americas shoppers who do avoid or limit dairy do so most often citing lactose intolerance (especially prevalent in Mexico) or to reduce their saturated fat or sugar/carb consumption. Overall, close to 60% of shoppers surveyed in the Americas feel that dairy alternatives are too expensive.

The Americas: Reasons for dairy avoidance



Dairy traditionalists in Argentina



Argentina is one of the most moderate and traditional dairy markets in the Americas. Shoppers here are more likely than those in other countries to consume real dairy on a regular basis, and they are least likely to have tried alternative dairy products. Nearly 70% consider real dairy a regular part of their diets, while 52% consume both and only about 3% consume alternative dairy products exclusively. Not surprisingly, the gap between taste preference for real dairy over dairy alternatives is also largest in Argentina.

Shoppers here also tend to be a little less concerned about the nutritional value of their dairy products, and overall they typically note less importance for the healthfulness and quality of ingredients. However, they tend to rate the importance of taste higher than other product attributes. Similarly, they are less likely overall than shoppers in Brazil and Mexico to check nutritional information on dairy products.

72% seek dairy products for bone health benefits

62% say ingredients help them determine if a dairy product is healthy

61% say they will pay more for dairy products they consider to be healthier

Brazil: The Americas' leading dairy market



With retail sales of \$25 billion, Brazil is the Americas' top dairy market³⁰ and consumption here dictates dairy performance in the region. The country is predicted to continue to be the largest for dairy consumption in the Americas, although growth will likely slow. The size of this market also makes for lively and progressive attitudes about dairy products. Shoppers in Brazil tend to be receptive to dairy alternatives, and they typically look closely at dairy products in making purchases. Of the Latin American countries surveyed, they are most likely to factor in all product attributes when they purchase dairy products, from nutritional value to label-friendly ingredients, and they are also a bit more likely than their counterparts in Argentina and Mexico to say taste is important for their dairy products. High numbers of these shoppers say they check dairy products for ingredients as well as sugar, protein and fat content.

Shoppers here are also fairly similar in their dairy expectations to respondents in Mexico, but Brazilian dairy purchasers tend to have a higher perception and expectation for dairy alternative products. For example, at 71%, they are most likely to say they expect dairy alternatives to provide the same experience as real dairy, and they are most likely to note they prefer the taste of dairy alternative products. The gap between the preference for the taste of real dairy (59% top-two boxes) and the preference for the taste of dairy alternatives (41%) is also less pronounced.

- 70%** look at the sugar content of dairy products they serve to children
- 69%** seek dairy products with digestive health benefits
- 67%** say ingredients help them determine if a dairy product is healthy

Embracing alternative dairy in Mexico



Like Brazil, Mexico is a more progressive market when it comes to dairy consumption. In fact, respondents here cite the highest use of dairy alternatives, with three in four saying they consume these products, and more than half noting they consume both. Shoppers here are similar to those in Brazil who place high importance on nutritional value, and healthy, high-quality ingredients, but they also have high expectations regarding taste of dairy products. They are nutritionally savvy and are slightly more likely than their counterparts in Brazil to check the Nutrition Facts box, with close to 80% saying they do so for flavored milks and alternative dairy products. The amounts of sugar, protein and fat also tend to be very important for shoppers here in all dairy categories.



Among shoppers surveyed in the Americas, those in Mexico tend to also have the highest perceptions about and expectations for real dairy products. They are most likely to say they prefer the taste of real dairy over dairy alternatives and note that real dairy is more satisfying than their alternative counterparts.

- 72%** seek dairy product for bone health benefits (e.g., calcium)
- 72%** say ingredients help them determine if a product is healthy
- 69%** say real dairy is a necessary part of a balanced diet

A new era of dairy products

Dairy products worldwide have been successfully riding the wave of numerous consumer trends. On the whole, dairy manufacturers have stayed ahead of the curve on growing consumer demands for more healthful, transparent products, capitalizing on their inherent health halo for bones and digestion, and meeting consumers' demands for more protein and "clean label" products with new product development and innovation.

While markets around the world exhibit different growth curves and nuanced perceptions, there are numerous similarities in dairy attitudes and consumption. Dairy shoppers in many regions still cling to their dairy traditions, even as they embrace new options for health and environmental concerns. They also almost universally have high expectations for all dairy products, both traditional and alternative, with taste and ingredient perceptions still strongly important for consumers in every market surveyed and in every dairy category. These similarities aside, global dairy consumption is evolving and manufacturers and producers will have to stay on top of changing consumer attitudes to remain relevant in the increasingly competitive segment. The stakes are high as global demand for dairy is predicted to see steady growth of 2.5% annually through 2020.³¹

Key study takeaways

Dairy alternatives are here to stay. Not everyone likes them and a significant majority of global dairy consumers prefer real dairy to alternative products, but their rise is unmistakable and consumers indicate increasing acceptance of these products worldwide. To be sure, they have come a long way since the first soy milks hit the market, with a variety of new and healthful options produced from fruits, grains, legumes, nuts and seeds. As these products continue to improve, consumers will likely continue to embrace them with the growing prevalence of dairy sensitivity, perceptions that plant-based dairy alternatives have greater health properties, and increasing concerns about the impact of dairy on environmental issues and animal rights.

Clean-label expectations for dairy are critical. The demand for "clean label" products and transparency in dairy is certainly driving innovation in the sector, and dairy consumers will continue to push the envelope in scrutinizing product labels. Clean label seekers in this report are already setting the bar by being the most likely to check for nutritional information, seeking ingredients that are organic and using the ingredient list to help avoid highly processed foods, GMOs, and unfamiliar or chemical sounding ingredients. As a result, they will likely continue to pull companies further toward using label-friendly ingredients and adopting transparent practices.

Innovation spells success. Consumers are looking to dairy products to not only meet their health and nutrition demands, but also help them cope with their busy, hectic lifestyles.



One need only look at the growth statistics in the dairy beverage category from 2012–2017 in trend-setting markets like the United States to see the writing on the wall:



Source: Euromonitor International

Lifestyles and consumer preferences are changing, so successful manufacturers will have to continue to innovate and stay ahead of these evolving consumer dairy expectations. New "clean label" solutions and transforming the taste and texture of dairy alternatives to more closely match real dairy will be key drivers of innovation.

Cargill dairy solution portfolio

Cargill specializes in helping manufacturers meet the growing demand for innovative, great tasting products that address some of the most pressing formulation concerns in dairy products. This includes reduced-sugar product development with zero- and low-calorie sweeteners that replicate the taste of sugar as well as texturizers that can mimic the texture, function and mouthfeel of fats.

Cargill offers a portfolio of sweeteners ranging from sugar and corn sweeteners to high-intensity sweeteners that are typically several hundred times sweeter than sugar but contain zero- or low-calories, which can substantially reduce or eliminate added sugars in dairy applications. Cargill's sweetener ingredients offer a range of sweetness levels depending on the goals of the manufacturer.



<p>Full stevia portfolio—Reb A, ViaTech® stevia sweeteners, EverSweet™ next-generation sweetener</p>	<p>Zerose® erythritol, Maltitol</p>	<p>Tapioca syrup</p>	<p>Sugar, including turbinado</p>	<p>Corn sweeteners and glucose-fructose syrup, including reduced-sugar corn syrup and crystalline dextrose</p>
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Cargill has a wide variety of texturizing solutions for dairy with numerous label-friendly, healthful and custom options. Consumers are looking for greater nutrition, functionality and transparency in their dairy products. They also expect their yogurts and dairy treats to have the same creamy texture and their beverages the same great taste and mouthfeel. Sugar reduction is also important for many consumers, but taste and texture remains critical.



Cargill's texturizing solutions can help balance these complex and often contradictory expectations. Sometimes it takes multiple label-friendly ingredients to replace one less desirable ingredient to achieve the same texture and stabilization. Cargill is an experienced formulation partner that can help streamline and speed the path to market with a portfolio of texturizing solutions for dairy and dairy alternatives.

- Carrageenan
- Chicory root fiber
- Custom texturizing systems
- Lecithins
- Maltodextrins
- Pectins
- Starches
- Plant proteins
- Xanthan gum



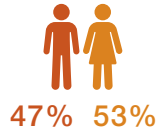
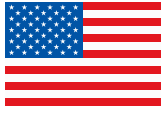
Claims: The labeling, substantiation and decision making of all claims for your products is your responsibility. We recommend you consult regulatory and legal advisors familiar with all applicable laws, rules and regulations prior to making labeling and claims decisions.

Some Cargill products are only approved for use in certain geographies, end uses, and/or at certain usage levels. It is the customer's responsibility to determine, for a particular geography, that (i) the Cargill product, its use and usage levels, (ii) the customer's product and its use, and (iii) any claims made about the customer's product, all comply with applicable laws and regulations.

