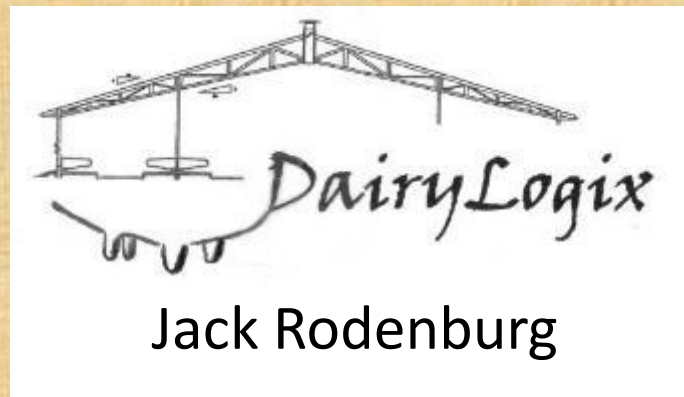


Innovation on the Farm and in the Marketplace



I have no handout for you. . . .

- Innovate Move toward a paperless society
- The presentation will be on my website www.dairylogix.com early next week.



The list is long or short depending on how new it has to be ?

- Strategic heifer programs: sexed semen, genomic testing and beef the bottom.
- New bedding options: Compost packs, dried manure solids, straw/limestone/water mixtures . . . But nothing beats sand !
- Niche markets: organic, on farm processing, omega, A2A2
- Cow comfort technologies, flexible stalls, flexible feed fence
- Management using data from sensors.
- Automation of work activities.



What drives innovation ?

- More profit
- Better lifestyle
- Sustainability (Animal welfare, Environmental responsibility)
- Better public image
- Need to be challenged



34 years as a Dairy Specialist with OMAFRA

**What makes money on the dairy farm...
What separates the economic leaders
from the pack?**

- Breeding a show winner and selling breeding stock?
- Highest production per cow?
- Highest income over feed cost?
- Highest income per \$ invested?
- The biggest herd?

Real data on dairy farm profits is hard to find!



What is the biggest input cost in producing milk?

\$ per HI Milk

(Ontario Dairy Farm Accounting Project 2017)

all 70 farms

Purchased Feed

\$ 14.13

Home Grown Crops

\$ 13.58

Total feed

\$ 27.71

Veterinary and Breeding

\$ 3.72

Other Direct

\$ 9.00

Labor is the biggest input cost on a dairy farm!

Total Labour 74 minutes

Labor Cost at \$45.25/hr. \$55.81

Labor Cost at \$24.50/hr. \$30.22



What input costs are most variable?

Labor is the most variable input cost on a dairy farm!

	<u>bottom 15 farms</u>	<u>top 15 farms</u>
Purchased Feed	\$ 13.97	\$ 13.71
Home Grown Crops	<u>\$ 16.53</u>	<u>\$ 11.04</u>
Total feed	\$30.50	\$ 24.75
Vet. and Breeding	\$ 4.59	\$ 3.77
Other Direct	\$ 9.29	\$ 7.47
Total Labour	133 minutes	42 minutes
Labor Cost at \$45.25/hr.	\$100.30	\$31.67
Labor Cost at \$24.50/hr.	\$54.30	\$17.15

Labor is the biggest and by far the most variable input cost on the dairy farm!

What is it on your farm?

The Ontario average is **74 minutes per HI** to look after the cows, replacements, barn related maintenance, cropping for feed production and herd related paperwork. (Cropping component is \pm 13 minutes)

“Monitor your labour, compare to your peers and strive to improve it ”



Labor is the biggest and by far the most variable input cost on the dairy farm!

What is it on your farm?

The Ontario average is **74 minutes per HI** to look after the cows, replacements, barn related maintenance, cropping for feed production and herd related paperwork. (Cropping component is \pm 13 minutes)

“ Hours per hectoliter should be benchmarked in milk recording programs ”



Labor is the biggest and by far the most variable input cost on the dairy farm!

What is it on your farm?

The Ontario average is **74 minutes per HI** to look after the cows, replacements, barn related maintenance, cropping for feed production and herd related paperwork. (Cropping component is \pm 13 minutes)

“ Those who lead in labour efficiency will lead the industry ”

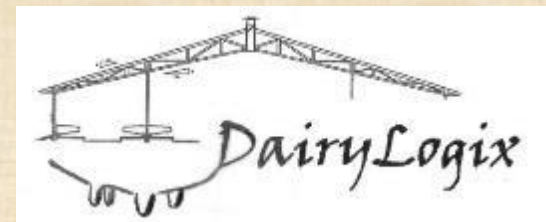


Labour per Hectolitre by Herd Size and Production System (ODFAP 2017)

	Tie Stall			Free Stall		
	<45	45-70	>70	<80	80 - 160	>160
No. cows	37	47	89	58	113	184
Milk per cow (l)	7037	9395	9032	9116	9667	11085
Minutes per Hl	141	76	61	64	46	35

Size Matters !!

But so does technique !!





Survey of
160 freestall dairies

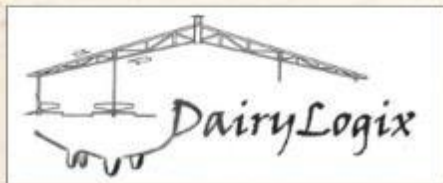
Labor per cow and Per HI by herd size (excludes cropping 2016)

No. Milking Cows	Minutes/Cow /Day	Estimated Minutes/Hi milk
< 90	15.8	44
90-180	12.3	34
180-250	10.0	28
>250	8.5	24

With traditional management, there are big economies of scale!



