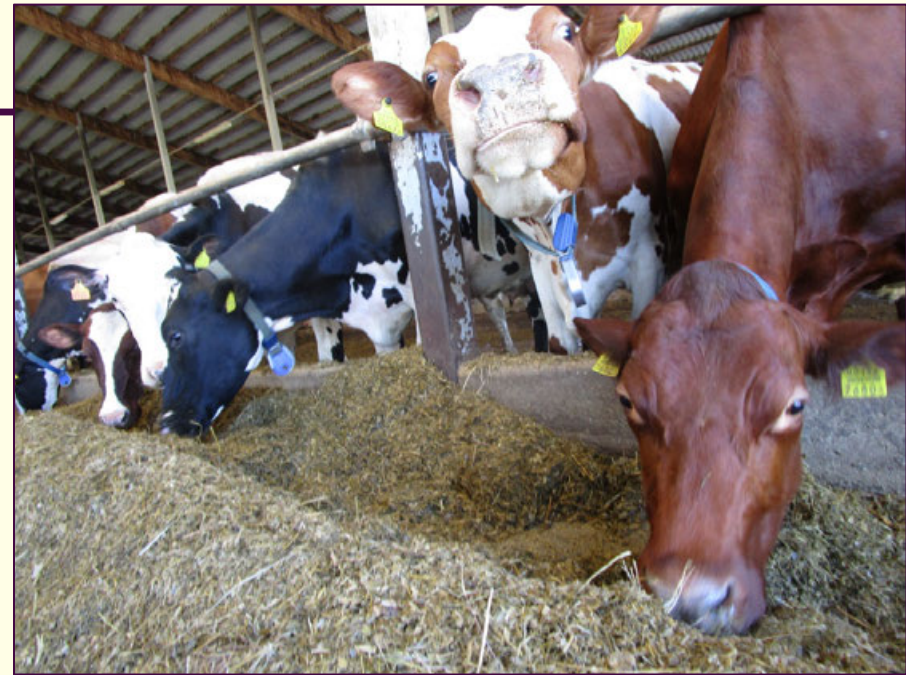


Large Dairy Farms



Competing in a World Market





2400 Cow Dairy in Washington

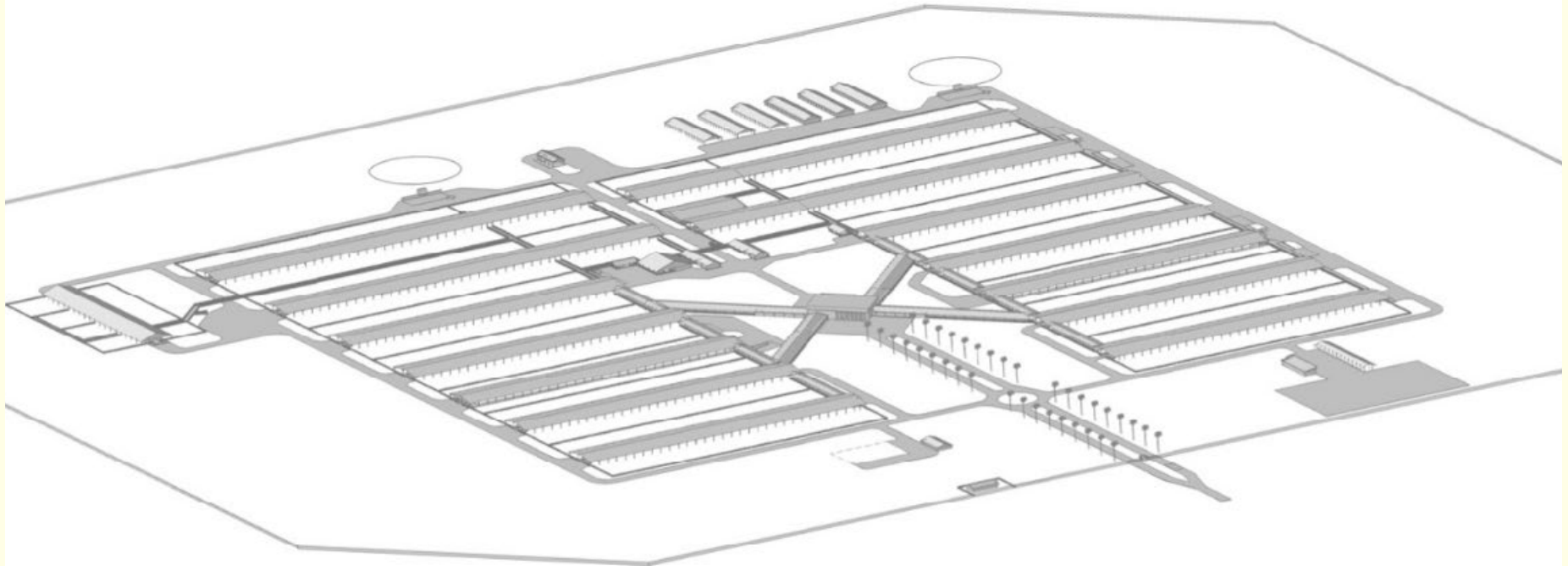


3000 Head
New Mexico

TYPICAL MEGA DAIRY FARM EXAMPLE



NATIONAL AGRICULTURAL DEVELOPMENT COMPANY
HARADH, SAUDI ARABIA

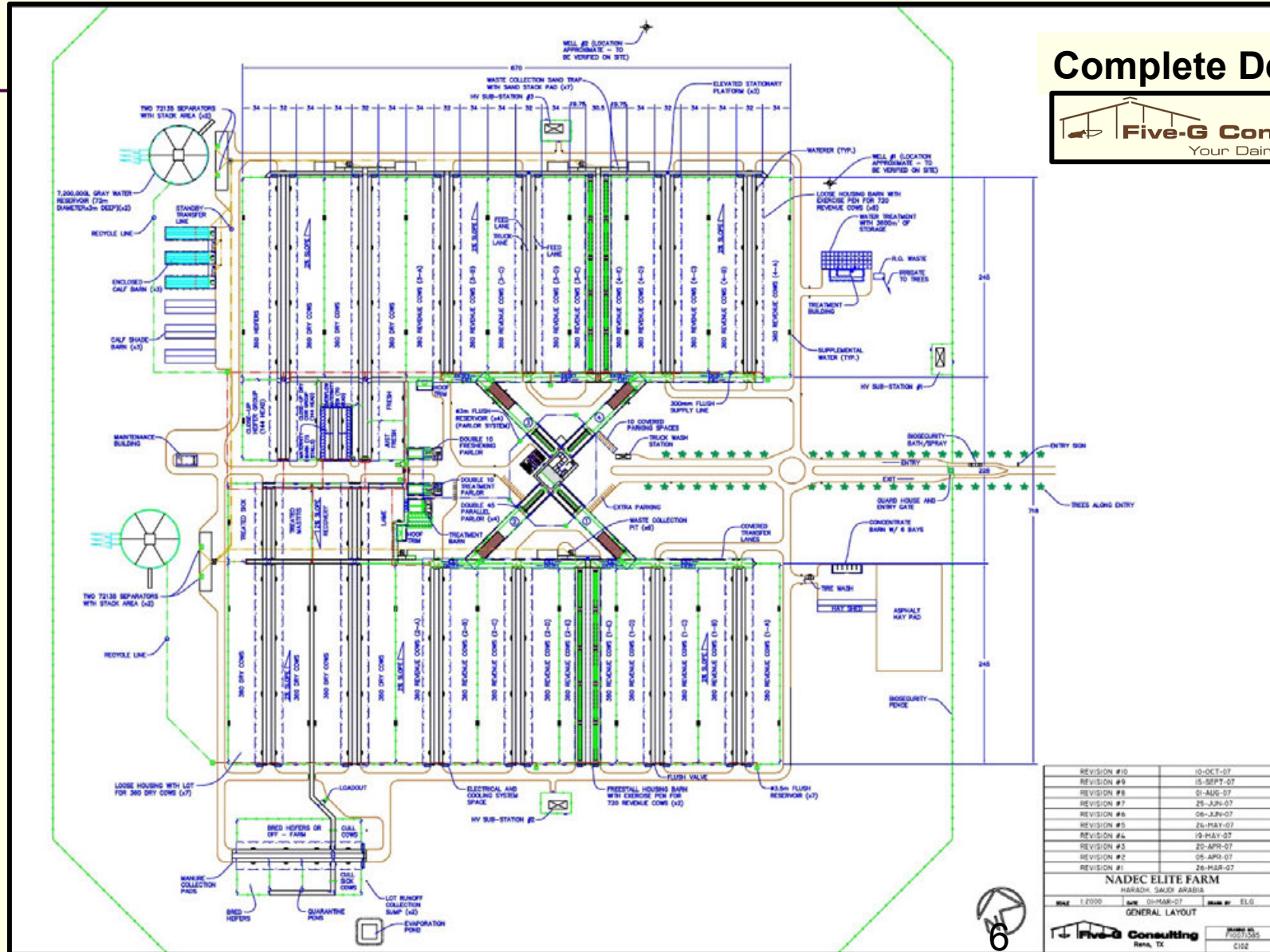


- **DAIRY #6**



TYPICAL MEGA DAIRY FARM EXAMPLE

Complete Design by



REVISION #10	10-OCT-07
REVISION #9	05-SEPT-07
REVISION #8	31-AUG-07
REVISION #7	25-JUN-07
REVISION #6	06-JUN-07
REVISION #5	26-MAY-07
REVISION #4	09-MAY-07
REVISION #3	20-APR-07
REVISION #2	05-APR-07
REVISION #1	26-MAR-07

NADEC ELITE FARM

HARASH, SAUDI ARABIA

SCALE: 1:2000 DATE: 03-MAR-07 DRAW BY: ELG

GENERAL LAYOUT



consulting



Nadec #6, KSA
10,000 Cows

Image © 2012 GeoEye

© 2012 Google

Goog



Milk production:

+ 304 mill t

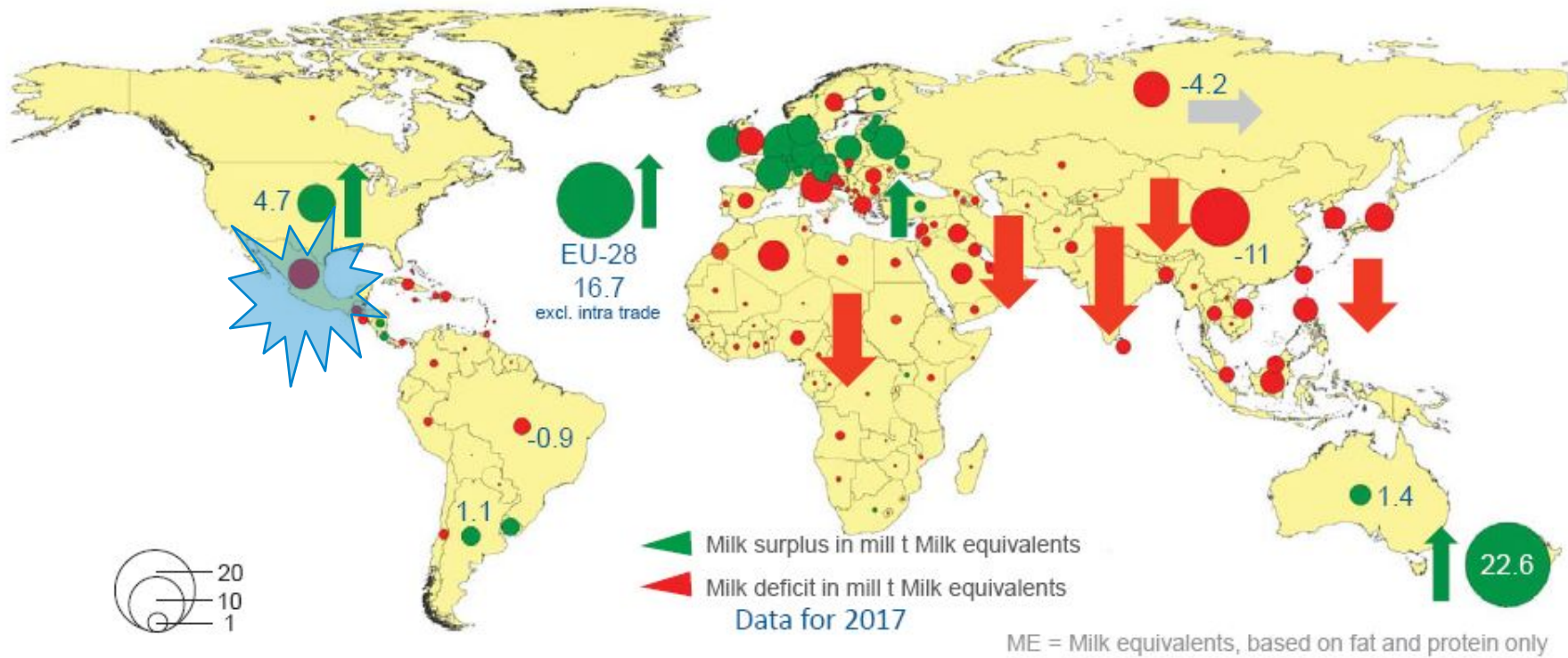
Approx. 3 times of the
current USA milk supply

current USA milk supply



Where Is This Milk Needed?

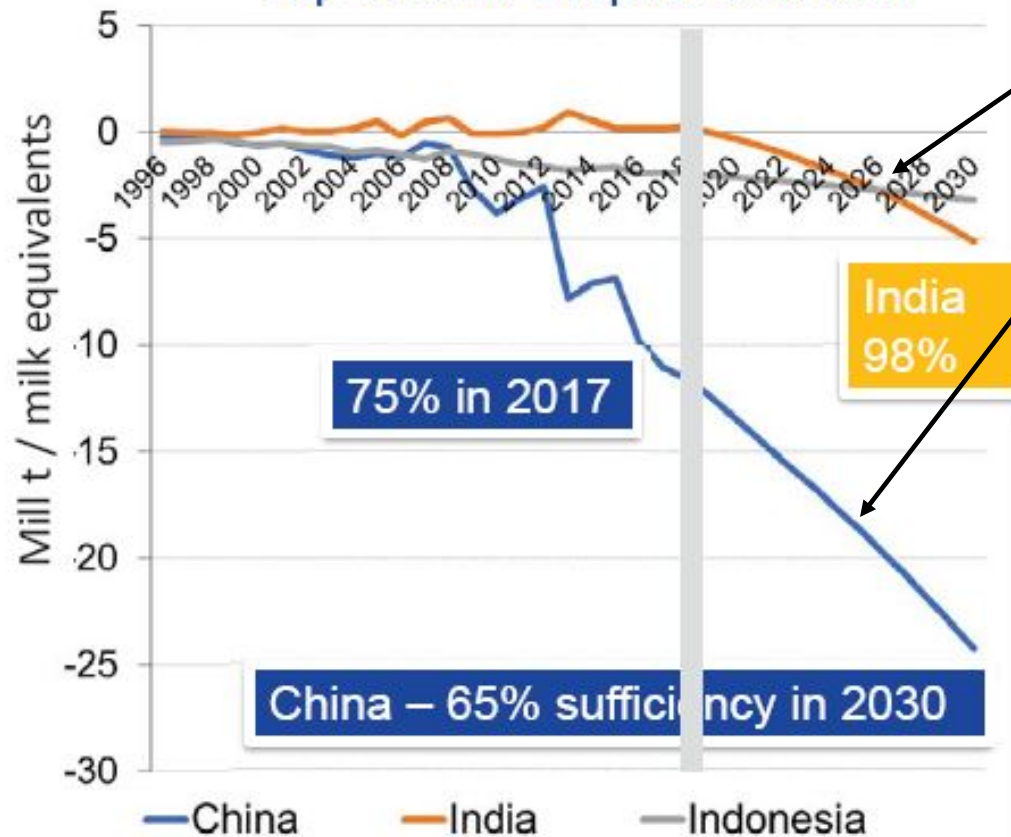
Milk Surplus and Deficit per Country 2017