Respondents' demographics

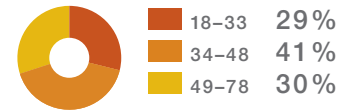
United States

Nationally representative sample of **840 surveys** were collected from respondents with primary or shared responsibility for grocery shopping. By category:



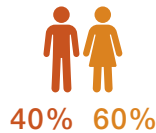
Yogurt (n=335)
Ice cream (n=401)
Flavored milk (n=319)
Dairy alternative products (n=337)

RESPONDENTS BY AGE



Europe

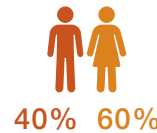
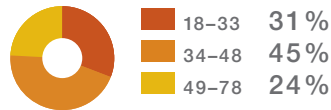
Nationally representative sample of **1,806 surveys** were collected from respondents with primary or shared responsibility for grocery shopping. By category:



United Kingdom (n=299)

Yogurt (n=107)
Ice cream (n=140)
Flavored milk (n=145)
Dairy alternatives (n=147)

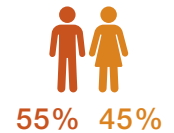
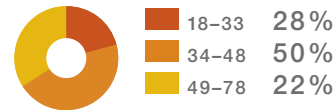
RESPONDENTS BY AGE



France (n=309)

Yogurt (n=47)
Ice cream (n=110)
Flavored milk (n=151)
Dairy alternatives (n=150)

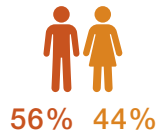
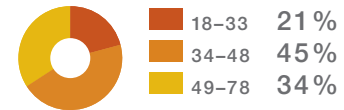
RESPONDENTS BY AGE



Germany (n=295)

Yogurt (n=122)
Ice cream (n=104)
Flavored milk (n=150)
Dairy alternatives (n=150)

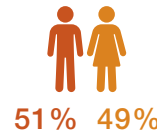
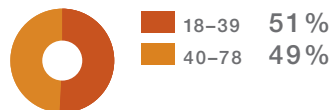
RESPONDENTS BY AGE



Spain (n=307)

Yogurt (n=148)
Ice cream (n=118)
Flavored milk (n=149)
Dairy alternatives (n=149)

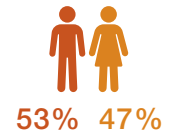
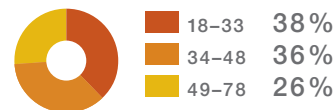
RESPONDENTS BY AGE



Denmark (n=290)

Yogurt (n=103)
Ice cream (n=142)
Flavored milk (n=147)
Dairy alternatives (n=103)

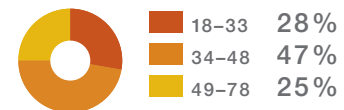
RESPONDENTS BY AGE



Russia (n=306)

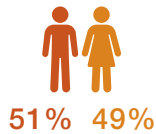
Yogurt (n=107)
Ice cream (n=149)
Flavored milk (n=151)
Dairy alternatives (n=148)

RESPONDENTS BY AGE



Asia Pacific

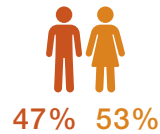
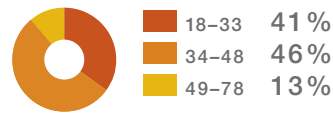
Nationally representative sample of **1,204 surveys** were collected from respondents with primary or shared responsibility for grocery shopping. By category:



China (n=602)

Yogurt (n=271)
Ice cream (n=209)
Flavored milk (n=319)
Dairy alternatives (n=257)

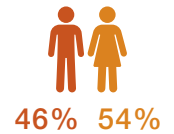
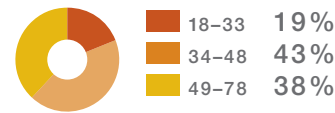
RESPONDENTS BY AGE



Japan (n=298)

Yogurt (n=147)
Ice cream (n=162)
Flavored milk (n=100)
Dairy alternatives (n=113)

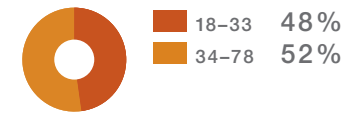
RESPONDENTS BY AGE



Indonesia (n=301)

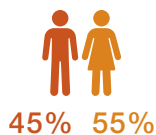
Yogurt (n=101)
Ice cream (n=130)
Flavored milk (n=164)
Dairy alternatives (n=124)

RESPONDENTS BY AGE



The Americas

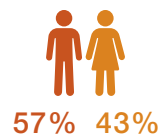
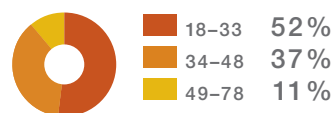
Nationally representative sample of **1,416 surveys** were collected from respondents with primary or shared responsibility for grocery shopping. By category:



Mexico (n=801)

Yogurt (n=305)
Ice cream (n=397)
Flavored milk (n=399)
Dairy alternatives (n=379)

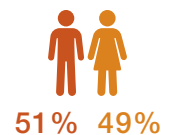
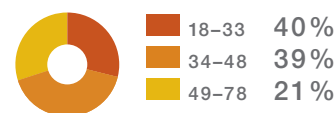
RESPONDENTS BY AGE



Argentina (n=306)

Yogurt (n=123)
Ice cream (n=150)
Flavored milk (n=132)
Dairy alternatives (n=141)

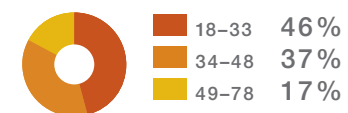
RESPONDENTS BY AGE



Brazil (n=309)

Yogurt (n=121)
Ice cream (n=149)
Flavored milk (n=149)
Dairy alternatives (n=148)

RESPONDENTS BY AGE



References

- 1 “Packaged Food: Dairy in Western Europe.” Euromonitor International, 2017.
- 2 “Dairy and Dairy Alternative Beverage Trends in the U.S. 4th Edition.” Packaged Facts.
- 3 “Dairy in Asia-Pacific.” Euromonitor International, 2017.
- 4 Dairy Category Research Report for U.S. Category Comparison Summary. Cargill Proprietary Research. March 2018
- 5 Dairy Category Research Report for Europe. Category Comparison Summary. Cargill Proprietary Research. March 2018.
- 6 Dairy Category Research Report for Asia. Category Comparison Summary. Cargill Proprietary Research. March 2018
- 7 Dairy Category Research Report for Americas. Category Comparison Summary. Cargill Proprietary Research. April 2018
- 8 Dairy Category Research Report for U.S. Category Comparison Summary. Cargill Proprietary Research. March 2018
- 9 Dairy Category Research Report for Europe. Category Comparison Summary. Cargill Proprietary Research. March 2018.
- 10 Dairy Category Research Report for Asia. Category Comparison Summary. Cargill Proprietary Research. March 2018
- 11 Dairy Category Research Report for Americas. Category Comparison Summary. Cargill Proprietary Research. April 2018.
- 12 “Packaged Food: Dairy in Western Europe.” Euromonitor International, 2017.
- 13 “Packaged Food: Dairy in Western Europe.” Euromonitor International, 2017.
- 14 “Packaged Food: Dairy in Western Europe.” Euromonitor International, 2017.
- 15 “Dairy in Asia-Pacific.” Euromonitor International, 2017.
- 16 “Dairy in Asia-Pacific.” Euromonitor International, 2017.
- 17 “Dairy in Latin America Report 2018.” Euromonitor International. <http://www.euromonitor.com/dairy-in-latin-america/report>
- 18 Hoşafçı, P. “Overview of Dairy in Latin America.” Euromonitor International. Market Research Blog, Dec. 28, 2017. <https://blog.euromonitor.com/2017/12/cheese-milk-latin-america.html>
- 19 Hoşafçı, P. “Overview of Dairy in Latin America.” Euromonitor International. Market Research Blog, Dec. 28, 2017. <https://blog.euromonitor.com/2017/12/cheese-milk-latin-america.html>
- 20 “Dairy and Dairy Alternative Beverage Trends in the U.S. 4th Edition.” Packaged Facts.
- 21 “Dairy and Dairy Alternative Beverage Trends in the U.S. 4th Edition.” Packaged Facts.
- 22 Mellentin, J. “Ten Key Trends in Food, Nutrition and Health 2018.” New Nutrition Business. <https://www.new-nutrition.com/>
- 23 “Dairy and Dairy Alternative Beverage Trends in the U.S. 4th Edition.” Packaged Facts.
- 24 “Dairy and Dairy Alternative Beverage Trends in the U.S. 4th Edition.” Packaged Facts.
- 25 Mellentin, J. “Ten Key Trends in Food, Nutrition and Health 2018.” New Nutrition Business. <https://www.new-nutrition.com/>
- 26 Mintel Global Ice Cream Annual Review, January 2017.
- 27 Canning, K. “Milk Sales Tumble, but Whole Milk, Flavored Options are Bright Spots.” Dairy Foods, Feb. 2, 2018. <https://www.dairyfoods.com/articles/92702-milk-sales-tumble-but-whole-milk-flavored-options-are-bright-spots>
- 28 “Dairy in Asia-Pacific.” Euromonitor International, 2017.
- 29 Hoşafçı, P. “Overview of Dairy in Latin America.” Euromonitor International. Market Research Blog, Dec. 28, 2017. <https://blog.euromonitor.com/2017/12/cheese-milk-latin-america.html>
- 30 Hoşafçı, P. “Overview of Dairy in Latin America.” Euromonitor International. Market Research Blog, Dec. 28, 2017. <https://blog.euromonitor.com/2017/12/cheese-milk-latin-america.html>
- 31 Dairy Sector—Trends and Opportunities, 2017. Deloitte Touche Tohmatsu Ltd. https://www2.deloitte.com/content/dam/Deloitte/ie/Documents/ConsumerBusiness/ie_Dairy_Industry_Trends_and_Opportunities.pdf

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New Concept in Dairy Barn Design

Positive & Naturally Ventilated Barn

Dr. Gordie Jones
Partner
Central Sands Dairy, LLC.

2020 Georgia Dairy Conference



All Season Hybrid Barn

Positive & Naturally Ventilated Barn

Dr. Gordie Jones
Partner
Central Sands Dairy, LLC.

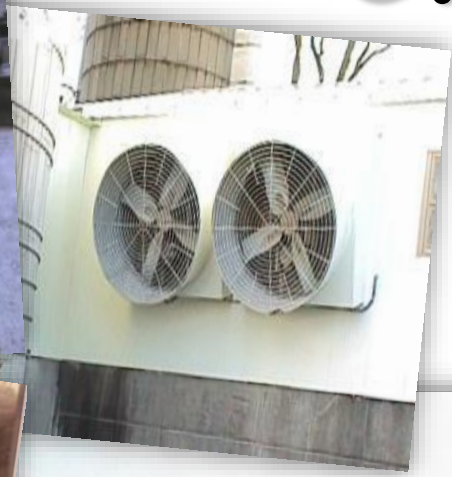


Dr. Gordie Jones

- 15 years Dairy Practice
- 10 years Dairy Nutrition / Facility / Cow Comfort consulting
- 3 years Monsanto (BST) consulting
- 6 years designed & managed Fair Oaks Dairy Farms (20,000 cows)
- 5 years building and managing my dairy farm!
- Consulting again

Trends in the Dairy Industry over the last 25 years can be best described by the term:

CHANGE



PM Fricke, Ph...