Economies of Scale Result Mostly from Scale of Mechanization



Fill a bigger mixer from a bigger bunker with a bigger loader, drive a little farther and a little faster and feed twice as many cows.



Traditional mechanization takes us to the 3000 cow US Midwest dairy



Your customers want local food from cow friendly barns that minimize environmental impact



**400 cow groups,
milked in an 80 stall rotary**

**6000 tonnes of feed hauled in and
10,000 tonnes of manure hauled out**

**“Factory farm” where cows are just
“numbers”**

**Perception of environmental and
animal welfare issues**

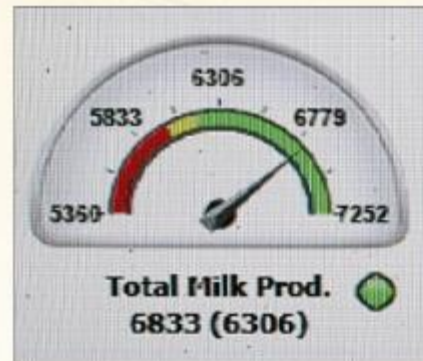


New Galma Dairy

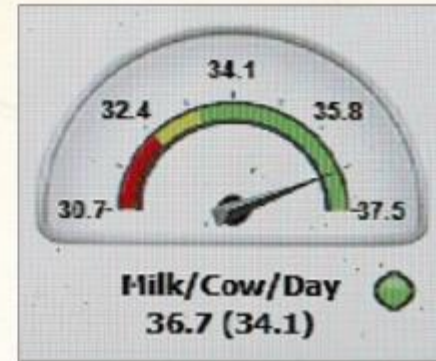
- Nico and Wilma Zeldenrijk
- 190 milking COWS
- 35 dry cows
- 200 calves and heifers
- 300 acres



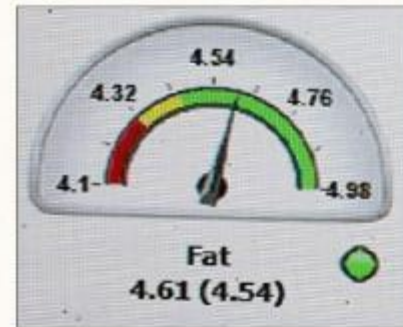
4 robotic milking stalls



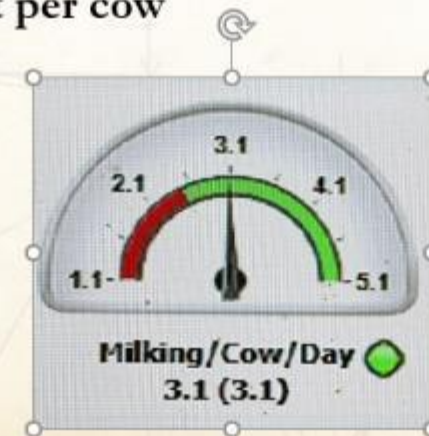
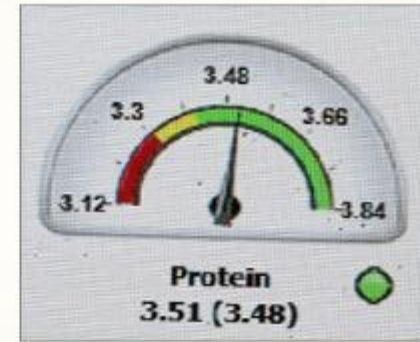
6800 Kg milk per day



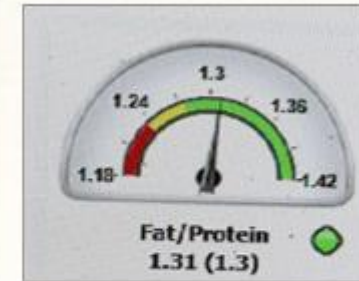
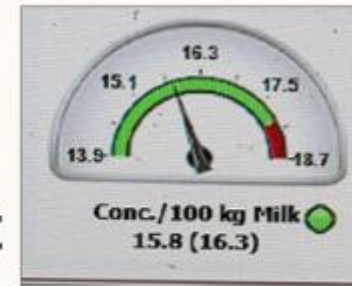
37 Kg milk per cow



1.7 Kg fat per cow



- **In line sensors** monitor SCC, color and conductivity for udder health, and fat to protein ratio for Ketosis
- An accelerometer in the **ID tag flags** high activity (heat) and low activity (sick)
- A collar mounted microphone records **chewing activity**
- Electronic scales **monitor body weight** changes
- **Feeds programmed amounts** of pellets according to production and stage of lactation.
- Varies **milking permission** based on production and stage of lactation



The future will offer much more:

. . . Health, nutrition and reproductive flags based on multiple sources of information

Milking visits, production, fat/protein ratio, pellet intake, SCC, milk conductivity, milk colour, weight change, activity, rumination, temperature and GPS resting and eating times.

. . . “Dynamic” software can test a cow’s response to inputs and individualize management. Dynamic feeding and dynamic milking software are two examples.



Automatic sorting to a handling area

Sorts on demand and/or based on sensor data (3 way - barn, footbath and separation)



Automatic Footbath

Replaces water and chemicals automatically based on number of passes



Automatic feeding



All ingredients added and mixed automatically without human intervention.



Pushes up feed 10 x per day and feeds fresh feed when the manger is nearly empty.



Manual work includes daily manger cleaning and tidying the kitchen and filling the kitchen twice week.