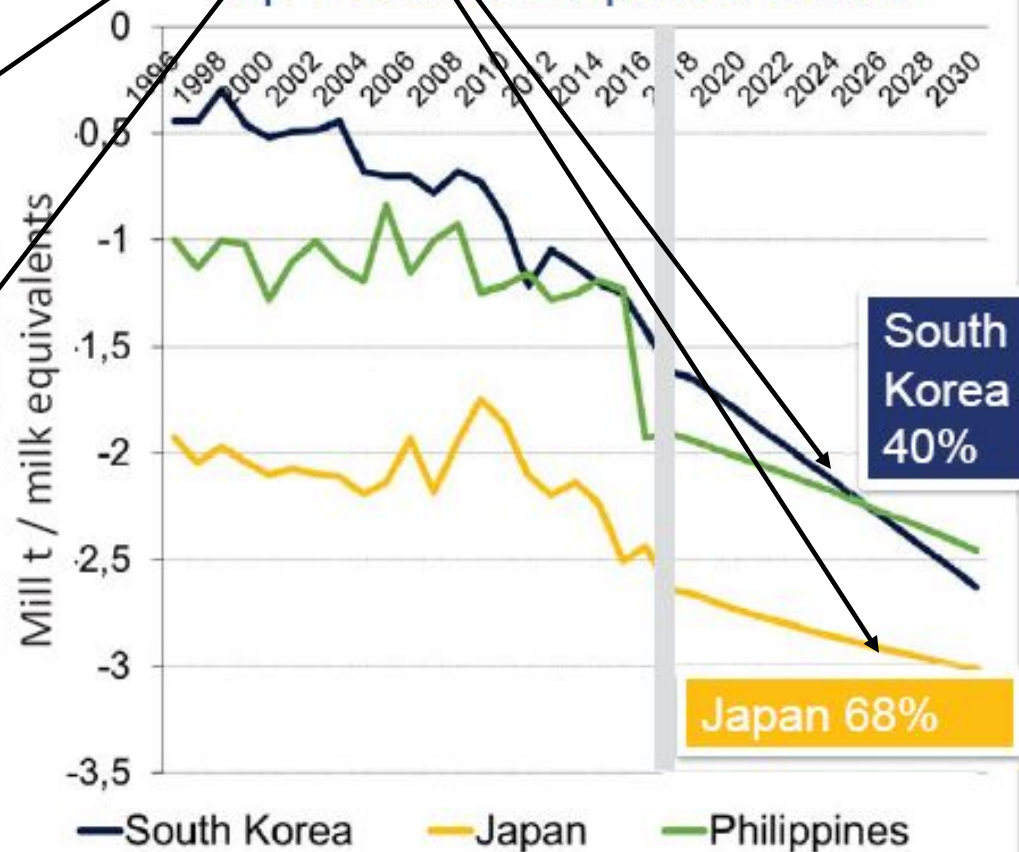
Cases from the Top 6 Asian Importers

Deficits Growing

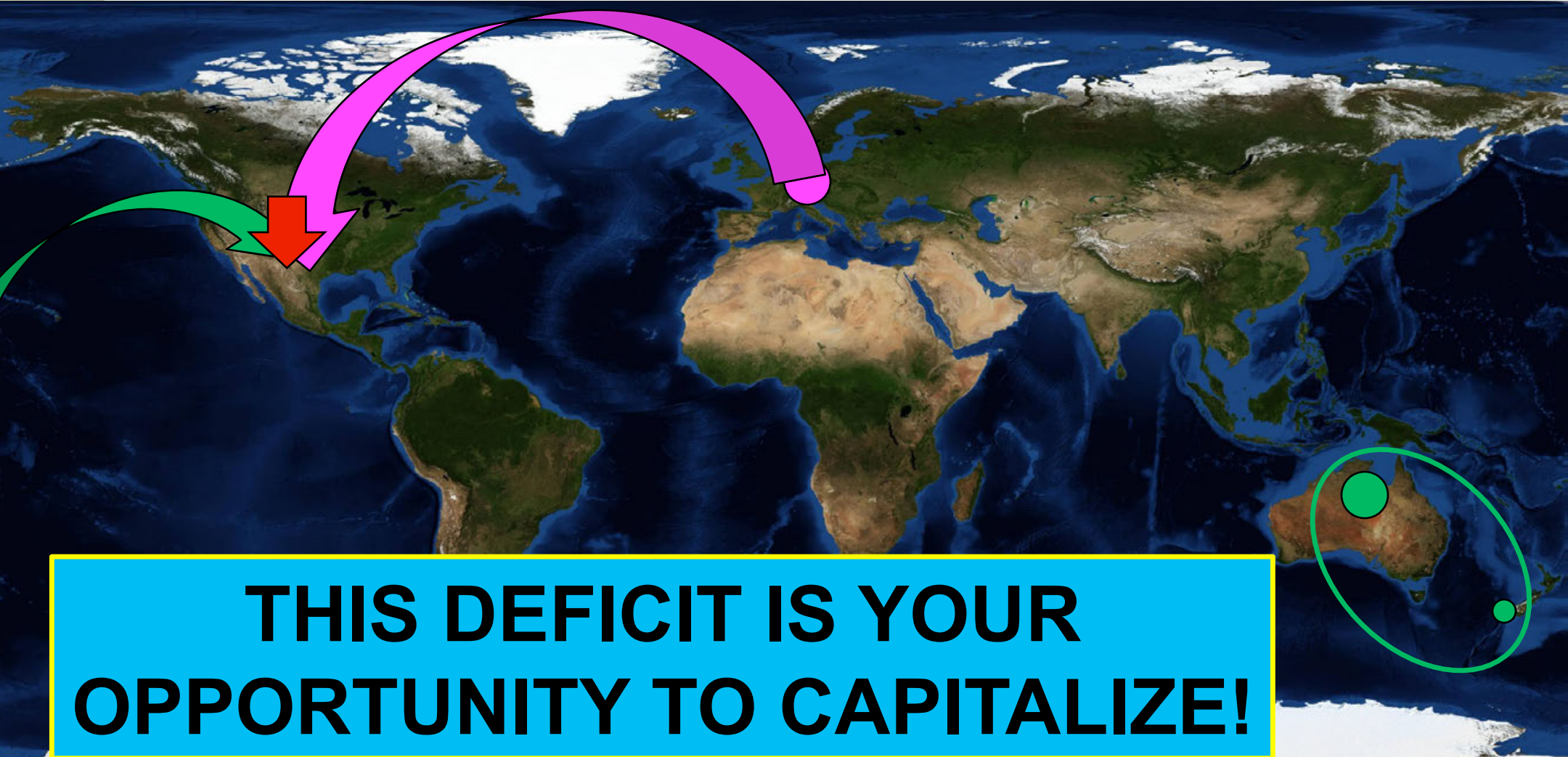
Top 3: Milk Surplus & deficit



Top 4-6: Milk Surplus & deficit

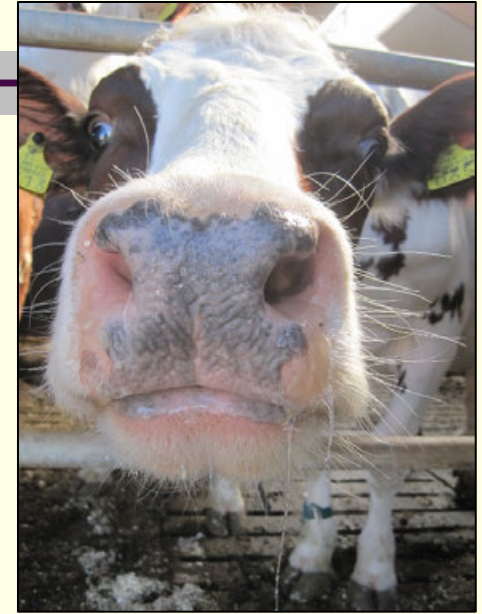


2030 FORECAST GLOBAL EXPORTS TO FILL THE DEFICIT



Let's Make Milk Here!





Dairy Facility Concepts

The U.S. Model

U.S. Dairy Statistics- 2017

- 9,500,000 Producing Dairy Cows
- 39,000 Dairy Farms Total
- 2,250 Dairies with More Than 1,000 Milking*
- 2,250 Dairies with 500 to 1,000*
- The 4,500 Dairies with more than 500 produce 67% of our Total Milk Supply, that is 12% of Farms



*No One Else Has So Many Large Dairies;
With So Many Years Experience.

U.S. Dairy Industry Change From 1992 to 2018

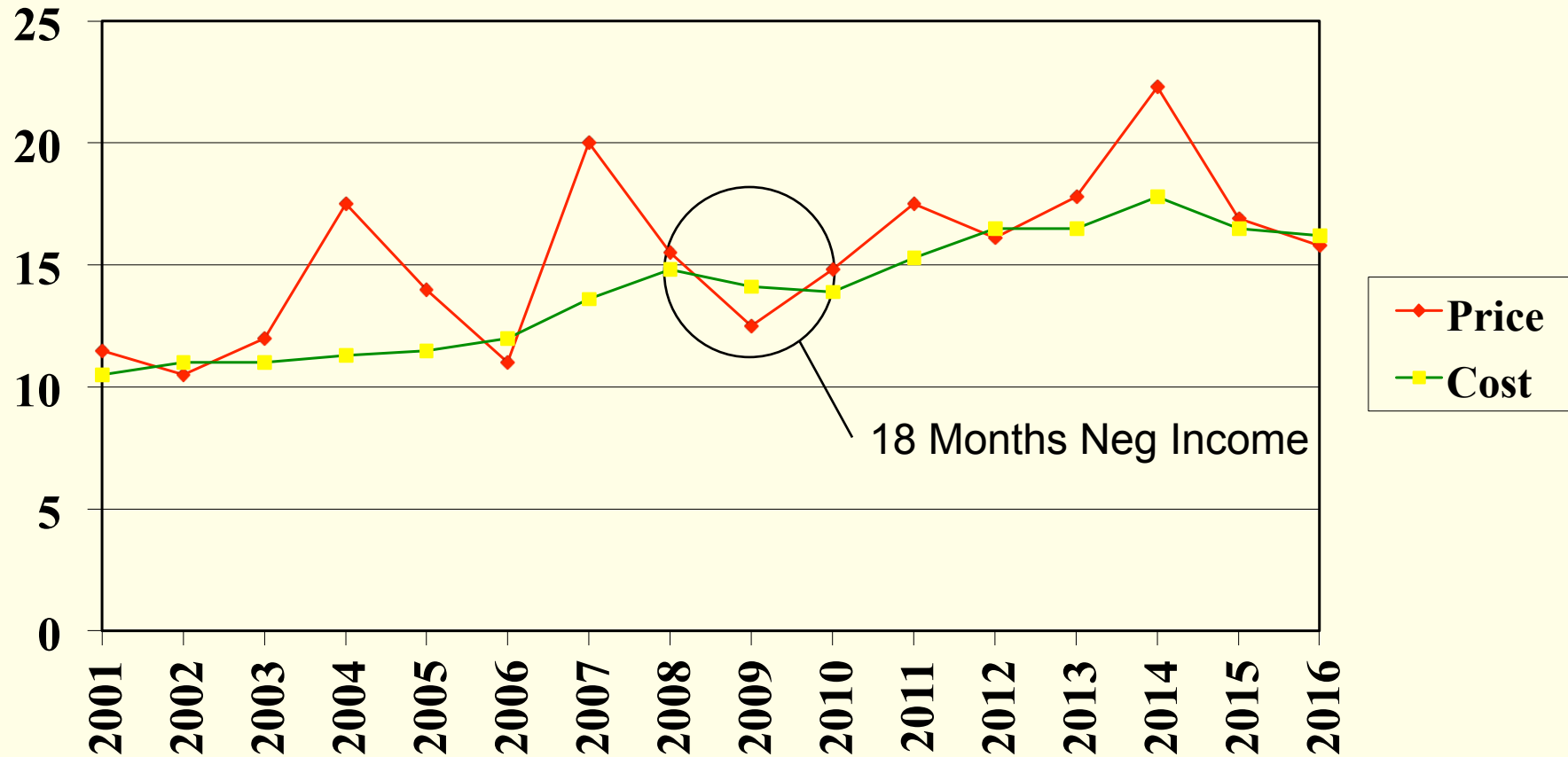
	1992			2018			Percent Change		
	Herds	Cows (1000s)	Cows/ herd	Herds	Cows (1000s)	Cows/ herd	Herds	Cows (1000s)	Cows/ herd
Midwest	80,135	4,100	51	19,535	3,342	171	(76)	(18)	234
Northeast	29,758	1,824	61	12,230	1,405	115	(59)	(23)	87
Southeast	12,057	1,253	104	2,225	506	227	(82)	(60)	119
West	9,559	2,515	263	3,478	4,146	1,192	(64)	65	353
U.S.	131,509	9,692	74	37,468	9,399	251	(72)	(3)	240

Over the past 27 years, the national average herd size has grown 240 percent, from 74 to 251 cows. Over the past year, herd size grew from 234 to 251 cows, up 17 cows per herd on average. Regionally, the West (+353) and the Midwest (+234) have seen the largest percentage gains in herd size since 1992.

- Hoard's Dairyman Insight, April 2019

Why Should You Listen to Me?