I just got back from a
dangerous & successful
hunting trip in Indiana



Management, Environment & Herd Performance

47 herds with similar genetics were fed same TMR

- **Milk yield varied by 29 lb/d (45-74 #) (20-34L)**
- **Non-dietary factors accounted for 56% of variation in milk yield**
 - Feeding management
 - Feeding for refusals (64.1 vs 60.6 lb/d)
 - Feed push-ups (63.7 vs 55 lb/d)
 - Stall design and management
 - Stalls per cow
 - Age at first calving

(Bach et al., 2008)





















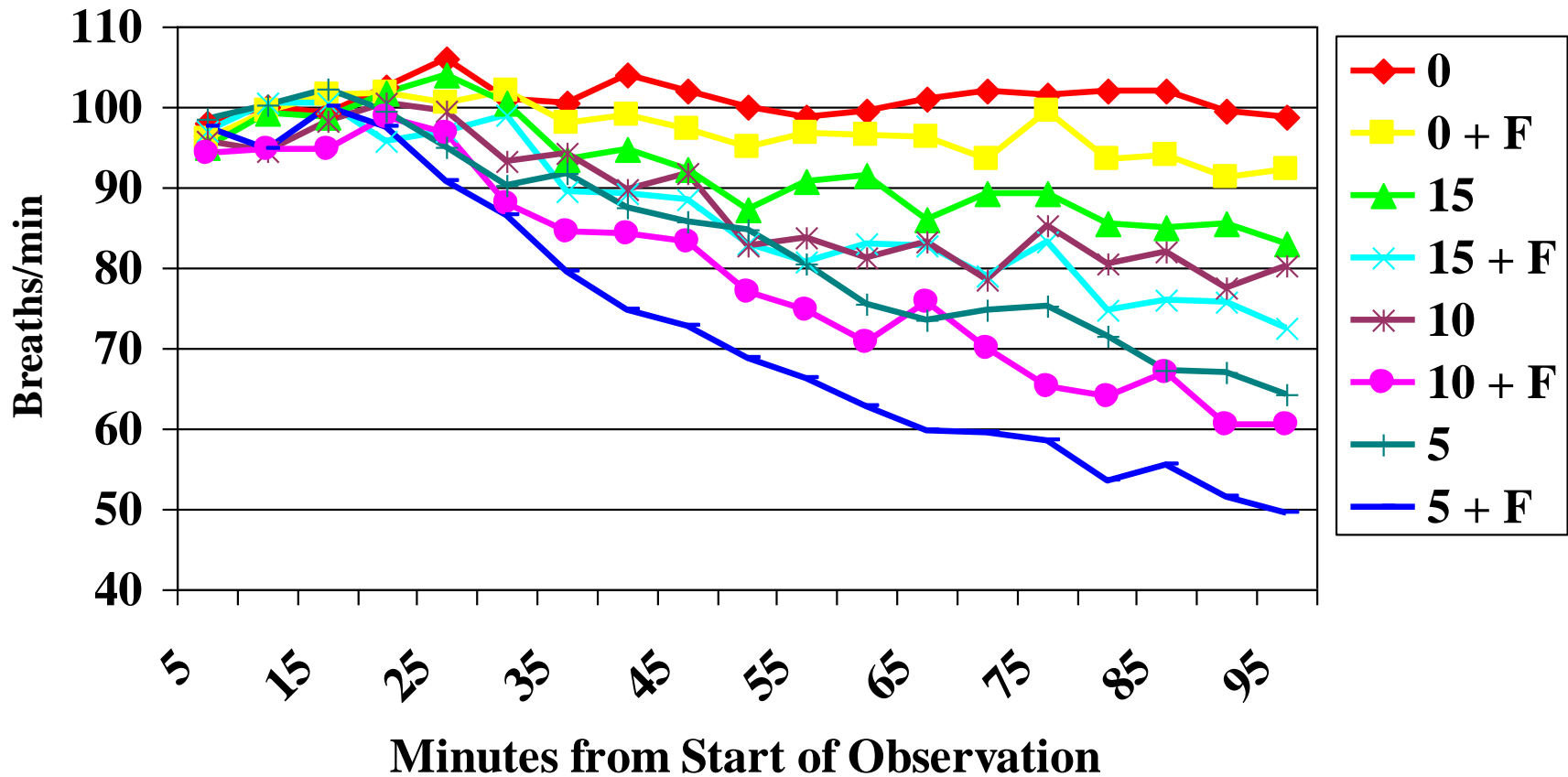
3 Things a Cow Should Do!

- Stand to MILK
- Stand to EAT & DRINK
- LAY DOWN



Effect of Fans and Soaking Cows

Effect of Soaking Frequency and Supplemental Air Movement



Breeding Cows at Large Dairy with no Cooling

- No Cow Cooling in Place
- No Fans / No Soaking
- Summer Preg rates 8-15

- Dairy Comp 305 ----- Large Dairy #2 -----
 - Command : BREDSUM\V40E -
 - Expanded : -

- 20102 ----- Dr Gordie Jones ----- 1/ 2

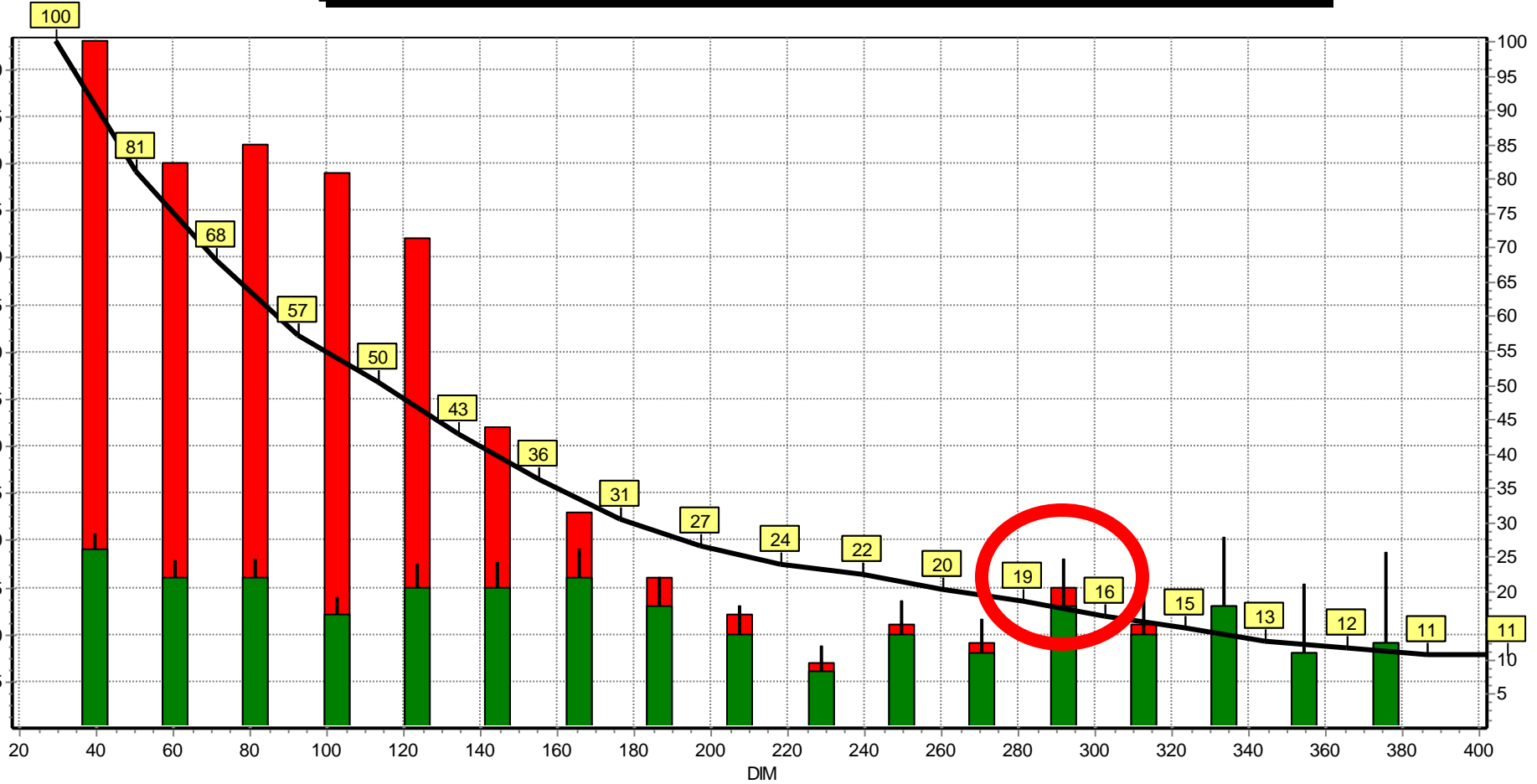
Date	Ht	Elig	Heat	Pct	Pg	Elig	Preg	Pct	
=====	=====	=====	=====	=====	=====	=====	=====	=====	
4/04/01	496	339	68	495	115	23			
4/25/01	475	310	65	475	90	19			
5/16/01	499	283	57	499	85	17			
6/06/01	459	317	69	458	58	13			
6/27/01	458	293	64	458	62	14			
7/18/01	470	267	57	470	39	8			
8/08/01	533	339	64	532	82	15			
8/29/01	585	418	71	585	116	20			
9/19/01	599	413	69	591	142	24			
10/10/01	619	411	66	611	139	23			
10/31/01	624	408	65	599	121	20			
11/21/01	609	387	64	0	0	0	0	????	Preg Stat
12/12/01	559	383	69	0	0	0	0	????	Preg Stat