Automatic bedding production and delivery



Screw press separates manure solids



Solids delivered to deep bedded stalls with a track mounted delivery cart



Robotic slat cleaner

Note the bent neckrail in these stalls . . . Not high tech but a great way to keep cows standing and lying straight !



Calves are group housed and fed with a robotic calf feeder

Labour Minutes per Calf per Day for Feeding, Cleaning, Wash up

Allenwaite Farms

Individually Bucket Fed in single pens	7.68
Computer Fed in a group pen	3.79

In a 100 cow herd this saves 240 hours per year . . . @ \$18/hr it returns ± 25% on investment



The average hours of in-barn labor on this farm is 90 hours per week

2.5 million liters of milk with 2.0 units of labour.

11.2 minutes of labor per HI of milk.

versus an Ontario average of 61 minutes/HI !

Our best parlor herds use double this amount of labor



Not All Robot Herds as Labour Efficient as Nico ?? (ODFAP 2017)

	<u>Robots</u>	<u>Free Stall/Parlor</u>
No. of Herds	11	26
No. cows	115	113
Milk per cow (l)	10365	9667
Minutes per HI	43	48



For Many this is a Lifestyle Choice

Lifestyle

- More flexible hours and time for family
- Less physically demanding
- Less hired labour, more family
- Safer workplace
- Innovative



You can't take lifestyle to the bank!

The cost to milk a cow with a robot in a large herd

- \$200,000 robot financed over 15 years costs \$1400/month in repayment @ 180 milkings/day = 26 ¢/milking
- Service, hydro, chem. etc. \$1000/month or 18 ¢/milking
- Labor to fetch, clean robot room, groom and clean stalls, water troughs and crossovers is 0.7 hrs per robot per day @ \$18 = 7 ¢/milking
- Total is 56 ¢/milking



DeLaval

Herd Navigator™



Cowside in line milk analysis for:

- Progesterone
- LDH (Lactate Dehydrogenase)
- BHB (Beta-hydroxybuterate)
- MUN (urea nitrogen)



**Tail mounted
calving alert**



**Camera
systems**

*Less time in
the barn
makes remote
monitoring
critical*



**Discovery 120 robotic
manure collector**

Robotic Milking Worldwide

- +20,000 dairy farms with robots, mostly 50 to 300 cow dairies in Western Europe, Canada, and the US Northeast.
- 95% Lely and DeLaval single box systems.
- GEA, BouMatic, SAC/Insentec, Fullwood, Milkomax, single, double and small multibox systems.
- **Differences are much bigger than with parlor technology. . . So do your homework!**

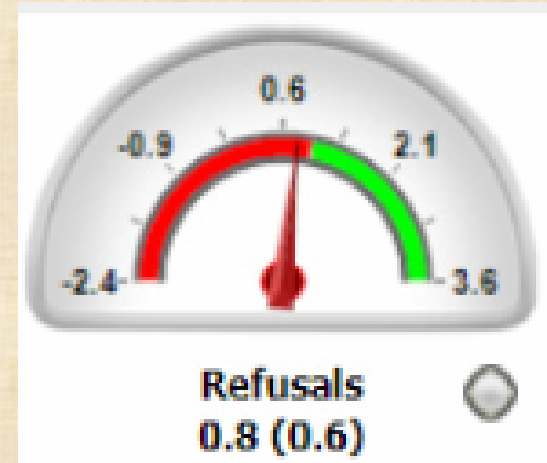
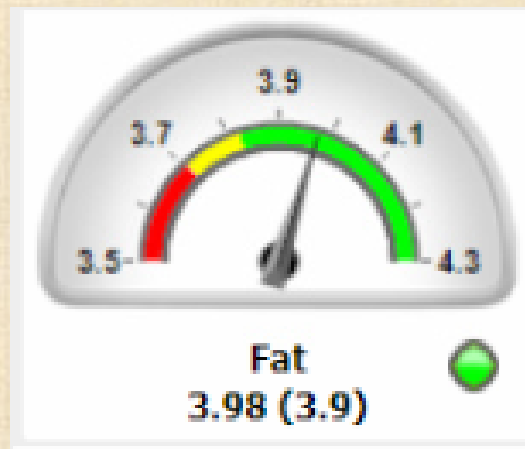
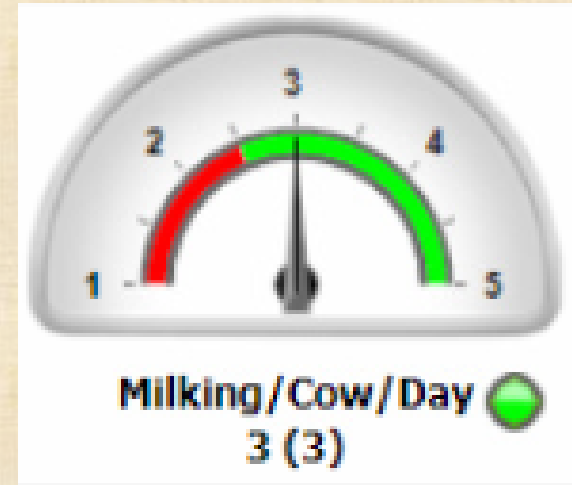
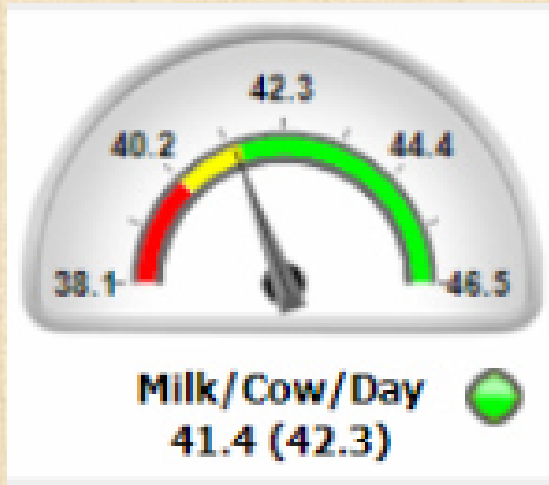


