The Transition Cow: Where Health, Reproduction, Milk Peak, and Profit are Won or Lost

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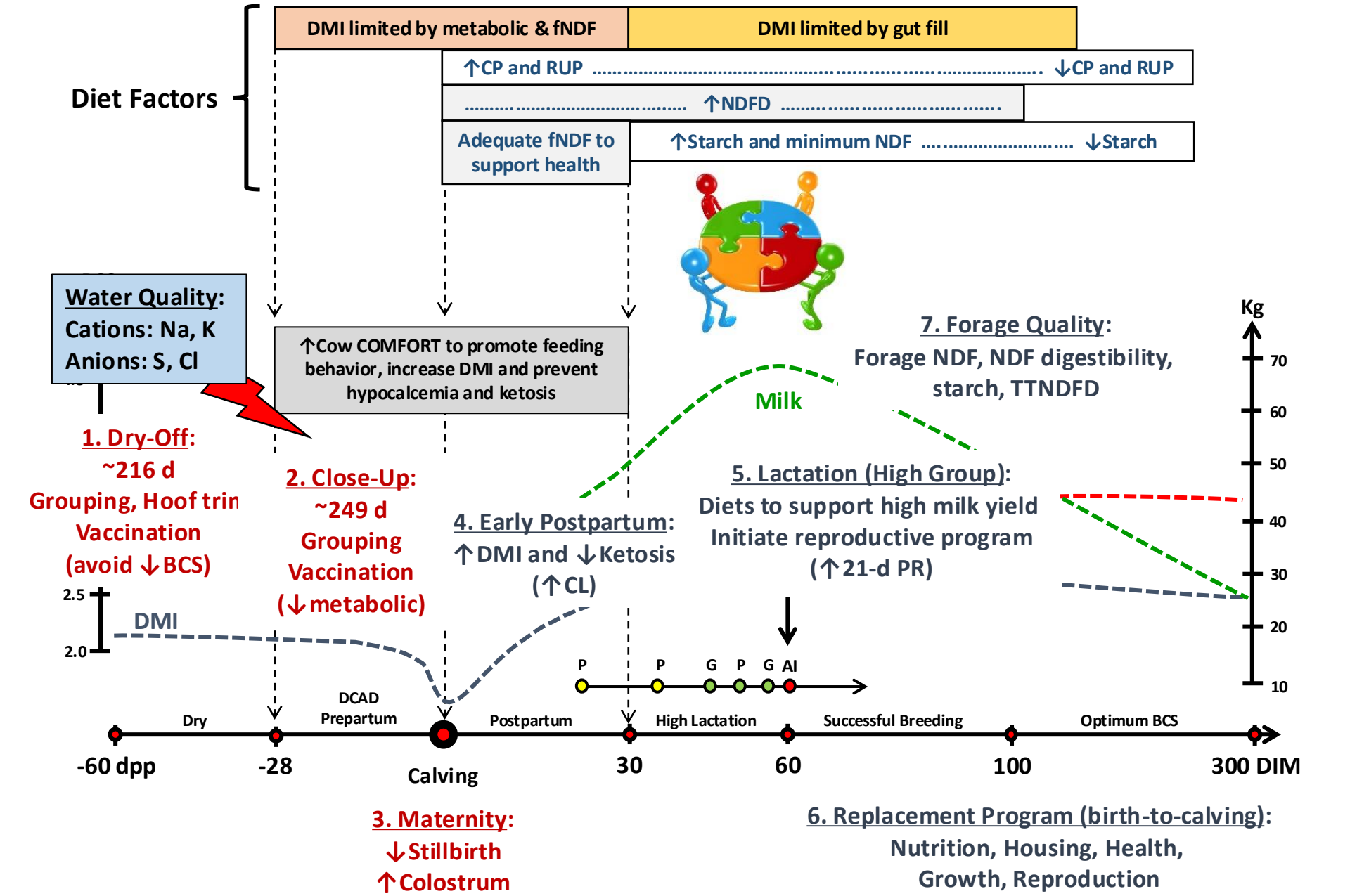


(NDF = Neutral detergent fiber, fNDF = forage NDF, NDFD = NDF digestibility, CP = Crude protein, RUP = Rumen undegradable protein; adapted from VandeHaar et al., 2015 JDS 99:4941–4954)

Where Are the Opportunities?

↓Intake
↑BCS loss
↑Metabolic disorders
↑Mastitis
↑Culling
↓Reproduction
↓Milk yield

↑Intake
↓Metabolic disorders
↓Culling & SCC
↑Reproduction
↑Milk yield and components

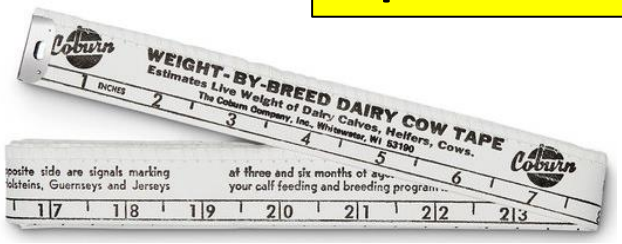
(Grant and Albright, 2001; Wiltbank et al., 2002; Theriogenology 57:21-52; Huzzey et al., 2006 JDS 90:3220–3233; Bach et al., 2008 JDS 91:3259–3267; Schuenemann et al. 2021 JDS 104:277(Suppl.1); Horst et al., 2021 JDS 104:8380–8410)

Opportunity #1: Effective Heifer Replacement Program

Objective: <2% mortality pre-weaning, ≥2x BW by weaning (60 d of age), >90% pregnant within first 2 services (13-15 mo) with ~55% mature BW and calving at 23-24 mo with ~80% mature BW (ADG ~1.8-2 lb/d or 0.8-0.9 kg/d)

Mature BW is determined in Lact 3-4 at 100-120 DIM

Tape or Scale = ↑Control & ↓Riesk



"You cannot manage what you do not measure!