Total	7547	4809	64	7500	1163	16	101		

Survival Graph Large Dairy #2

01/02/02 Cow and Heifer File

Heat Detection Rate PR 95% CI Pregnancy Rate Percent of Herd Still Open



Preg Rate Loss

- Drop of 1 Preg Rate point is 1\$/Cow/Month M. Overton -Elanco
- Drop for 5 months
- 1,000 Cows * 25\$ = \$25,000

Breeding Cows at Large Dairy-Cooling in Place

- Cow Cooling in Place
- Fans over beds & feed lane
- Summer Preg rates 15-20



- Dairy Comp 305 ----- Dairy 2 -----

- Command : BREDSUM\V40E

- Expanded :

-

- 20103 ----- Dr Gordie Jones ----- 1/ 9 -

Date Ht Elig Heat Pct Pg Elig Preg Pct Aborts

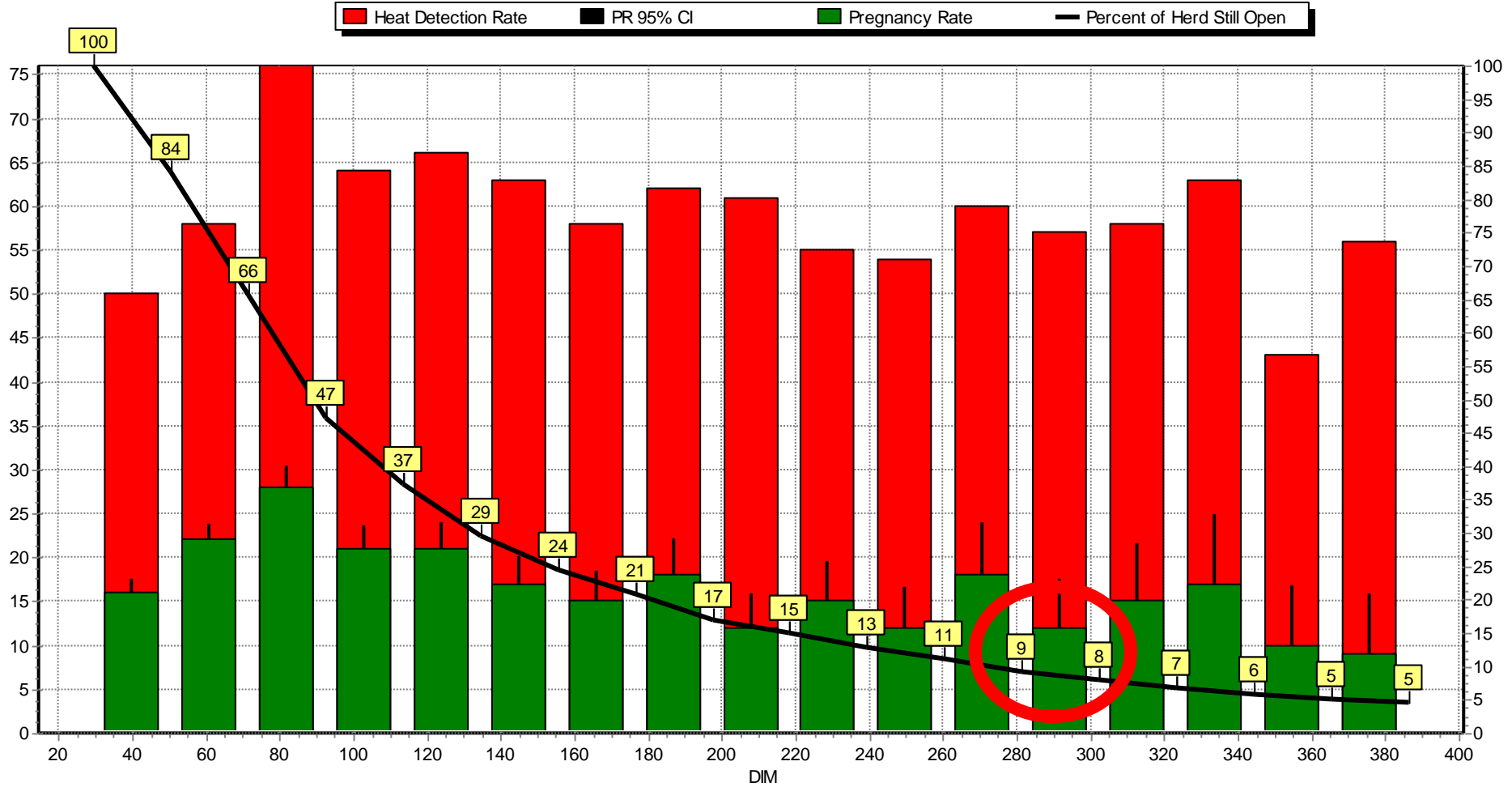
=====

2/28/02	500	298	60	500	90	18	7	
3/21/02	434	256	59	434	73	17	6	
4/11/02	494	329	67	494	101	20	5	
5/02/02	530	303	57	530	92	17	8	
5/23/02	582	373	64	582	118	20	5	
6/13/02	652	419	64	652	129	20	7	
7/04/02	645	418	65	644	115	18	7	
7/25/02	623	367	59	623	94	15	2	
8/15/02	662	424	64	662	122	18	2	
9/05/02	670	424	63	660	120	18	3	
9/26/02	708	465	66	694	140	20	0	
10/17/02	711	460	65	696	137	20	0	
11/07/02	790	461	58	756	141	19	0	
11/28/02	517	291	56	0	0	0	0	???? Preg Stat
12/19/02	477	293	61	0	0	0	0	???? Preg Stat

Total 9140 5604 61 9065 1521 17 70

Survival Graph Large Dairy #2

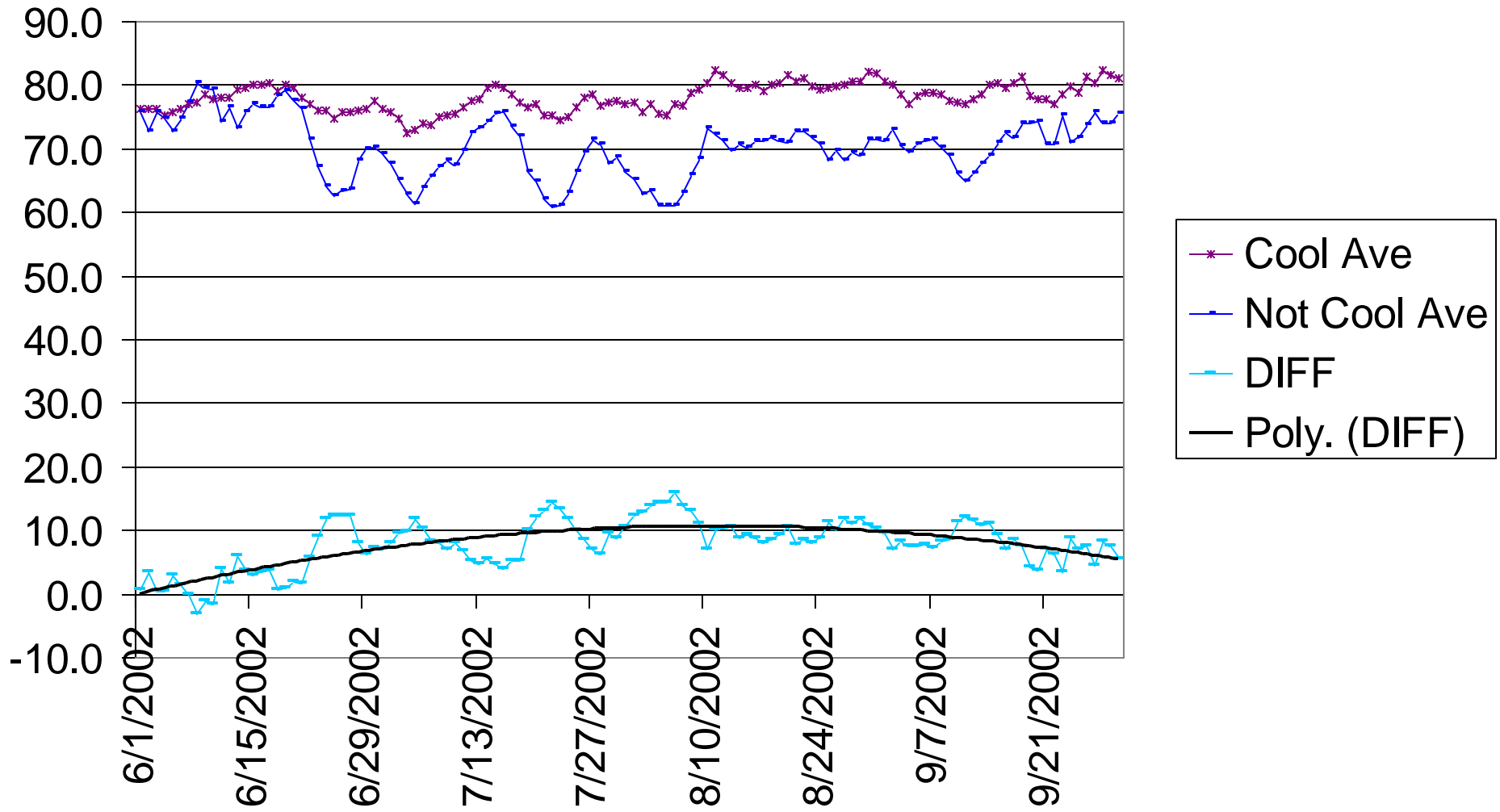
09/01/04 DAIRY 2



Milk Loss

- Comparing Two dairies not cooled
- One dairy cooled

Cooling Summer 2002



Milk Loss / Day

- $8\# (3.6L) * 1,000 \text{ cows} = 8,000$
- $80\text{cwt} * 15.00 = \$1,200$
- Less Feed Cost
- Feed $1\# = 2.5\#$ Marginal Milk
- $8,000 / 2.5 = 3,200\#$ feed/day
- $3,200\# * .1/\# = \$320$ /day feed
- $\$1,200 - \$320 = \$880/\text{day}$
- $120 \text{ days} * \$880 = \$105,600\$$

Money Loss Total

- \$105,600.00 Milk
- \$ 25,000.00 Repro

Summary for Cow Cooling

- Soaking every 5 minutes + Fans
 - Superior Heat Abatement
- Increasing Soaking
 - Decreased Respiration Rates
 - Decreased Body and Skin Temperatures
- Many Systems Ineffective
 - Water Restrictions
 - Airflow
 - Frequency

Brand New Dairy Building

All Dairy Facilities are Tools

- Facilities are tools that let you implement the dairy plan.
- If no plan, then the facility will dictate management
- Facilities last a long time.
- So do your decisions!