My son is a Lely dealer, West Coast Robotics,
in British Columbia



My daughter is a dairy farmer in Ontario, Canada
milking with a Lely robot since 2014





50 cows, 1 on manual milking, 2 fetch cows



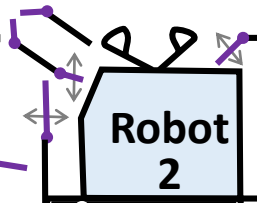
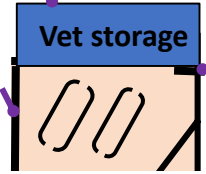
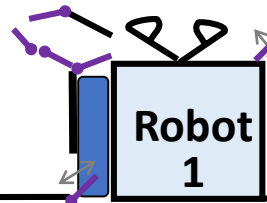
225 Kg pellets per day or 4.5 Kg per cow or 0.11 per Kg milk

Perimeter feeding

120 free stalls on 3 head to head platforms

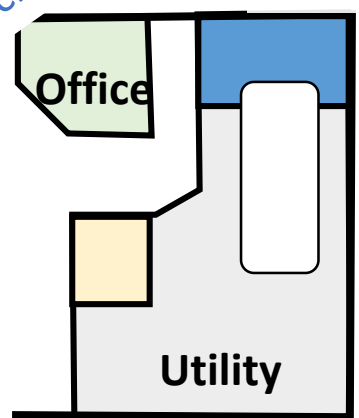
Perimeter feeding

Robots facing the same way



Split entry fetch pens

↓ Tank



Central handling

Separation area

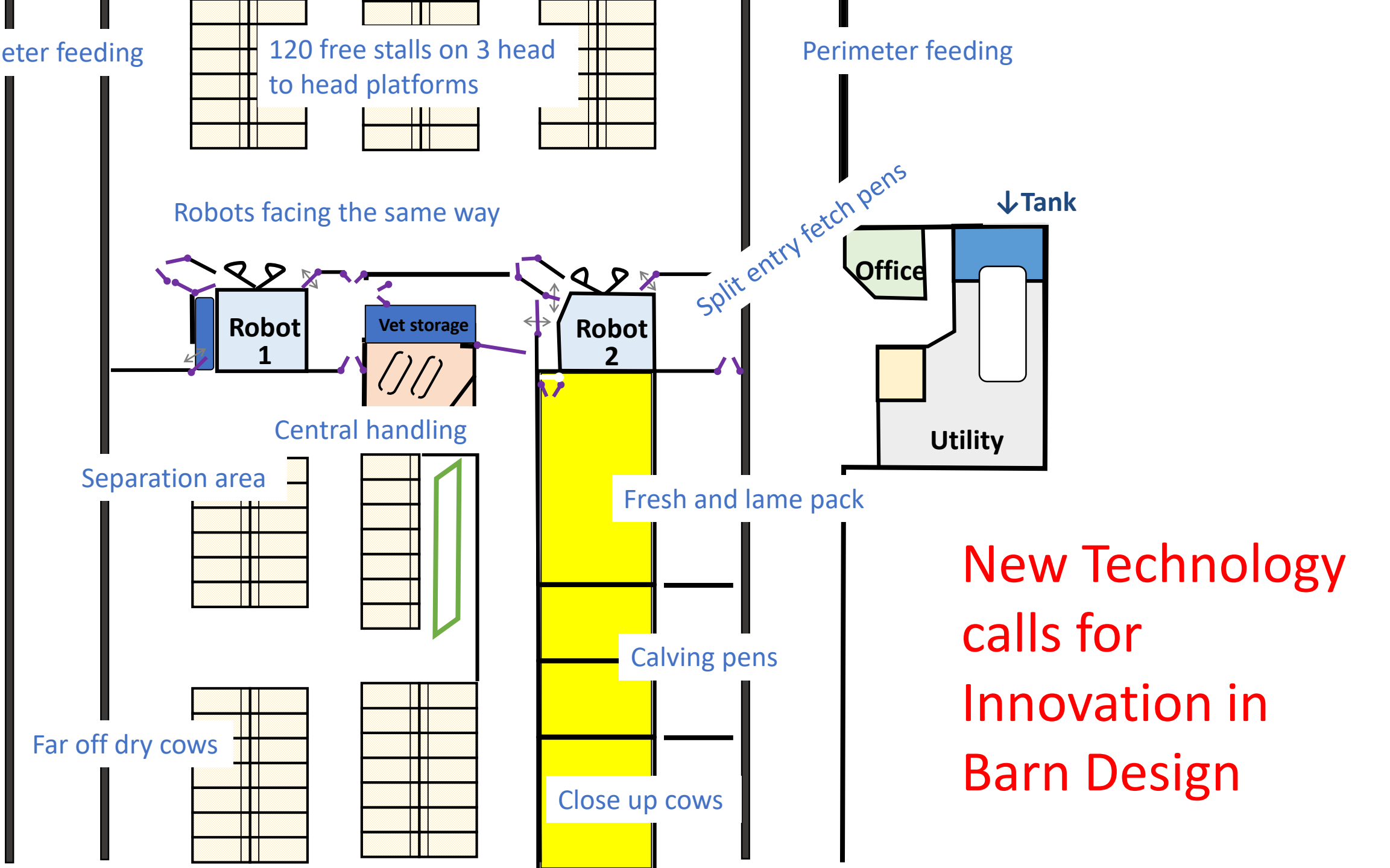
Fresh and lame pack

Far off dry cows

Calving pens

Close up cows

New Technology calls for Innovation in Barn Design