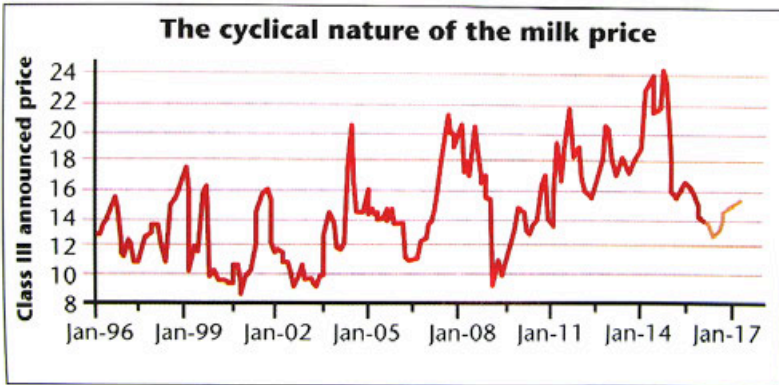
U.S. Milk Price



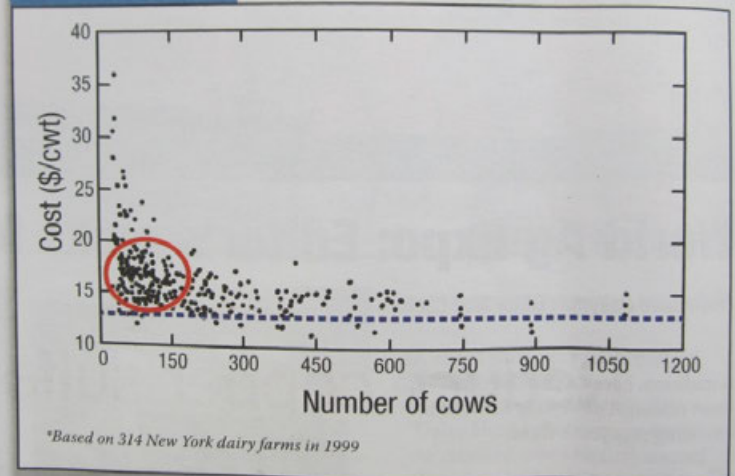
INSIGHT

Price waves of agriculture

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ext peak
018. For
climb to
milk price
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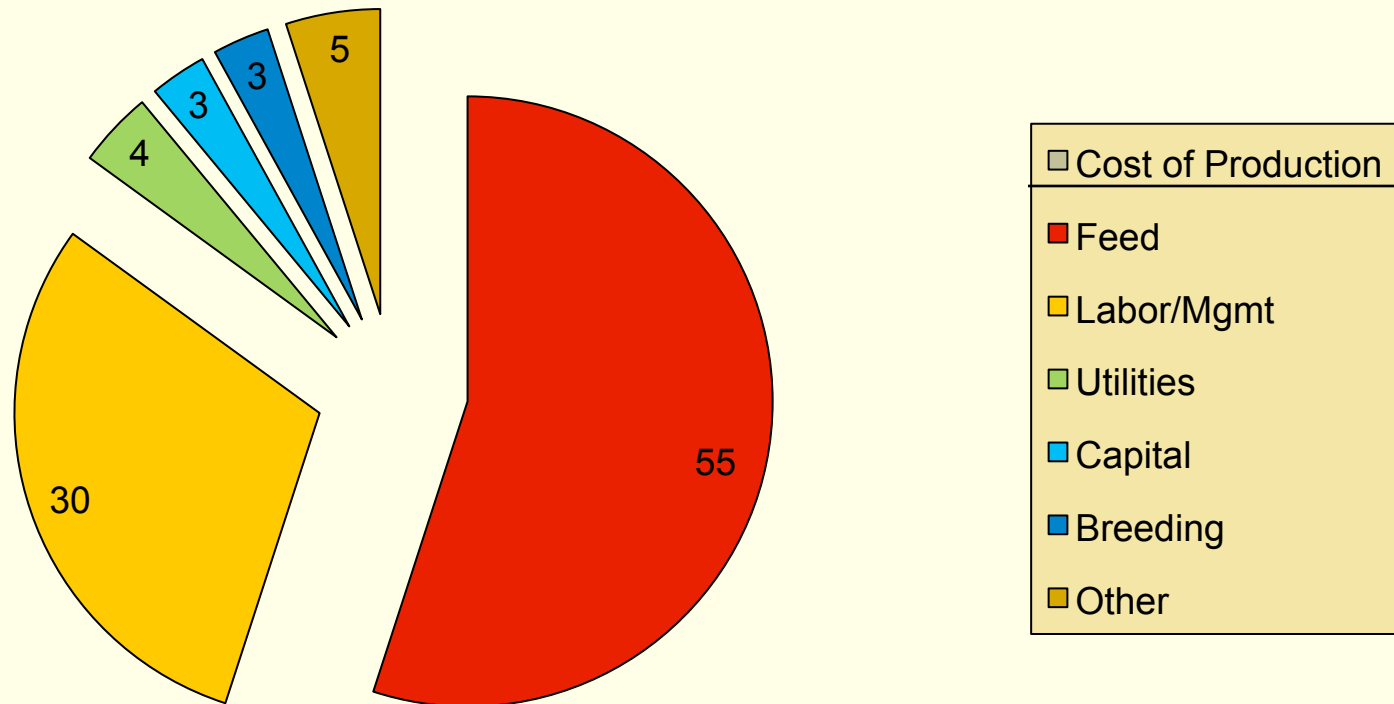
Actual Milk Price Data



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prices
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prices it is
and small,
ober
ook just

factored in as only part of the decision
to quit farming. The producer
made a conscious decision to exit the

% U.S. Cost of Production Breakout





New 3500 Cow Dairy
in W. Texas

The U.S. Has the Most Varied Climate of Any Major Milk Producer



U.S. Dairy: Innovation Leader

1. Price based on Market Economics for over 40 years.
2. The lowest cost of production in a total confinement system.
3. By far, the most efficient total confinement dairies in the world.
4. Managing large dairies as businesses for over 50 years.
5. Most diverse climate zones of any dairy economy in the world.
6. Over 70 years of developing genetics for high volume, large, total confinement dairies.
7. Emphasis on technology as a management tool, not just to eliminate labor.
8. Simple systems that are easy to manage.
9. Lowest maintenance systems in the industry, designed for 24/7 operations.
10. All of the significant developments in cow environment and cooling for the past 60 years have been from the U.S.
 - a. Parasol type freestalls
 - b. Natural vent freestalls
 - c. Arizona/Saudi style open barns
 - d. Curtain sided barns
 - e. Tunnel vent barns
 - f. Cross vent barns
 - g. HVLS fans
 - h. Feed line soaking systems
 - i. Vanned High speed fans
11. Primary facility emphasis is on cow comfort.
12. Leader increasing the barn and component dimensions to benefit the cows.



Normal U.S. Dairy Operations Numbers

- Total Cull Rate: 33%
- Actual Death Loss: 6% (Involuntary Culling)
- Average Lactations: 3
- Calving Interval: 13 Months
- Age at First Calf: 23 Months



The U.S. Makes the Most Efficient Milk in the World

How Are You Culling Cows?

- Voluntary Culling

You Choose Which Cow to Remove



- Involuntary Culling

Cows Just Die,
No Choice



High Plains Dairy 2004



Initial Construction



Milking 1800 in 2006

Expanding in 2007,
Milking 2400





High Plains Dairy 2009- 3600 Cows
3x Milking @ 40.8 kg/day average production

High Plains Dairy 2011- 4100 Cows
2x Milking @ 36 kg/day average production





These Dairies Do NOT
Represent Your Situation

You Cannot Copy This
3000 Cow Dairy...

...But, You Should Use U.S. Concepts and
Methods, However, The Package Must Change

In An Underdeveloped Dairy Sector

- You Are Trying to Expand As Rapidly as Possible
- You Do Not Have Ready Access to Cows
- You Are Paying Double for Replacement Heifers
- You Do Not Have Local Dairy Experts and Consultants
- You Do Not Have Trained Builders or Technicians
- You Do Not Have Trained Cow People
- Biggest Issue Is.....



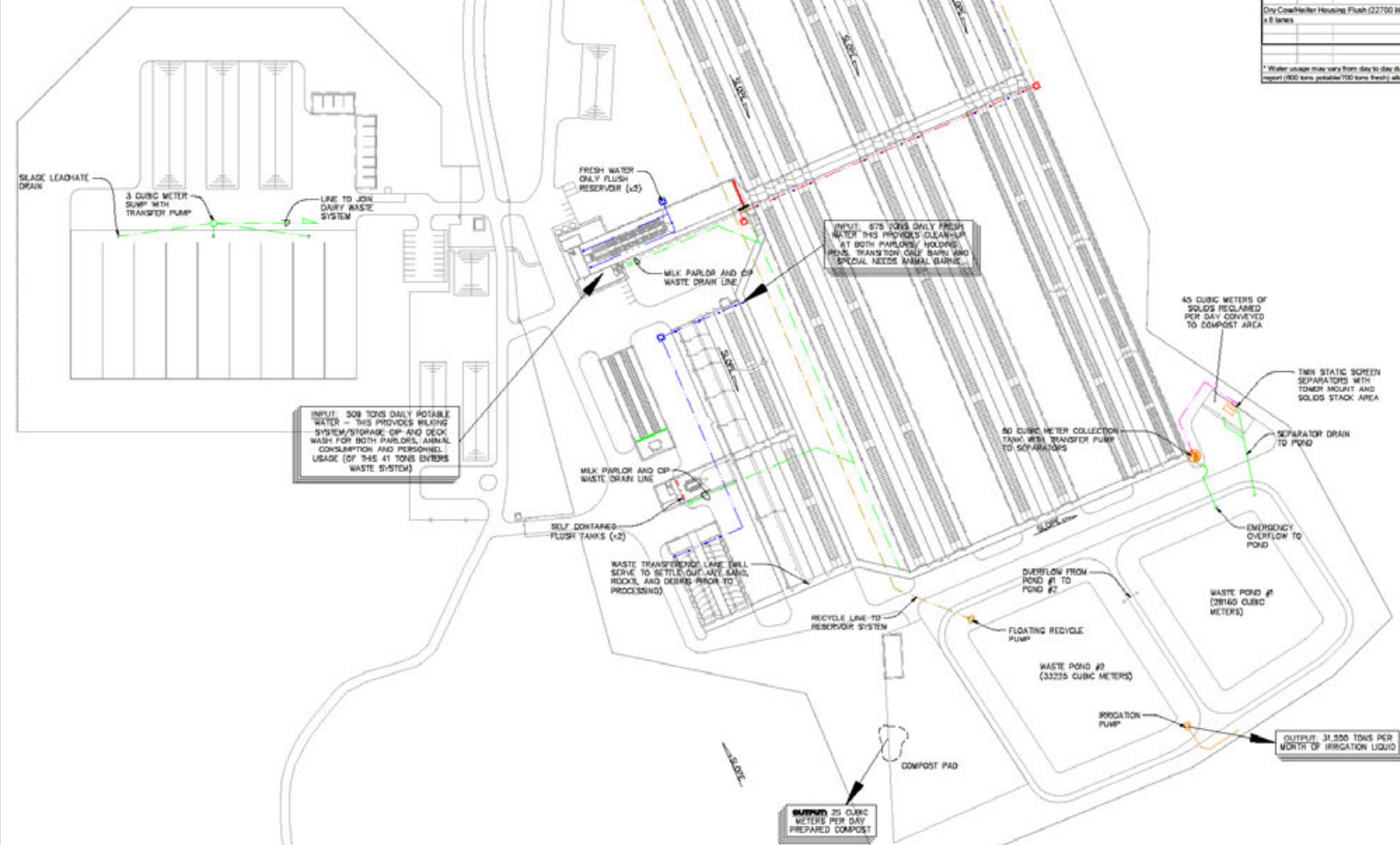
....You Do Not Have These People



Experienced Suppliers



2400 Cows in China



DAILY WATER USAGE BUDGET			
Application	Water Type	Liters	Tons
Personnel Usage (400 liters/day X 40 workers)	Potable	16000	
Revenue Cow Inake (2400 @ 130 liters)	Potable	312000	
Adult Support Cow Inake (400 @ 80 liters)	Potable	32000	
Young Stock Inake (2200 @ 50 liters)	Potable	110000	
Milking/Storage CIP and Deck Wash (Revenue & Treatment Parlor)	Potable	34000	
Baby Calf Raising	Potable	1500	
	Total Potable	509100	509
Parlor Holding Pan Flush (Revenue and Treatment) (Revenue: 24 Flashes at 13000 liters/flush, Treatment: 8 Flashes at 8000 liters/flush)	Fresh	363000	
Transition Calf Flush (5000 liters/flush X 3 flushes/day X 4 lanes)	Fresh	60000	
Special Needs Animals Flush (Maternity, Just Fresh, Close-Up Treatment) (3000 liters/flush X 8 flushes/day X 7 lanes)	Fresh	252000	
	Total Fresh	675000	675
Revenue Cow Housing Flush (22700 liters/flush X 3 flushes/day X 10 lanes)	Recycle	1069500	
Dry Cow/Heifer Housing Flush (22700 liters/flush X 3 flushes/day X 8 lanes)	Recycle	544800	
	Total Recycle	1634400	1634

* Water usage may vary from day to day due to weather conditions, peak usage periods, etc. Input volumes specified in the written report (600 tons potable/700 tons fresh) allow for these variations by evaluating peak usage.