Performance

- Welfare / Cow Comfort
- Nutrition / Rations
- Management / People

Goals of Management

- Breed cows
- Pregnancy check
- Vaccinate Herd
- Milk quickly
- Manure
- Treatment
- Deliver Feed
- Deliver Bedding
- 20 hours of eating/ drinking/ lying
- Move Cows
- ???

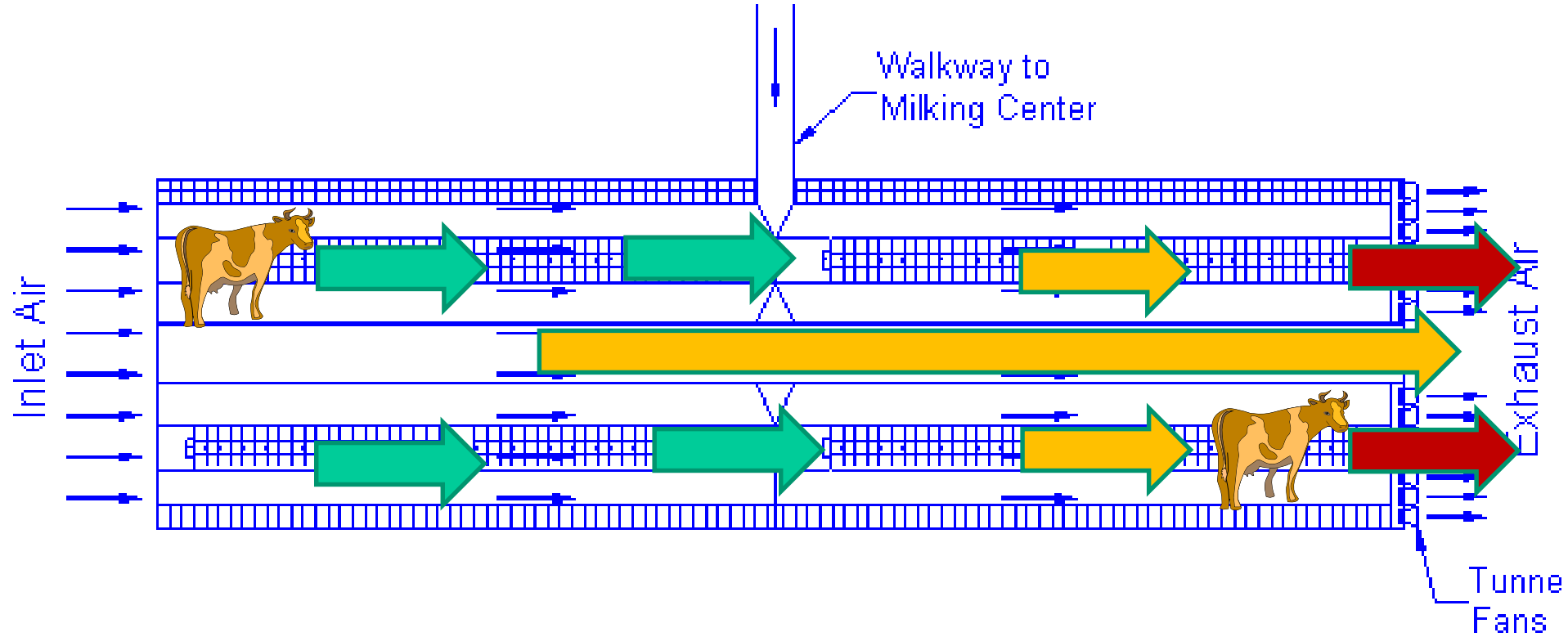
Toughest Decisions

- Ventilation - Natural vs. Mechanical
- 6 row vs. 4 row
- Stalls - Head to Head vs. Tail to Tail
- Bedding - Sand vs. everything else
- Hospital parlor
- One way or two way main street