Healthy claws: 4 success factors

1. Good claw quality

Good diet with
fibre and
minerals

3. Low pressure

Comfortable Stalls
Bedding Pack for
problem cows

2. Low infection

Clean and Dry
Comfortable Stalls

4. Early, effective treatment

Foot Baths
Handling Chute

Clean dry alleys reduce lameness







Discovery 120 robotic scraper for solid floors can scrape 500 m² or +80 cows.
No manure bath, Cleans crossovers, can work dead end alleys and two sides of a manure drop.
New and untested, expensive



Feed stalls

Tube scraper

Tube scraper



Feed Stalls



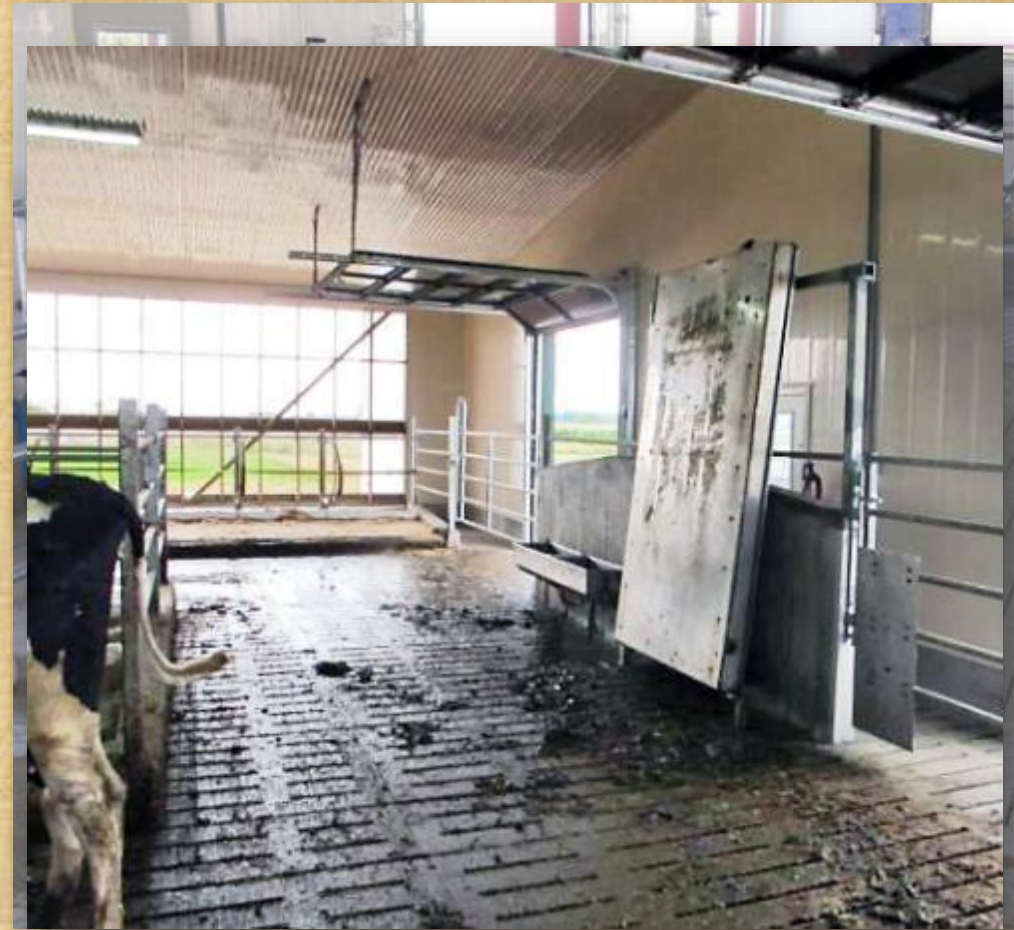
- Reduce competition
- Cows stand on dry rubber out of the scraper line
- 80 cm Stall
- 155 cm Platform
- 265 cm Scrape Alley