THESE ARE PRELIMINARY DRAWINGS NOT TO BE USED FOR CONSTRUCTION UNTIL DETAILS HAVE BEEN COMPLETED AND AUTHORIZATION HAS BEEN OBTAINED FROM THE INSPECTING AGENCIES.

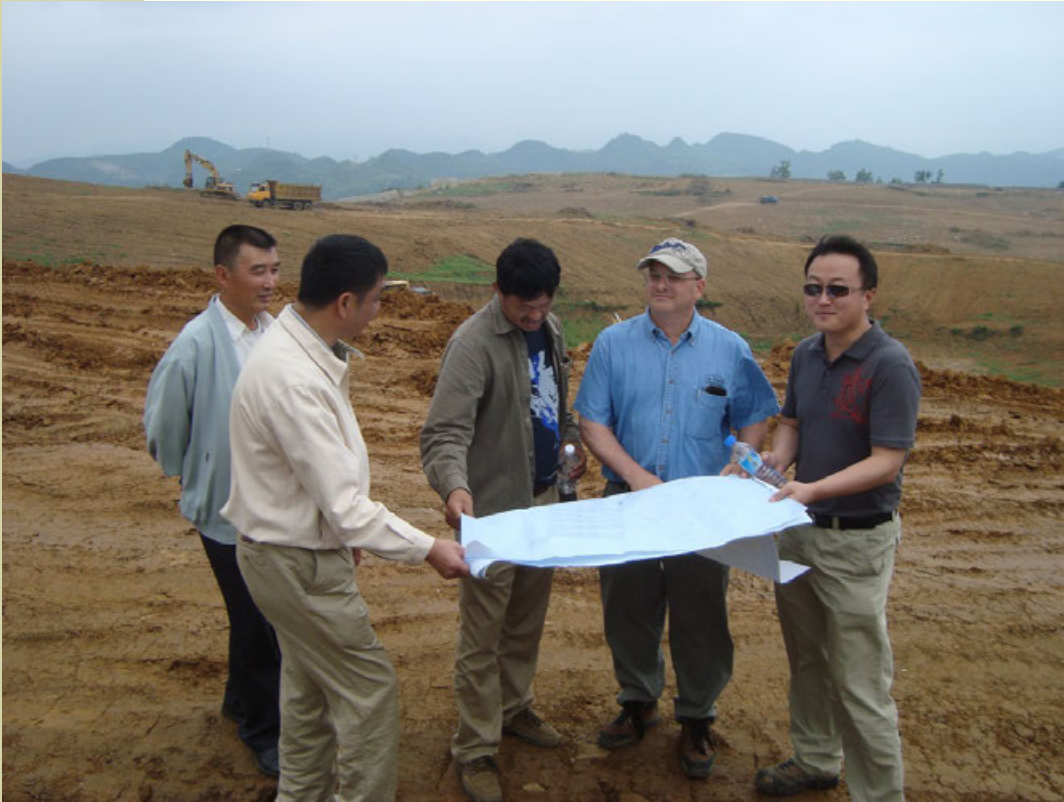
GUPU DAIRY
GUIZHOU PROVINCE, CHINA

SCALE: 1 : 1000 DATE: 30-JAN-09 DRAWN BY: ELG

WATER USAGE/WASTE DISPOSITION PLAN

Five-G Consulting
PLANO, TX

DRAWING NO. F50070638
REV. 8 OF 15



McArthur Farms, Florida
10,000 cows

Feed Center

Hwy 441

Neighbors 4000
Cow Dairy

Office

Dairy #3

Dairy #2

New Freestall
Barn

Dairy #4

Dairy #1

© 2016 Google

Google

1994

Imagery Date: 1/23/2016 27°25'36.98" N 80°48'27.77" W elev 70 ft eye alt 2



McArthur Farms Dairy #1

Dairy #3











In Some Locations 500 Cows Can Be A Large Dairy



Grace Farms, NY
220 Cows



Grace Farms, NY
120 Cows



New 100 Cow Dairy,
Expandable to 200

Housing
Expansion

New 4 Row F.S.
Housing for 90 Rev.