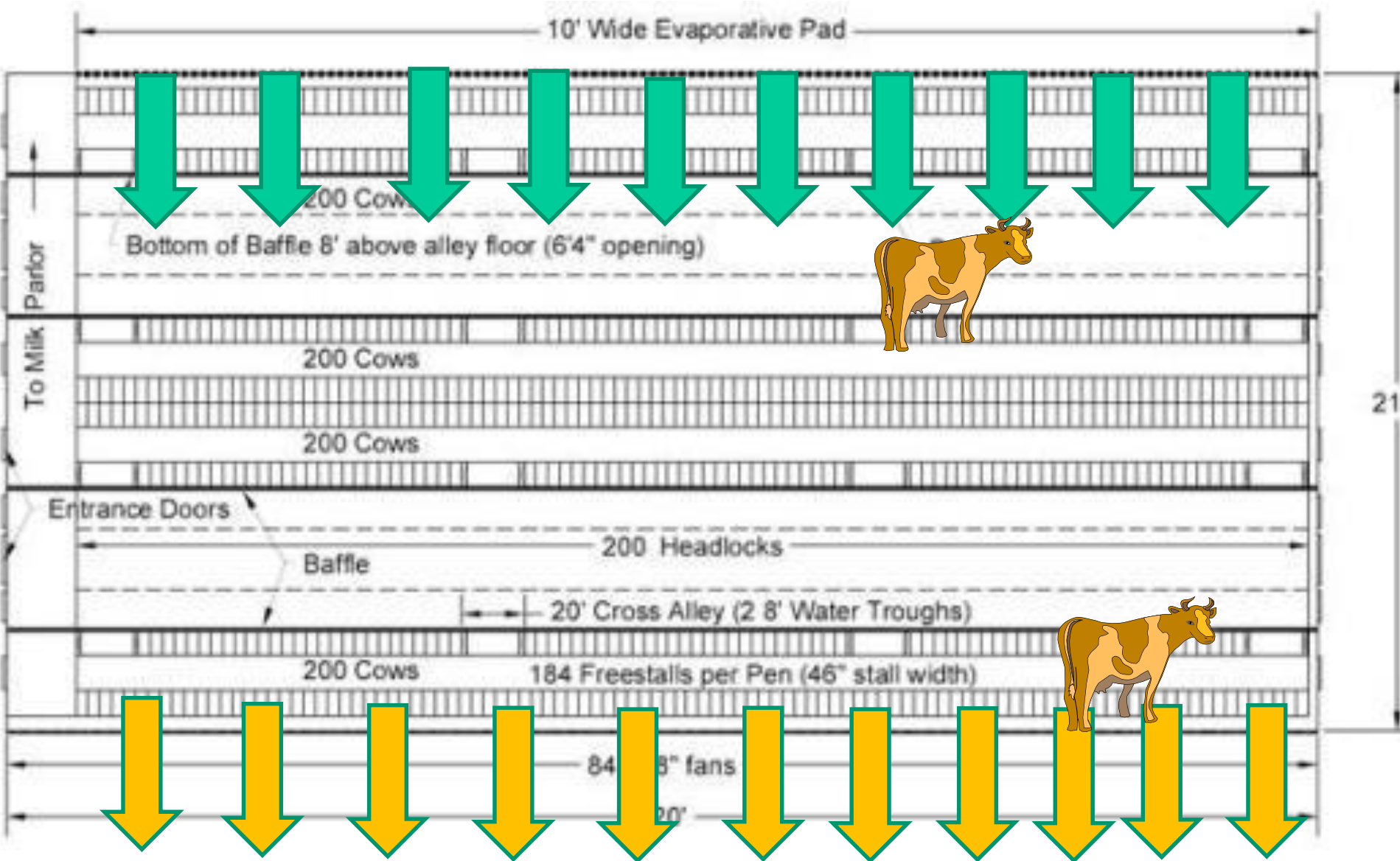
Ventilation

- Natural
- Mechanical
- Wind Tunnels
- Cross Ventilation

Wind Tunnel



Cross Vent



Both Wind Tunnels & Cross Vents

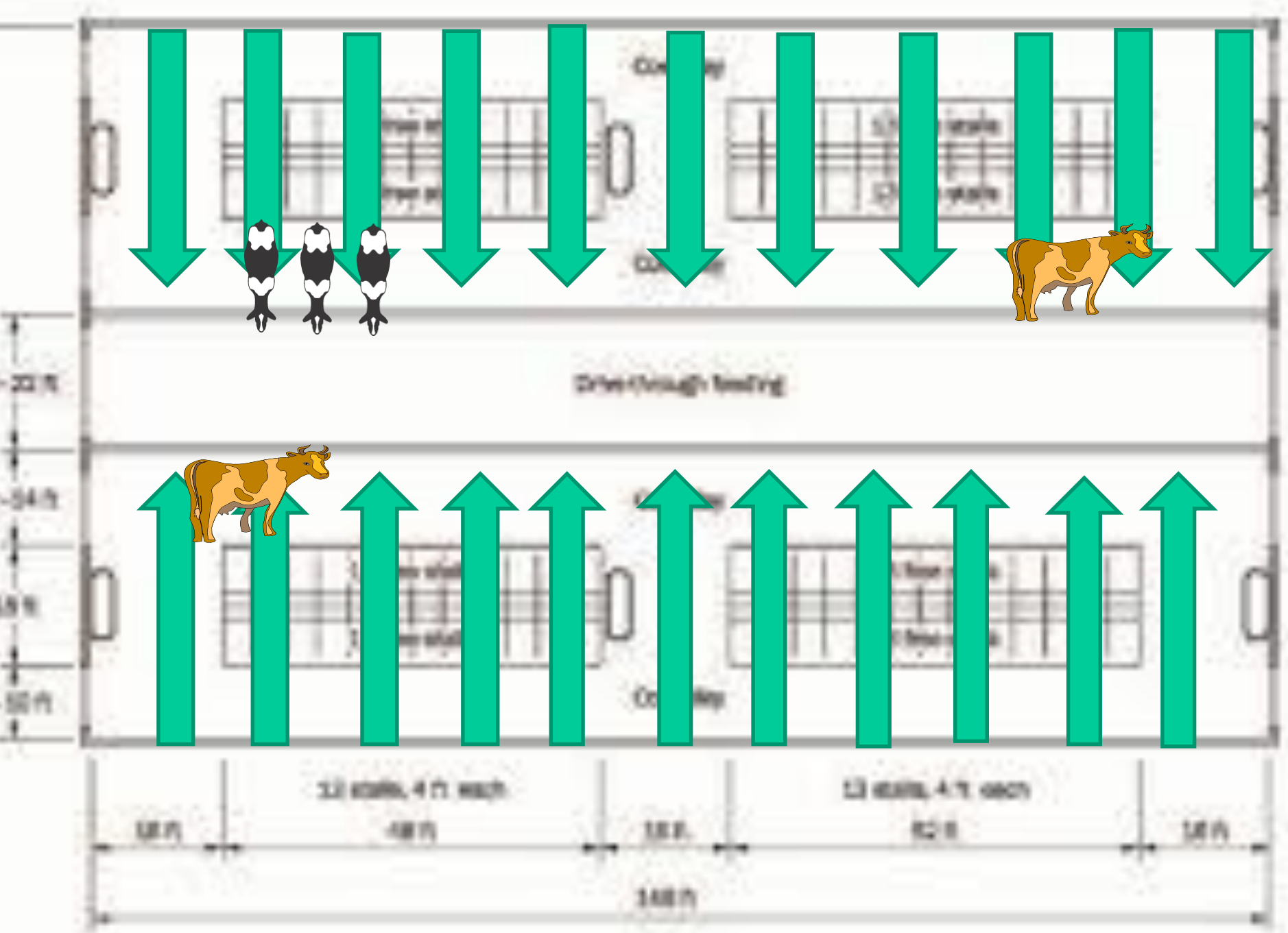
- Need Fans 100% of the time
- Need Generator for Fan backup
- Have Fresh air inlet side/end
- And Stale air exhaust side/end
- Any Penetration
- Feeding, Bedding, Manure, disrupts the ventilation

Newest Freestall Ventilation

- Natural / Positive Hybrid
- Naturally Ventilated up to 70f THI
- 70F THI Curtains Close
- Positively Ventilated >70f THI 40-60 ACH
- No Power / No fans needed below 70f THI
- Winter....below 10f reduce the exhaust to 4 continuous air exchanges/hour (ACH)....
- no manure freezing ($\Delta 30^{\circ} C$)

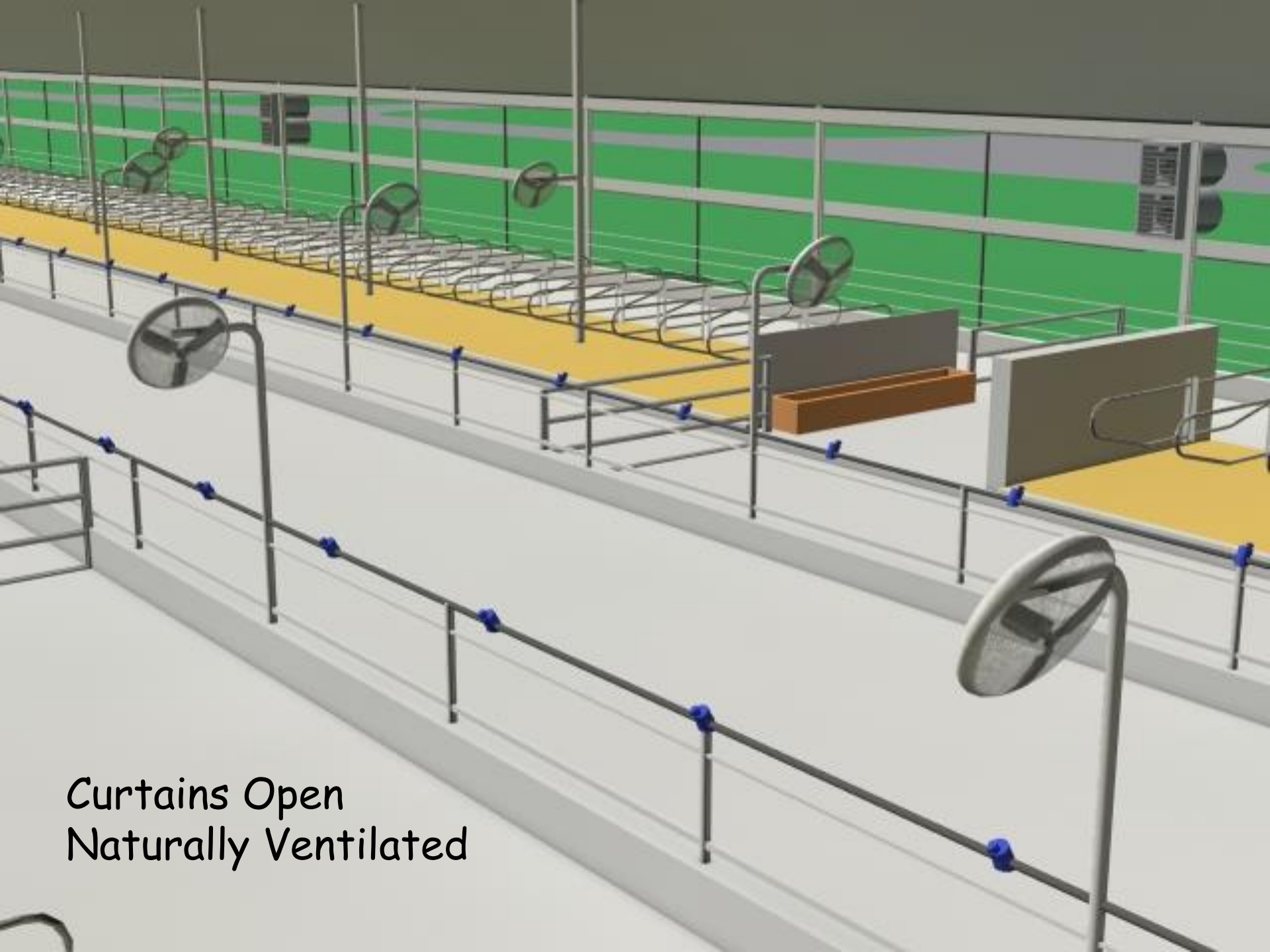
Goals of New Barn

- No heat stress
- No "Bunching"
- No Frozen Manure in cold climates
- Fresh Air Everywhere for all Cows