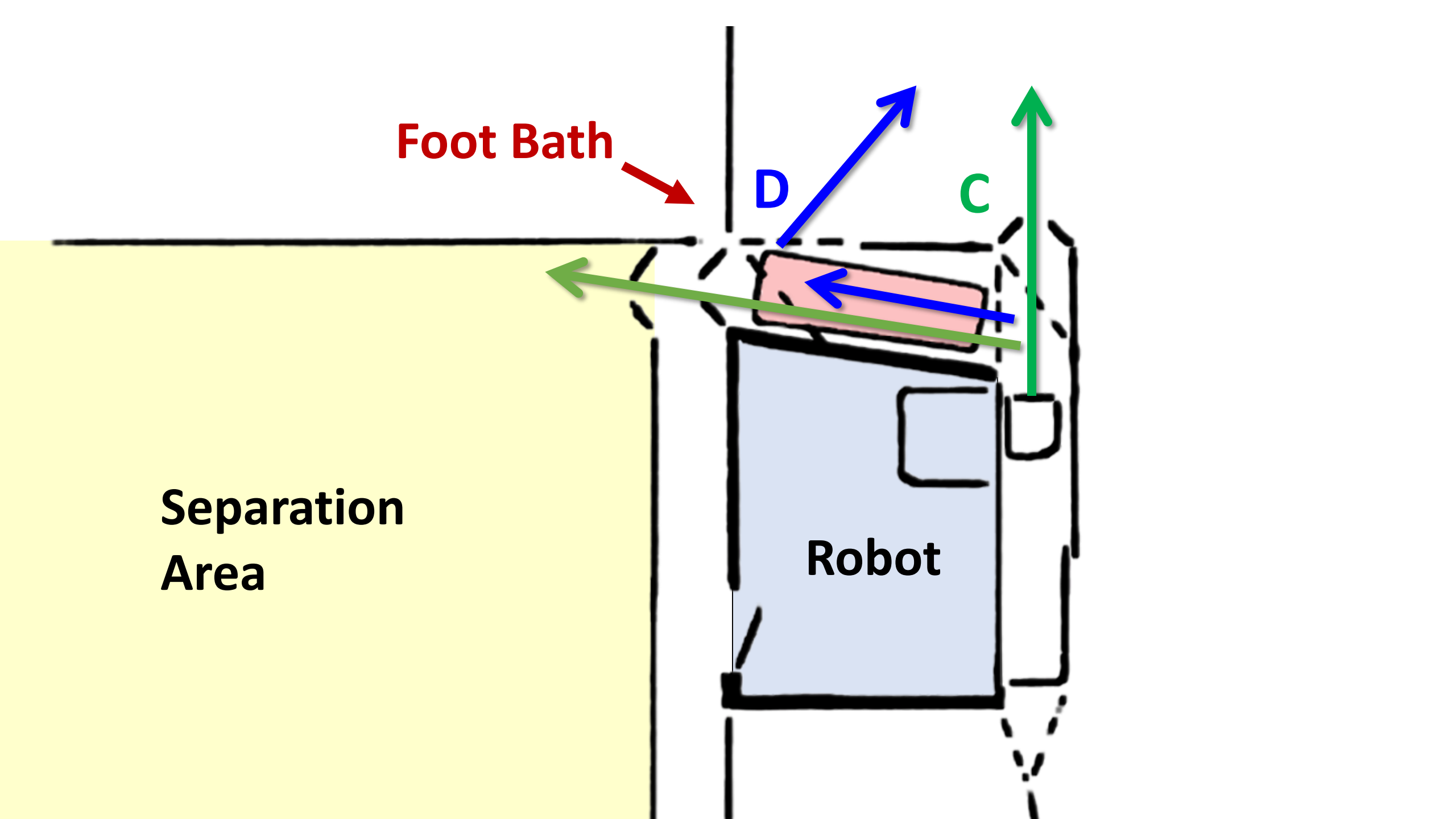


- Footbath at the robot exit discourages visits
- In free traffic, the number of passes is highly variable

A footbath in a remote crossover – walk all cows through it as often as needed

- Less disruptive to robot visits
- All cows get the same passes
- Clean fresh chemical works better
- Keeps chemical away from milk and delicate metal parts
- Combine with bedding delivery
- **BUT HERDING COWS IN GROUPS IS NOT NORMAL ROBOT BARN BEHAVIOUR !!**