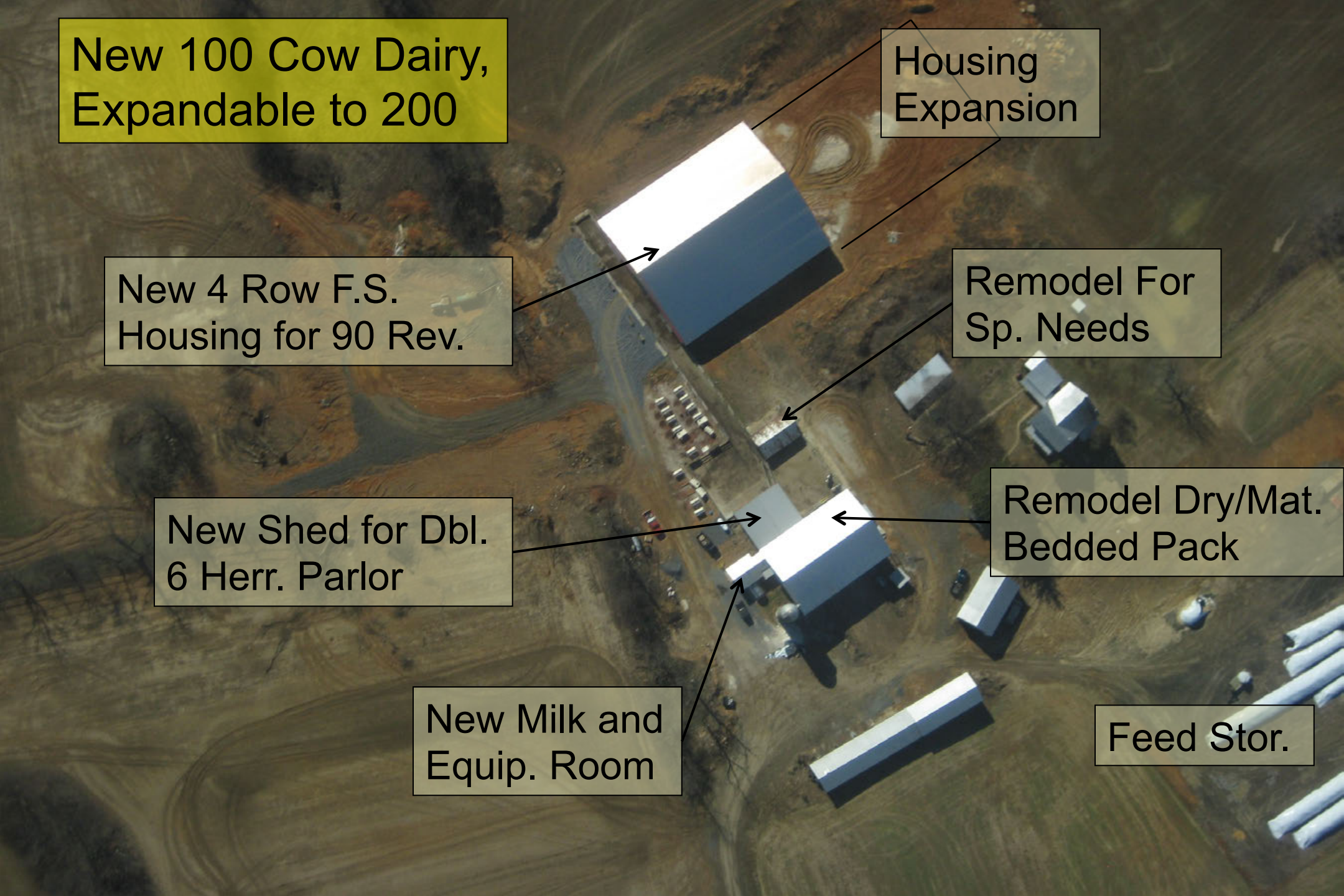
Remodel For
Sp. Needs

New Shed for Dbl.
6 Herr. Parlor

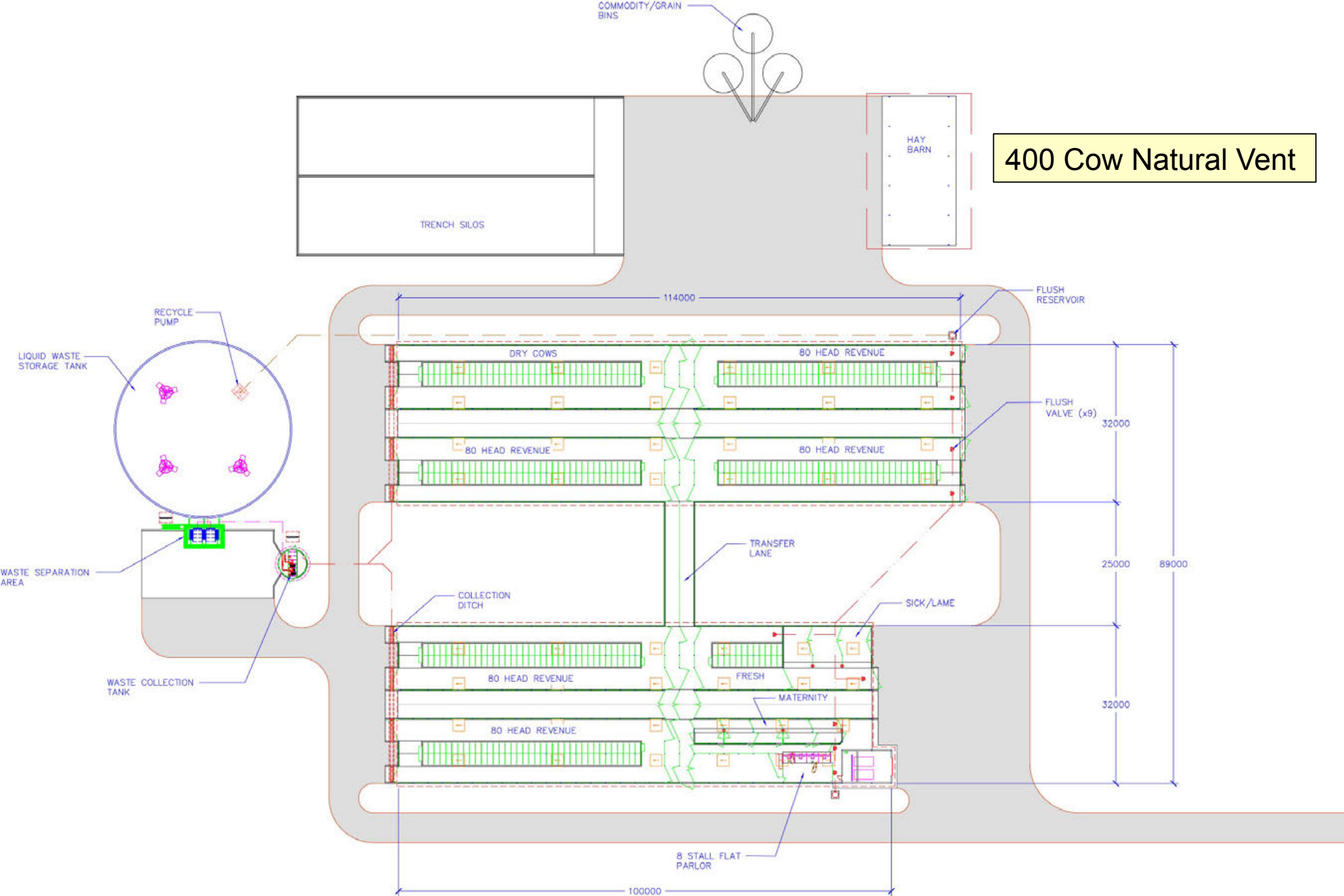
Remodel Dry/Mat.
Bedded Pack

New Milk and
Equip. Room

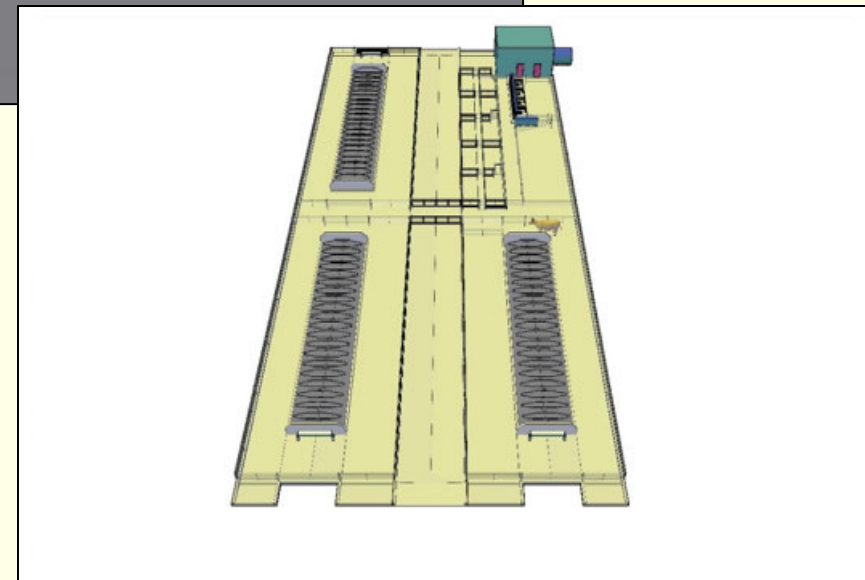
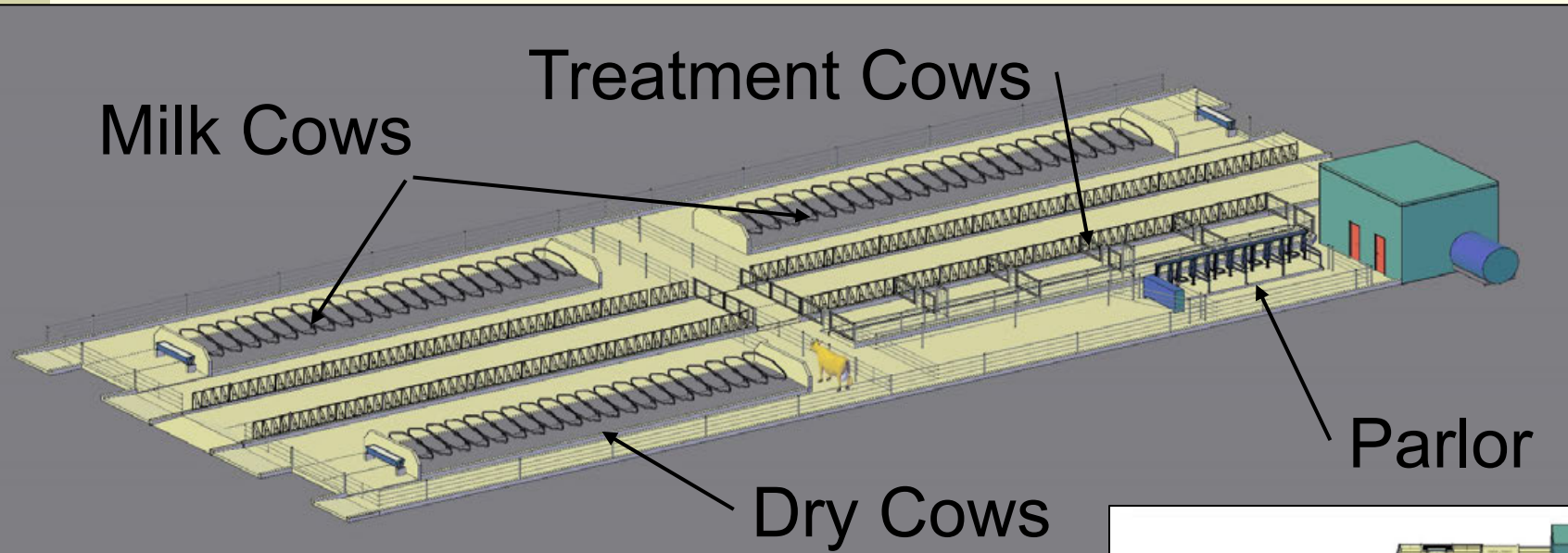
Feed Stor.



400 Cow Natural Vent



Smaller Dairies



What Type of Housing?



Overall Concept

Dry Lot Housing- Corrals









Dry Lot- Corrals

- Lowest Cost
- Sun Exposure
- Less Manure Daily
- Best Air Quality
- Exterior Feeding
- Good Production (in good weather)

- Heat Stress
- Sun Exposure
- Mud
- Long Walking Distance
- Large Area
- Runoff Issues
- Wind
- Overall Labor

Open Barns



Saudi Style



Arizona Style





Open Barns-Saudi Style

- Lower Cost (?)
- Covered Feeding
- Less Exposure
- Shade and Cooling
- Smaller “Footprint”
- Good Air Quality

- Mud
- Long Walking Distance
- Large Area
- Runoff Issues
- Waste Handling
- Some Wind Issues
- Shade / Bedding









Reality...









Compost Barns

- Reduced Cost (?)
- Less Liquid Manure
- Covered Feeding
- Less Exposure
- Shade and Cooling
- Good Leg/Hoof Health

- Mud
- Keeping Bedding Dry
- Double the Area
- Waste Handling
- Bedding Source
- High Labor Input
- Heat of Compost
- Poor Cooling