This was my first concept of a
Naturally Ventilated Hybrid Barn



Curtains Open
Naturally Ventilated



Curtains Closed
Positively Ventilated





$V_o, \Delta t_o, A_o, K1, K2$

Alpha o

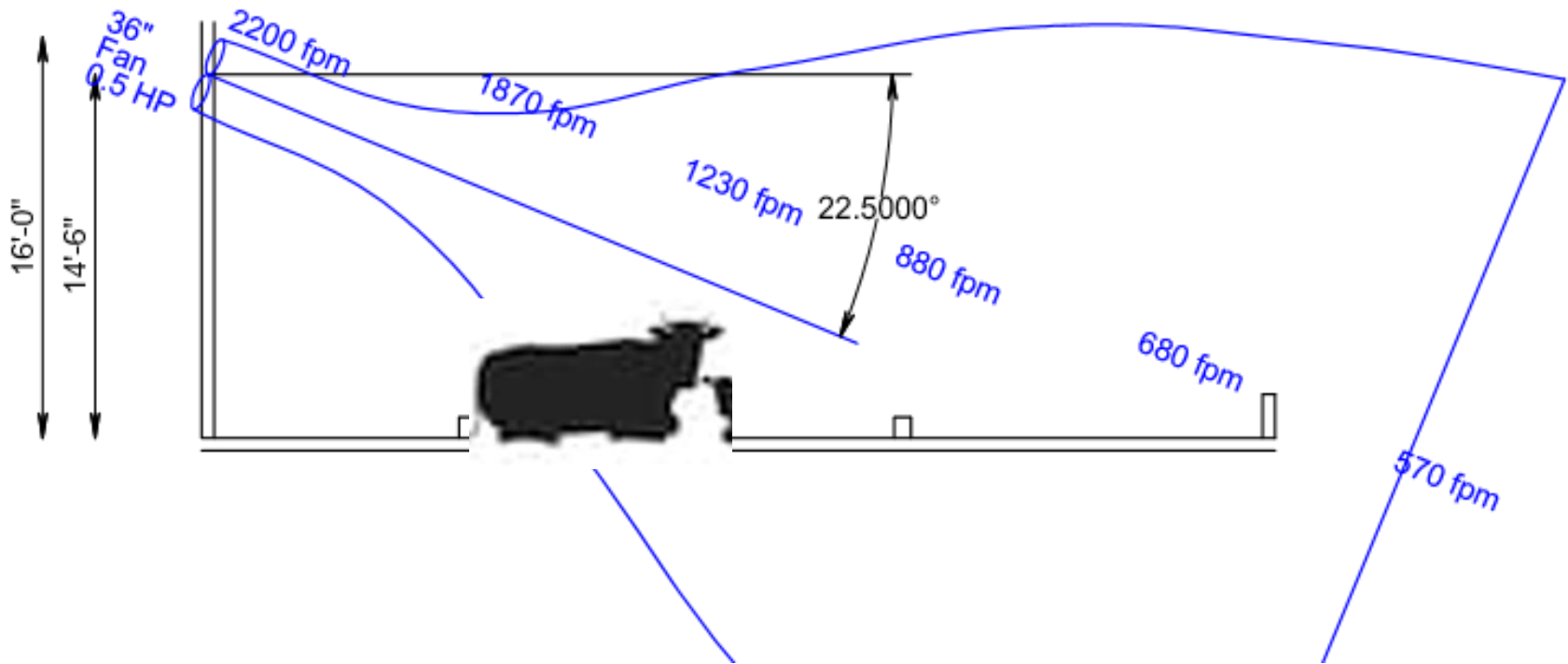
centerline

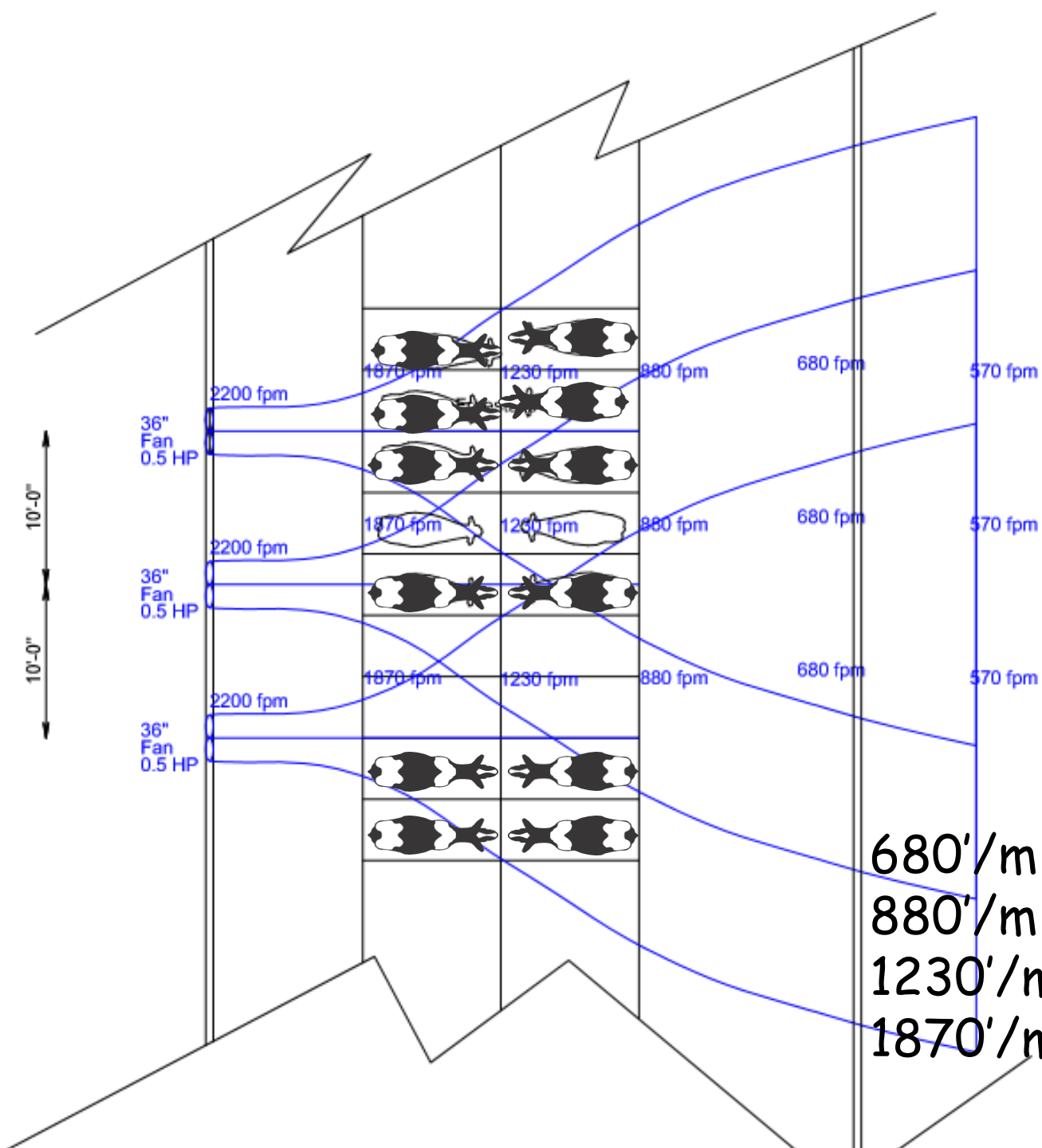
$V_x, \Delta t$

$$\sqrt{\frac{\rho_o Q_o V_o^2}{\rho_{room} (1 + II^2) V_{room}} + \frac{2gH Q_o \beta (T_{room} - T_o)}{(1 + II^2) V_{room}}}$$



Occupied Zone





$680' / m = 7.7 \text{ mph}$
 $880' / m = 10 \text{ mph}$
 $1230' / m = 14 \text{ mph}$
 $1870' / m = 21 \text{ mph}$

Operational Costs

System	No. of Barns	Exhaust/ Intake fans per barn	Circulation fans	Total Fans (All Barns)	ACH	Cost per cow per year
Nat Vent	2			240	NA	\$17.99
Hybrid Positive	2		-	360	60	\$18.60
Tunnel	2	46	62	216	40	\$56.13
Cross	1	115	-	115	50	\$46.46
Hybrid Tunnel	2	12+47	64	246	40	\$62.04





















Goals of New Barn

- No Heat Stress
 - No "Bunching"
 - No Frozen Manure
 - Fresh Air Everywhere for all Cows
-
- Goals Achieved !!

Case Study Herd

- 85-90#/cow
- 30% Overcrowding
- New All Season Hybrid Barn Built
- Old Barns retro fitted
- Both Ventilation and Cross Overs fixed
- 1 Cow/ Bed
- Main Street 26' (8m) wide
- Milk up to 105-108#/ cow within 6 months

Advantages of All Season Hybrid Ventilation

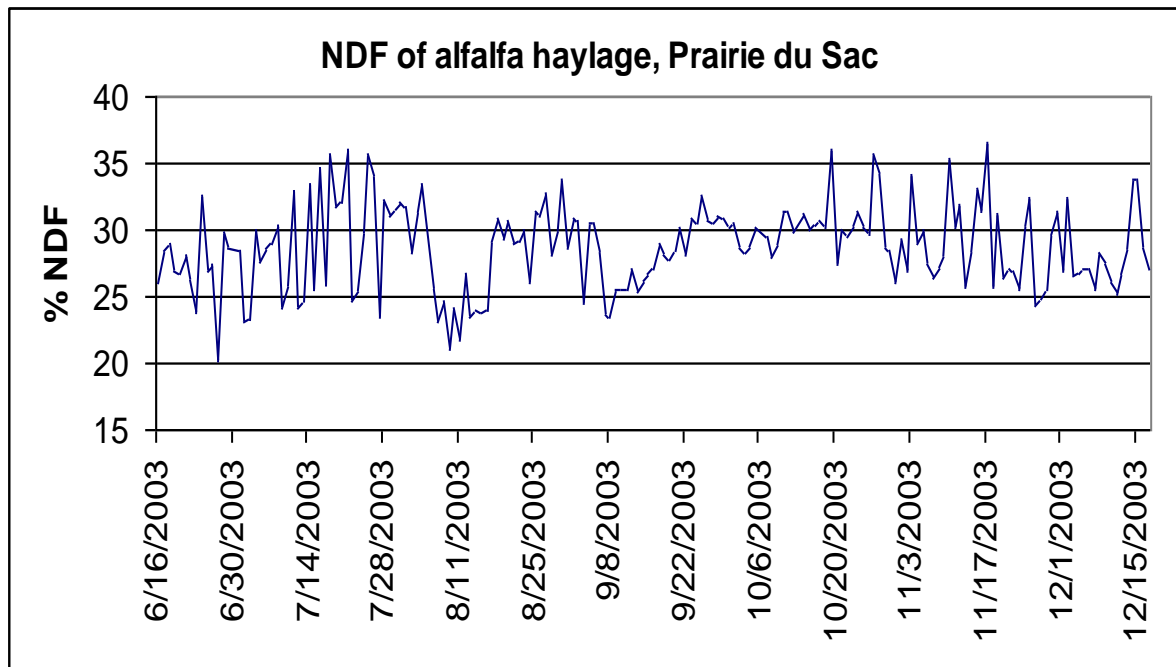
- Clean Fresh Air everywhere
- Same operational costs as Naturally Ventilated with fans
- 1/3 lower operational costs than Mechanical Vent
- Doors can be open or closed, no effect on ventilation
- Less Real Estate (Buildings can be close together)
- No Generator needed for Fans
- Always Fresh Air (no wind needed)
- Simple to operate
- No manure freezing, No Steaming ($\Delta 30^{\circ} C$)

Questions? Thoughts?