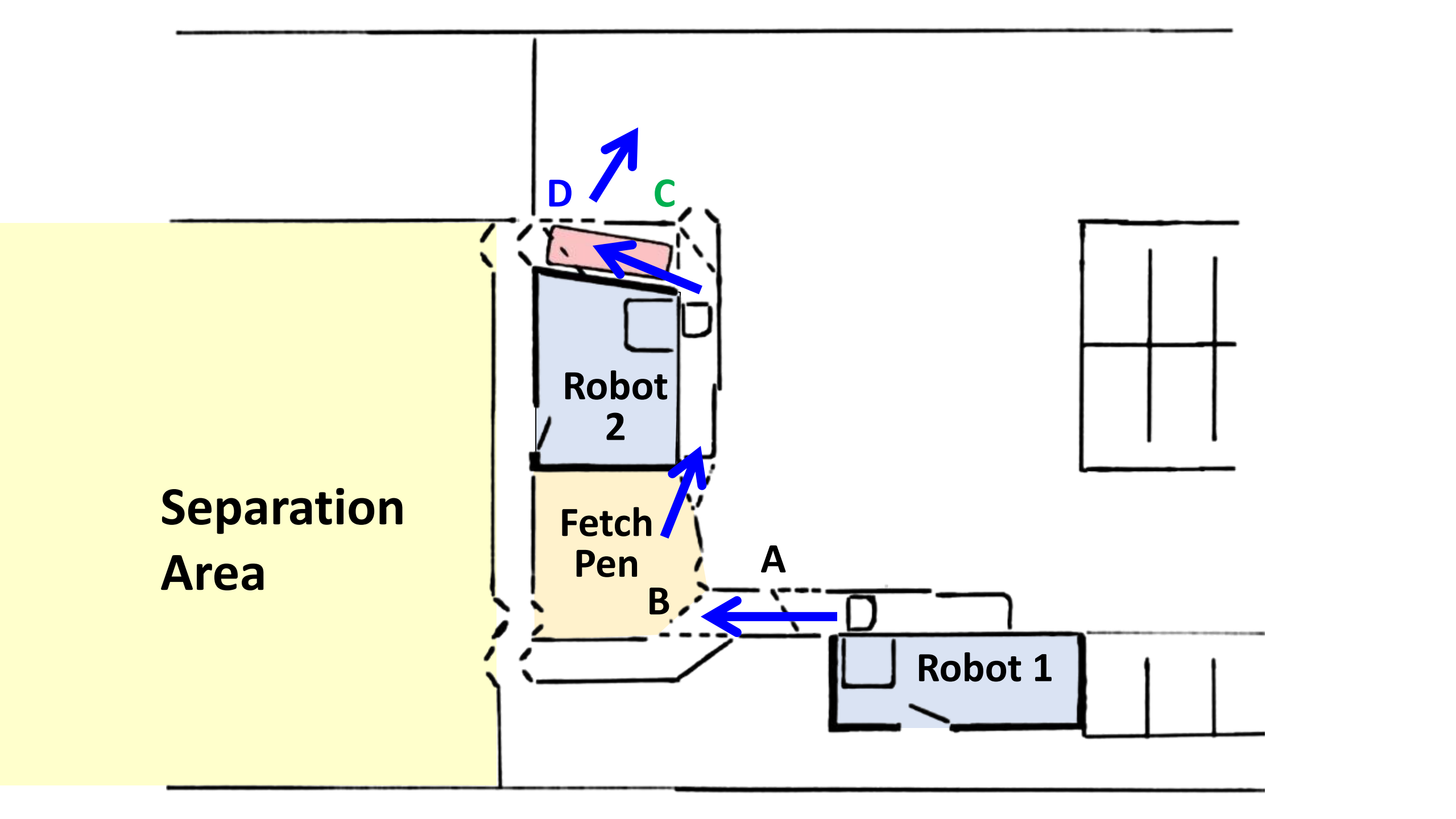
Foot Bath

D

C

**Separation
Area**

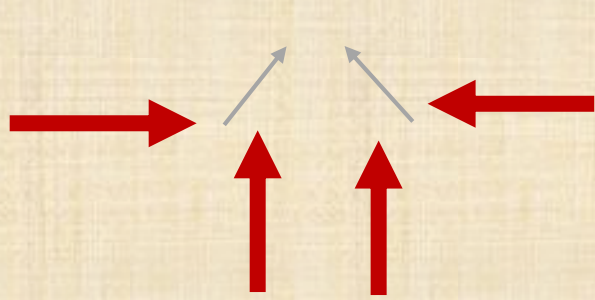
Robot





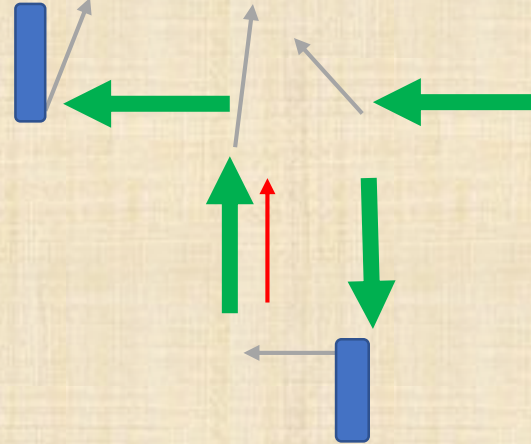
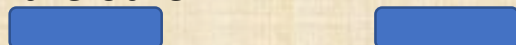
This “L” layout is great for sharing a footbath, and visibility and “cross use are excellent.
LELY NEEDS TO WRITE THE SOFTWARE FOR THIS FOOTBATH ROUTINE

Which robot orientation in an double "L"?



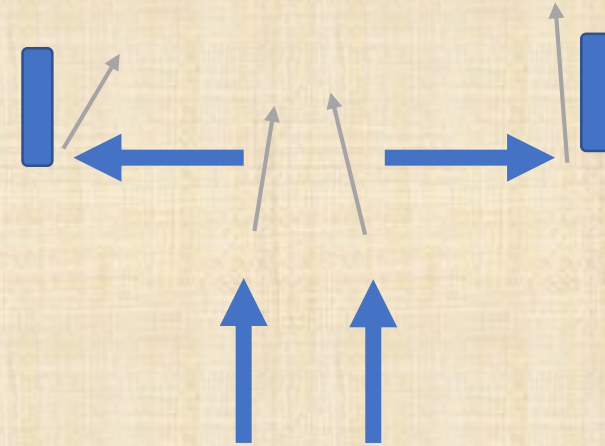
+ Robots closest together, 1 m narrower crossover, 4 extra stalls in the barn, simplest separation. Two groups behind is easy. Cows can go in any group.

-- No easy footbath option, least manger space, some cows prefer 1 robot over the other.



+ All the same way, easy for cows to learn and never need to adapt, slightly higher attachment success, cows can go in any group. Two groups behind is easy. Easy footbath route

-- Red arrow shows refusal needed to separate, and this requires a fetch pen to route this cow



+ Easy footbath route, cows go to both robots.

-- two groups behind requires a crossing. Cows should go to same orientation each lactation

MY ORDER OF PREFERENCE IS GREEN BLUE RED MOSTLY FOR FOOTBATHING

Ten barn design criteria for robotic milking

1. Open space near the robots
2. All robots the same way
3. Simple routing to robot, group to group and handling area
4. Split entry fetch pen
5. Fresh and lame pack with robot access
6. Stress free calving line
7. Flexible grouping
8. Flexible separation area
9. Perimeter feeding
10. Straight lines for material handling

Ten barn design criteria for robotic milking

1. Open space near the robots
2. All robots the same way

www.dairylogix.com

Links to:

World Dairy Expo lecture

Hoard's Webinar

3. Flexible separation area
9. Perimeter feeding
10. Straight lines for material handling

What about robotic rotaries?



Saves labor, but does nothing for the cow

Single box robots in large dairies can change consumer perceptions



- Less stress with no group movement and crowding
- Cows have more time to eat and rest
- Individual management according to individual needs
- Cows choose when to be milked



The future?