Freestall Systems

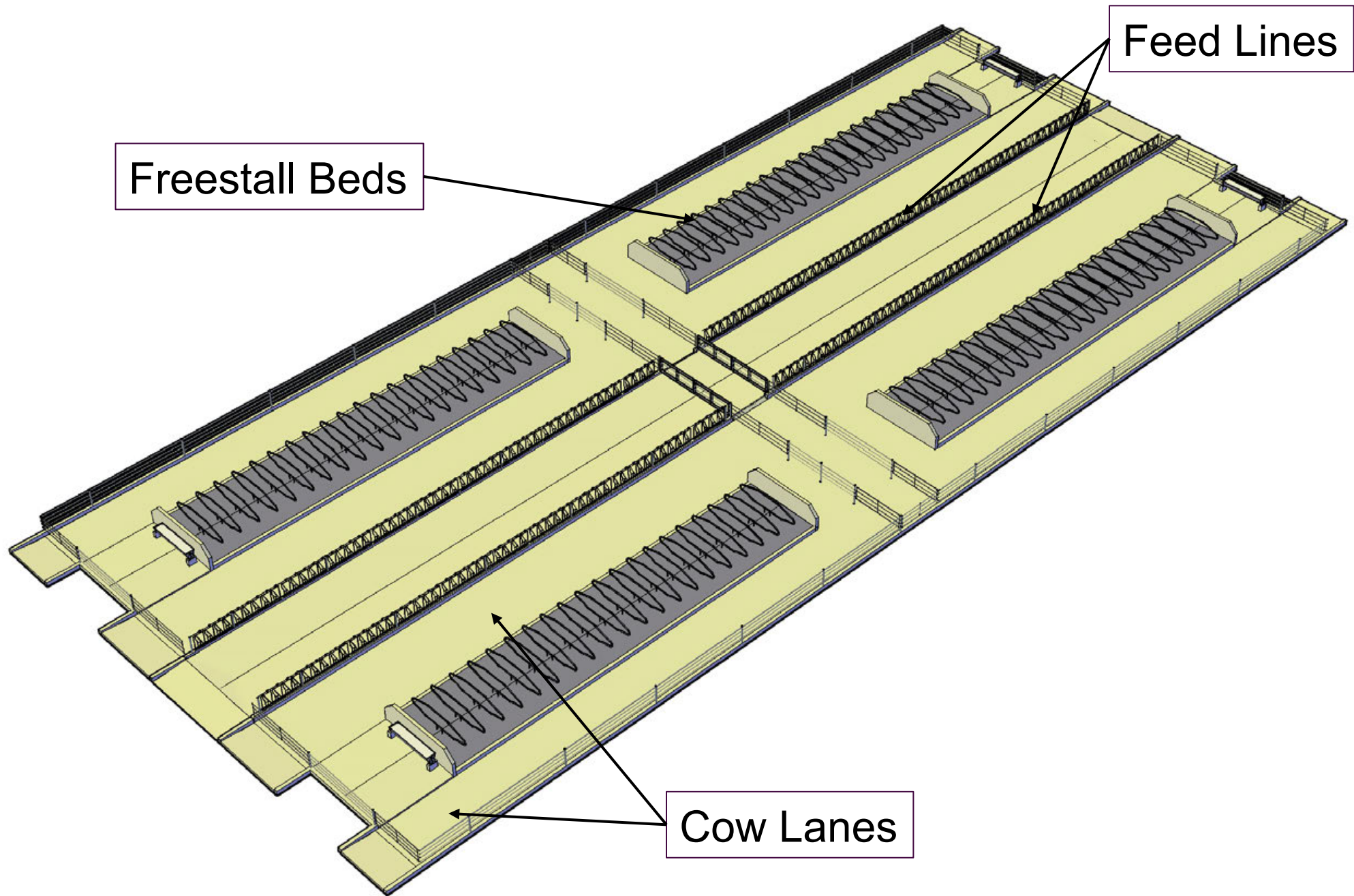


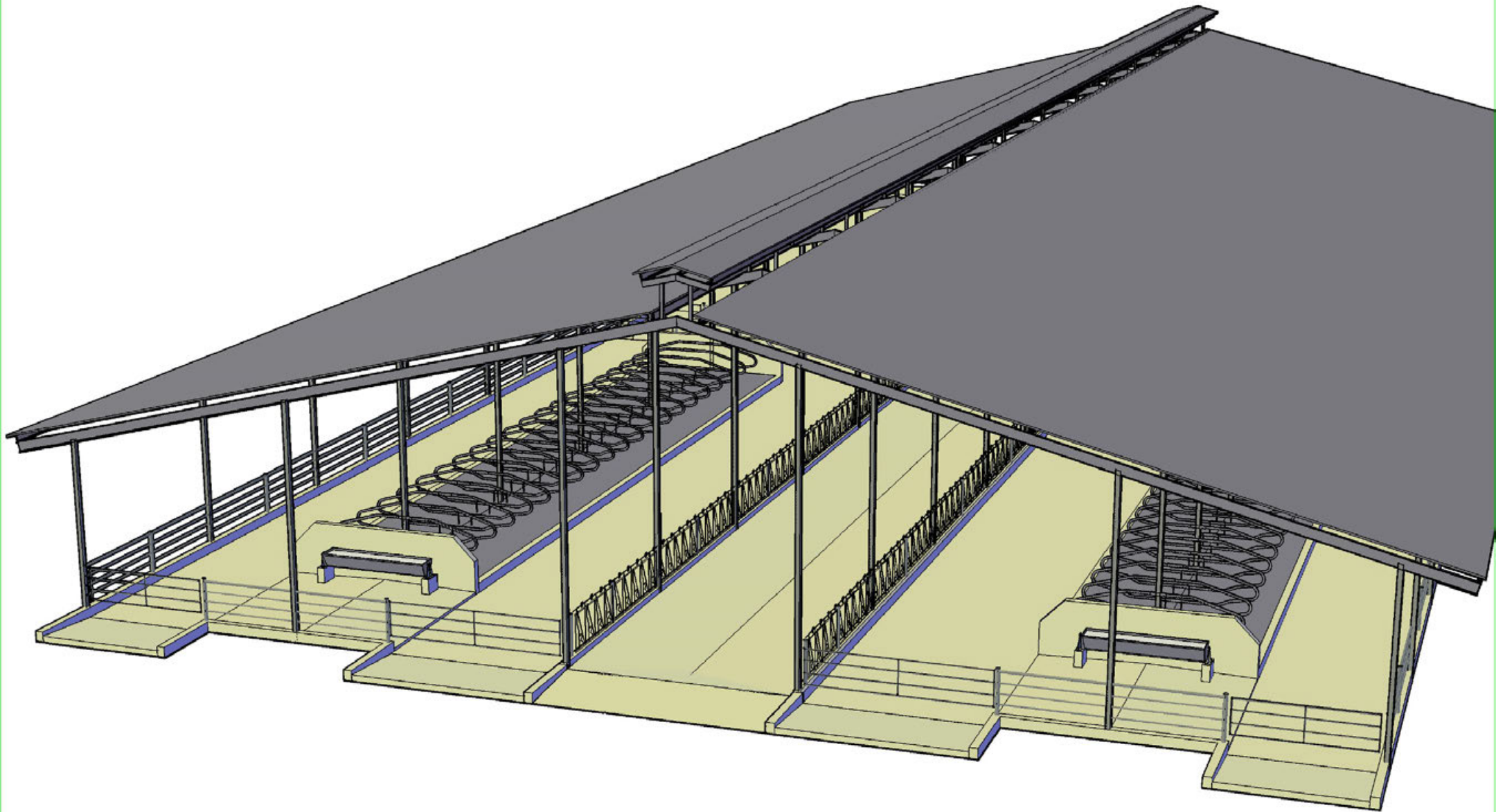
Cow Comfort











Freestall Housing







Freestalls

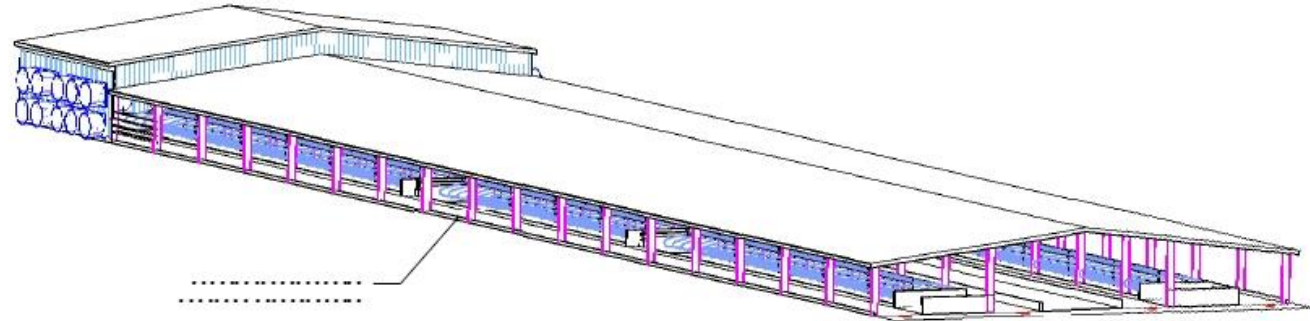
- Efficient Operation Labor
- Optimum Feeding
- No Mud Issues
- Consistent Beds
- More Compact Design
- More Efficient Cooling
- Higher Production

- Higher Cost (?)
- All Manure is Collected Daily
- Stall Bedding
- Higher Management Investment

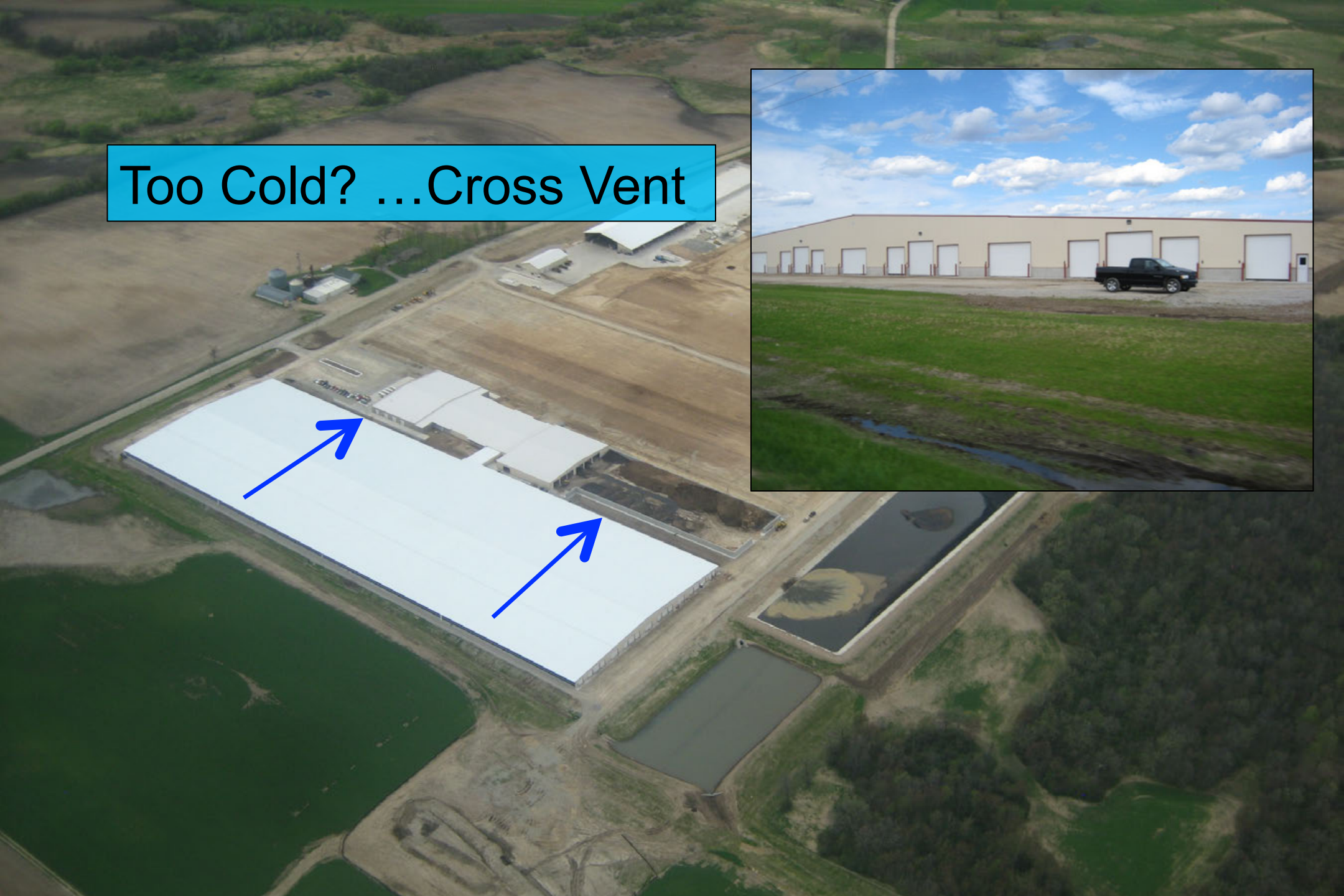
Too Hot? ...Add Fans



...Or Tunnel Ventilation



Too Cold? ...Cross Vent



Housing Space Requirements

- Dry Lot/ Corrals
- Open Housing (Saudi)
- 4 Row Natural
- 6 Row Natural
- 4 Row Tunnel
- 4 Row Cross Vent

- 56 sm / Cow
- 37 sm / Cow
- 17 sm / Cow
- 14.5 sm / Cow
- 11 sm / Cow
- 9 sm / Cow



There are Choices...

Select the Best for Your Farm



- In the end work with people that help select the best options for you.