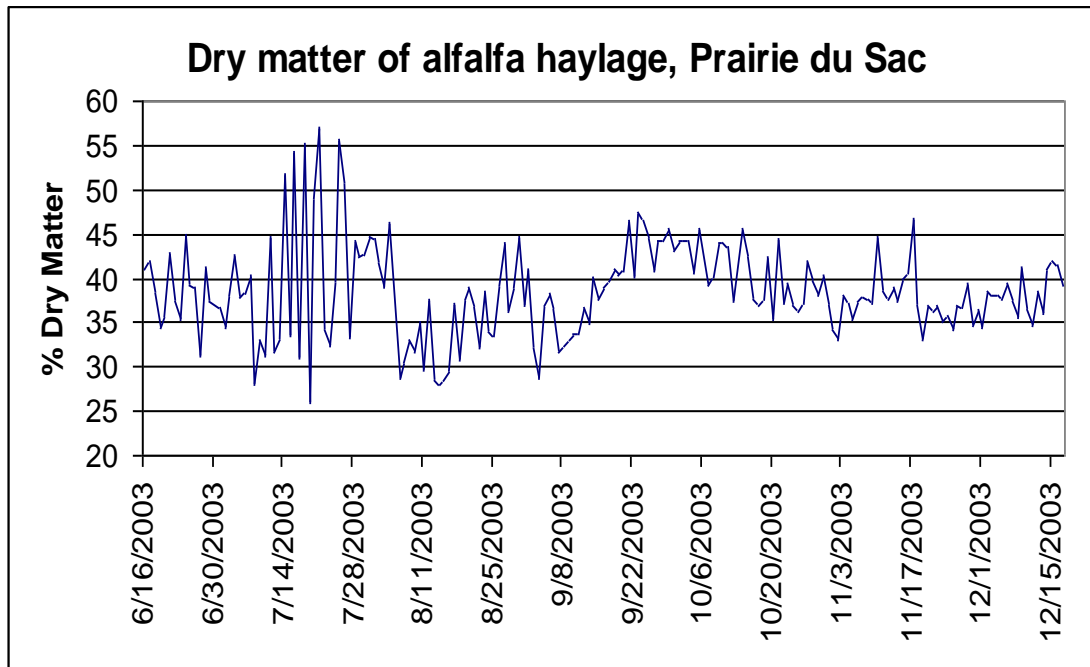


A Few Tips!

Variation in forages



Variation in forages





KUC-DWU LERSTM F-480 NBP-WG 1P

KUC-DWU LERSTM D-26FS





Laying Straight

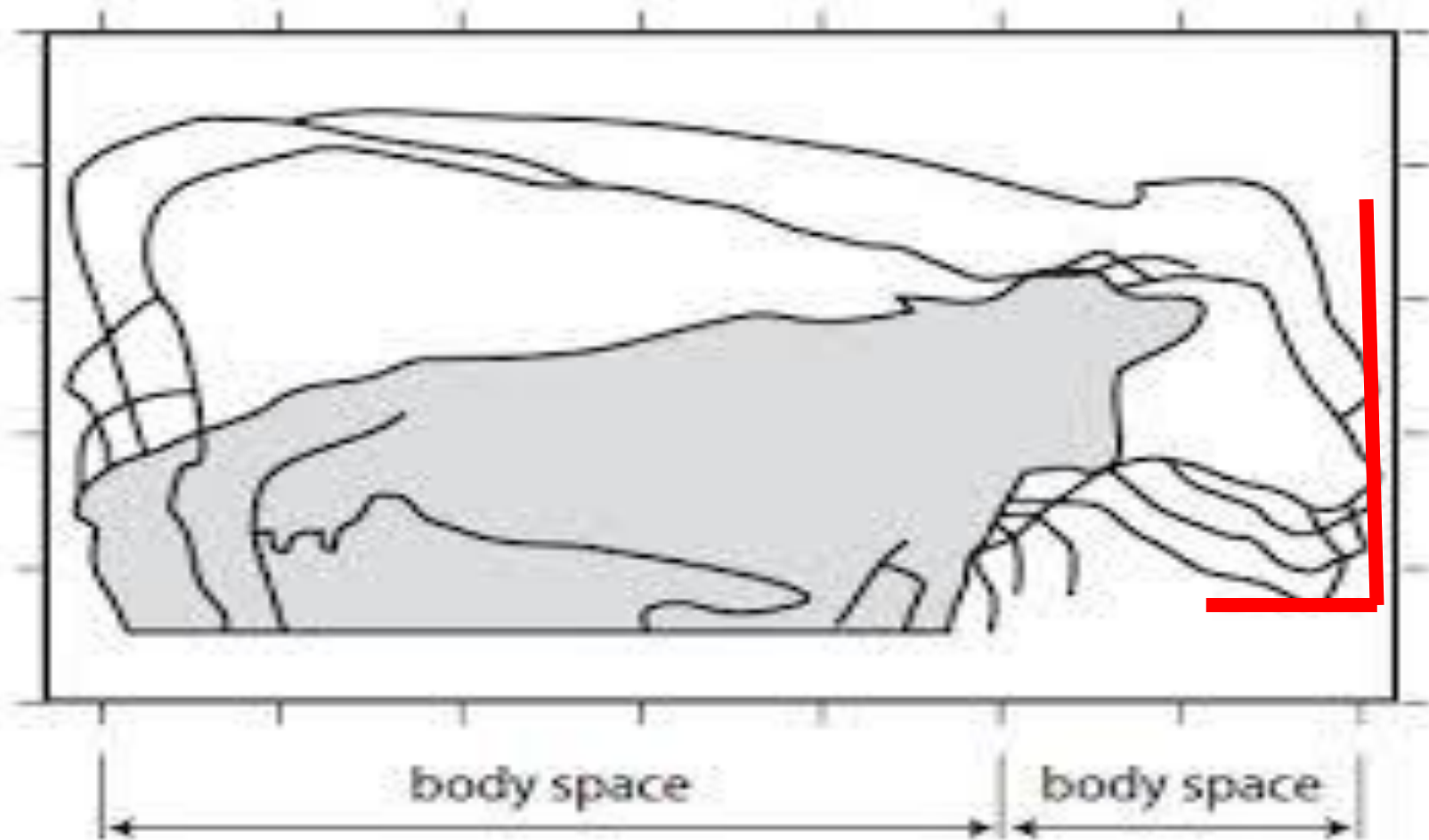


Freestalls

4 reasons freestalls fail

- Lack Of Cushion
- Neck Rail Placement
- Lunge Space Limitations
- Lack of Fresh Air / Vision





Source: *Irish and Merrill.*







Freestall Pen
Head to Tail





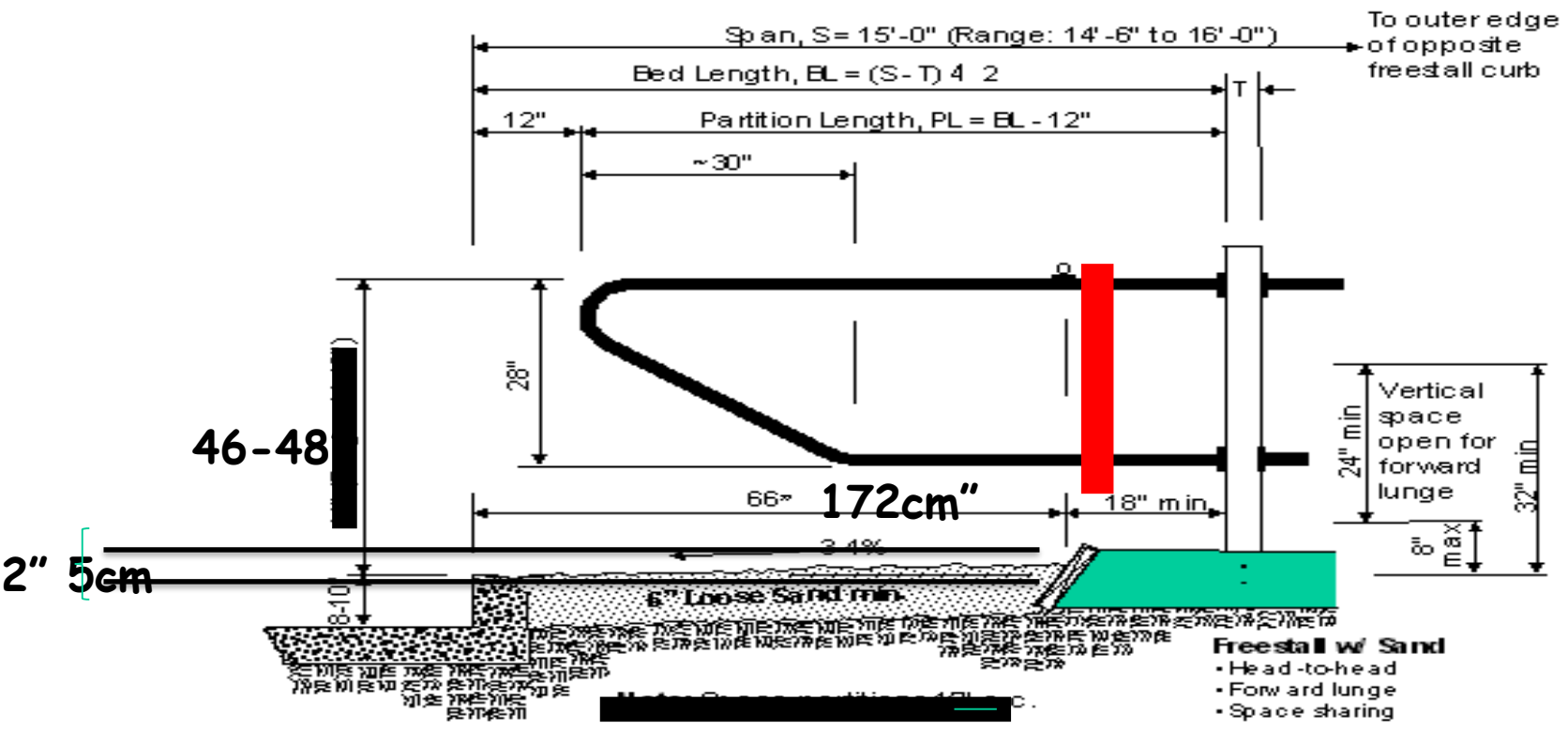




Freestalls

my current recommendations

- 48" (122cm) wide
- Neck rail 48" (122cm) above back curb
- 66-68" (172cm) from back curb to contact of neck rail
- 16' (5m) from curb to curb "nose to nose"
- 66-68" (172cm) to Brisket Board
- 2" (5cm) above back curb for brisket board



Wide stalls

- Why are we making them wider?
- Cows lay diagonally in the stalls
- If a 28" loop is used with forward lunge, width is not so important.
- Next slide is a small Jersey springer in a 46" wide stall that is too wide for her, but because of the loop she is lying parallel to the dividers

