- Bring robotic milking even closer to the cow:

Milk at the manger



Milk on pasture



Virtual fencing technology has the potential to eliminate fetch cows



“Automation” with robotics will replace “mechanization”

It will be less dependent on scale:

- **“ideal size”** might be 800 to 1200 cows instead of 3000, perhaps as satellites served by one transition site
- Family run dairies with 200 to 300 cows will be competitive

Fewer but more **skilled employees**

Cows will give more milk, and live longer through more **individualized management**



Innovation in the marketplace ?

I am not a marketing expert . . Just an interested observer

**SOUTH WESTERN
ONTARIO
DAIRY SYMPOSIUM**



“Food From Our Farms”

Convenience, out of home, package size, single serve, vending, “cup holder bottles”, organic, Omega, Greek yoghurt, speciality cheeses, on farm processing, blue cow, branding, sports beverages, cheese awards, frozen pizza, ethnic products, grass fed etc.

Differentiation in the marketplace Australia



Leppington, Moxey and Kyvalley produce and market A2 Milk.

First marketed 20 years ago

Now 10% of the fluid
market

Very big in infant formula



What is A2 Milk

Casein comes in three forms A1, A2, A3 which have different BCM7 peptides

A1 is the most common, and some studies suggest some people have difficulty digesting it.

Some sensational “science” linked it to autism and schizophrenia.

Good marketing to health conscious consumers has now made it a trusted brand

A2 Milk

Controlled by a single gene .

A2 is recessive so a cow has to be “A2A2” to produce A2 milk
35% of Holsteins are A2A2 (Geurnseys are nearly all A2A2 . . . Eby
Manor promotes it)

Simple to genetic test for A2 and segregate A2A2 cows (\$15
genomic test from Holstein Canada)



Innovation in the marketplace ?

**SOUTH WESTERN
ONTARIO
DAIRY SYMPOSIUM**



Plans for 2019

..... Threats to Our “Perfect Food” Image

Terry O’ Reilly host of CBC “Under the Influence”

February 21, 2019,
Woodstock Ontario



Threat 1 - Sugar is the new nutritional enemy and milk is 5% sugar:

Type 2 diabetes epidemic
Obesity in children



“Lactose free tastes sweeter than regular milk”
. Can we take advantage of this?

Filtered and reconstituted so it has half the sugar, (6 vs 12 grams) no lactose and more protein (13 vs 8 grams)



22 grams sugar vs 21 grams in regular chocolate milk ? . . . That is 10 grams added !
Can we do with less ??

Threat 2 - Non-dairy/meatless substitutes are attracting a following



Driven by :

Animal rights ?

Environmental concerns ?

Health/nutrition ?

20% of Canadians think about “animals suffering and dying”
when they eat meat (Dalhousie U.)

We need to reinforce positive images for the industry



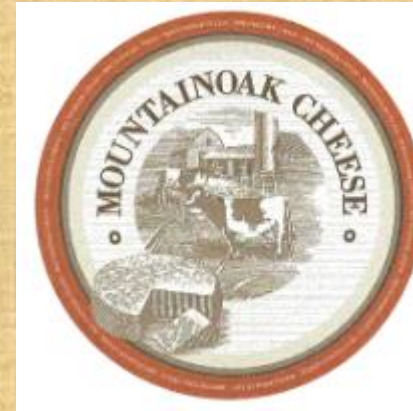
Processing/Food Tourism



Michael Bennett



Consumers want to know
where their food comes from.



“Food tourism”

A few clean well managed dairies, processing and
selling direct with barns open to the public
Is a great image builder





Vejlskovgaard Dairy, Denmark





A Fair Oaks Dairy Adventure

at exit 220 on Interstate 65 south of Chicago



Milk a plastic cow, do a nutrition quiz, learn about cow comfort etc.



The 45 Minute Bus Tour



WE NEED FORMAL PROGRAMS FOR DAIRY TOURISM

Keep it Mainstream and Real

Make it personal

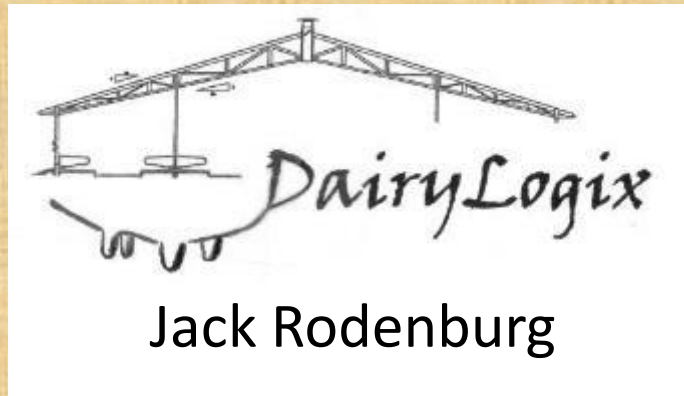
Support it Financially if it is branded right.

Structure your message

“we protect our cows from
the elements” Moxey Dairy Australia



Innovation on the Farm



How do you prepare for technology change?



- Be Aware . . . **open houses, talk to users, research.**
- Incorporate **adaptability** in all future building projects.
- **Start small** if you can.
- Anything “**bleeding edge**” should be shared risk with the manufacturer and dealer.
- **Prepare where you can** . . i.e. for robotic milking in five years, select cows and sires now for fast milking, good teat placement and good feet and legs.



Be open to the possibilities:
Thank you for listening!



www.dairylogix.com

Questions? Discussion?