TYPICAL U.S. DAIRY FARM

Heifers

Hospital

Housing

Parlor

Housing

3000 Milk Cows,
3800 Total Cows

FACILITY DEVELOPMENT OVERVIEW

- FREESTALL HOUSING FOR 3800 (MILKING PLUS DRY COWS)
- SPECIAL NEEDS AREA (MATERNITY, HOSPITAL, LAME ETC.)
- 80 STALL ROTARY PARLOR
- FEED STORAGE AND MIXING AREA
- WASTE MANAGEMENT SYSTEM



TYPICAL 3000 DAIRY FARM



3000 MILKING DAIRY FARM

FACILITY DEVELOPMENT OVERVIEW



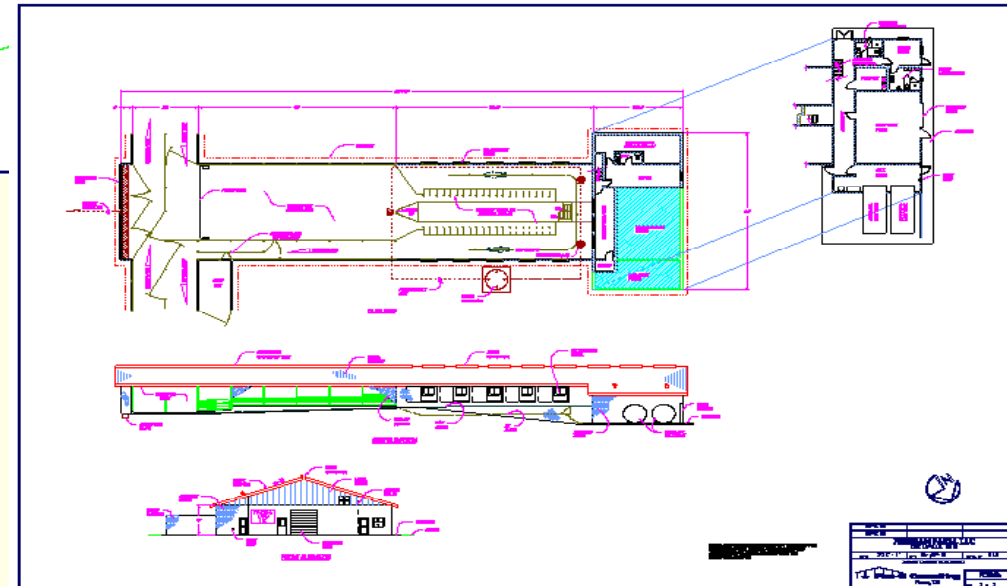
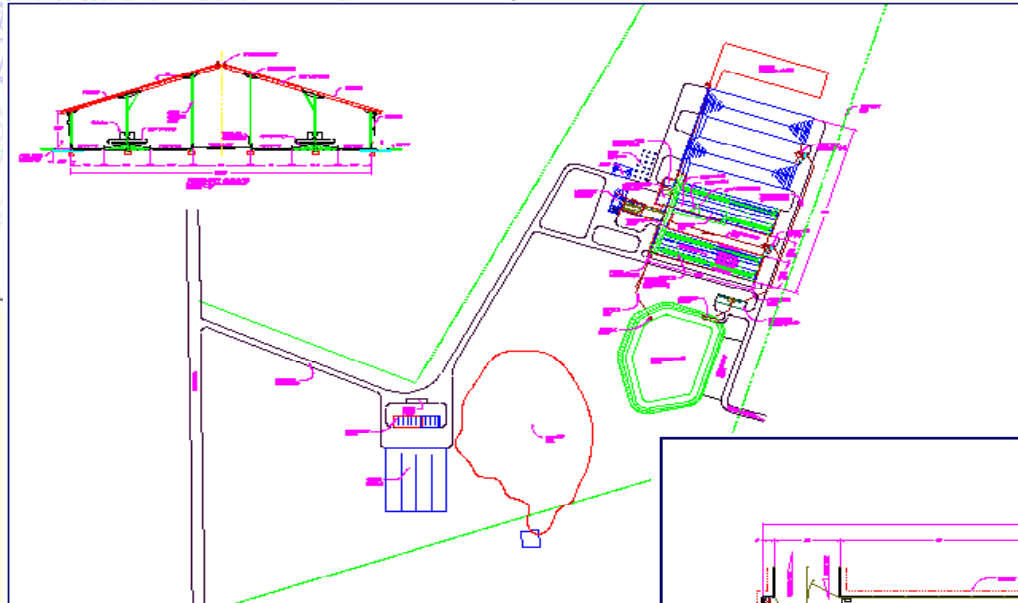
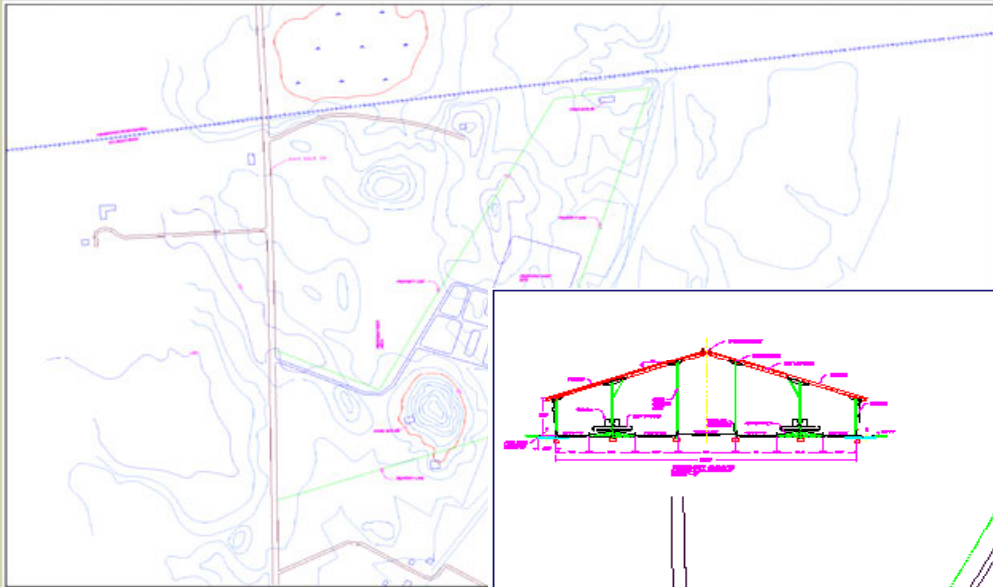
- 3 YEARS FACILITY WILL BE CONSTRUCTED & STAFF TRAINED
- 3 YEARS TO GROW HERD TO MILK 3000 COWS
- 3 YEARS TO ACHIEVE 110MT/DAY PRODUCTION
- TOTAL FACILITY COST APPROX **\$20M USD**

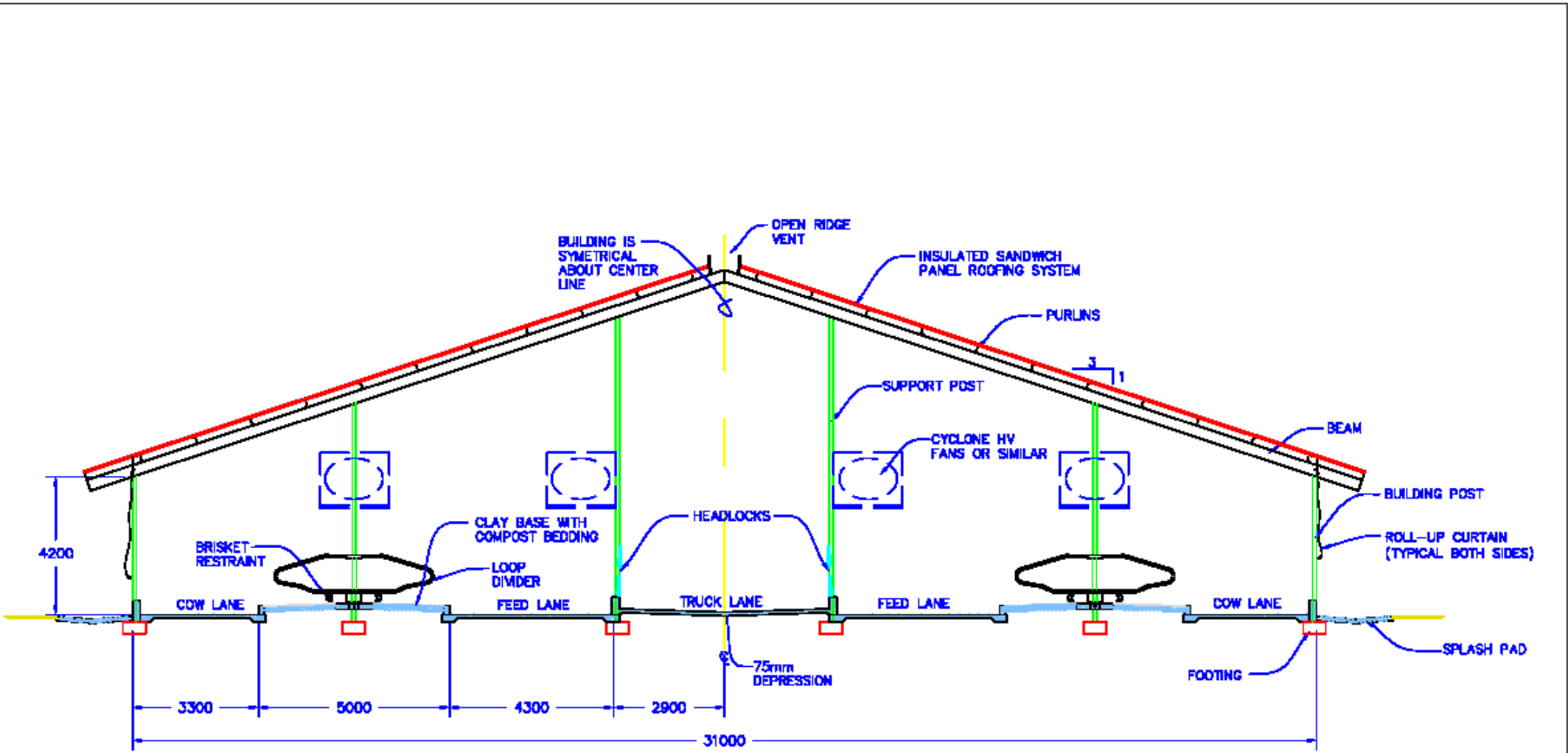
Miedema Dairy, Started 2004



Auke

Plans First, Then Equipment, Then Construction





Miedema Dairy, Circleville, Ohio

2011- 900 Milking



2005- 600 Milking



Planned
Expansion
Thru 1500





Dbi. 20 Parallel Parlor



© 2016 Google

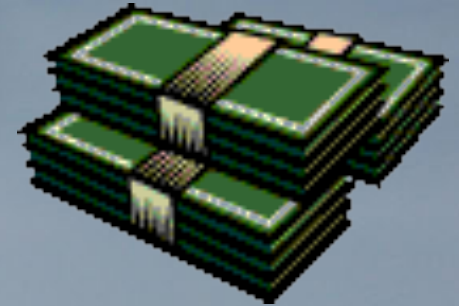
1250 Milking
Currently



1994

Imagery Date: 8/22/2015 39°34'42.18" N 82°59'45.66" W elev 691 ft eye alt 2728 ft

Regardless of Your Size or Location
Dairy Facilities are Expensive.



Key is Spending It Correctly



Questions?



www.fiveg.com

Come Visit Me Sometime!



- The Second Largest Paris. In Texas.



www.fiveg.com