Opportunity #2: Effective Transition Cow Program

Objective: Achieve consistency in maternity (<2% stillbirth), reproductive performance ≥30% 21-d PR, milk yield ~45 kg/d ECM (4.2% F, 3.5% P), <150,000 SCC/mL, and longevity >3.2 lactations with positive financial outcomes

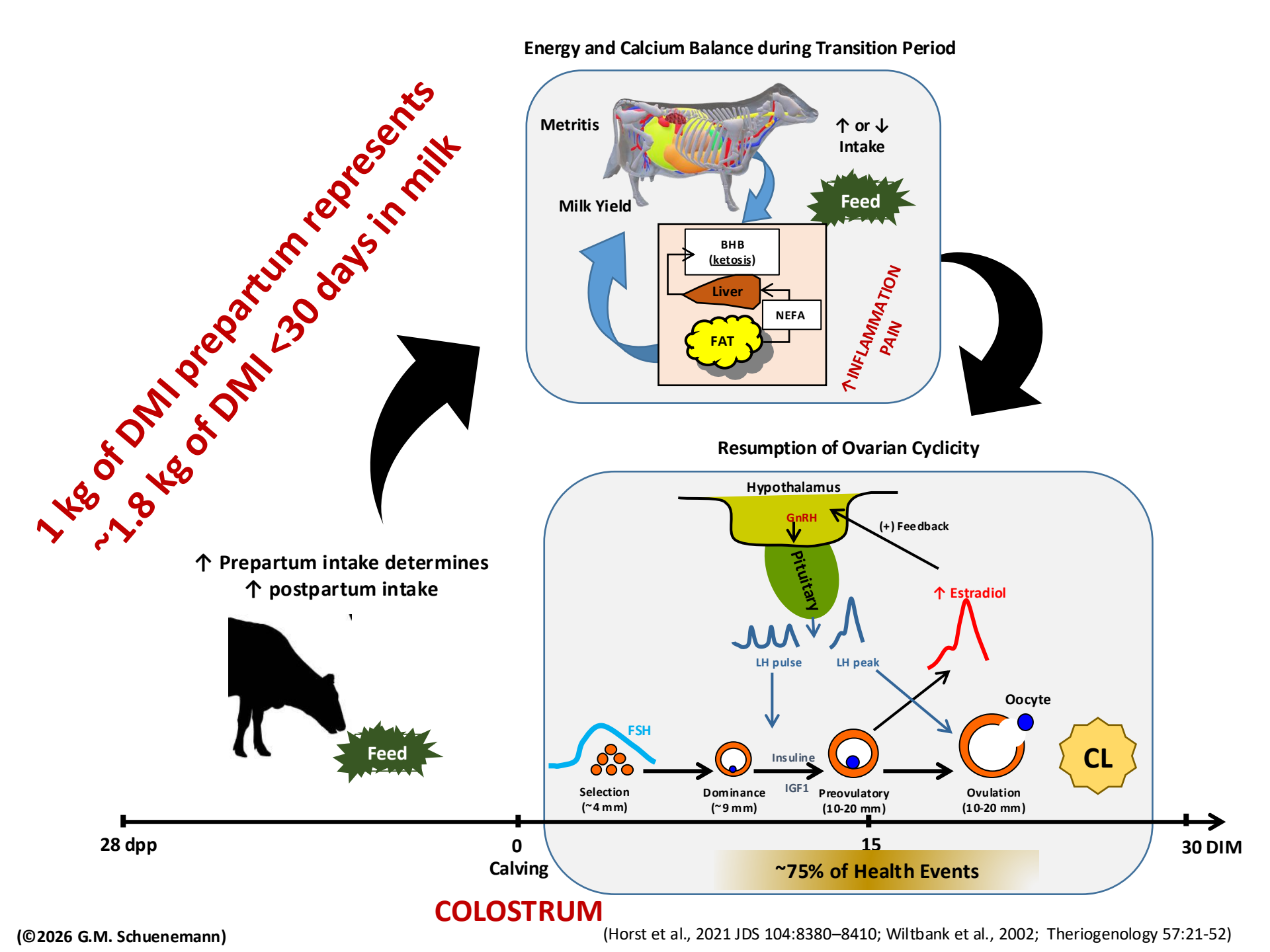
Opportunity #3: Effective Forage Quality Program

Objective: Produce sufficient quantities of highly digestible forage (fiber and starch) with minimal soil, mycotoxins, and bacteria contamination

Forage Quality is Usually the Limiting Factor for DMI on Most Dairy Farms

Opportunity #4: Effective Training Program with Strong Emphasis on Prevention and a Process of Continuous Improvement

Objective: Have all protocols written down (simple but informative), implement a training schedule that is integrated and consistent with the protocols and facilities, and schedule regular meetings to review processes and goals



(Horst et al., 2021 JDS 104:8380–8410; Wiltbank et al., 2002; Theriogenology 57:21-52)

J. Dairy Sci. 102:3348–3361
https://doi.org/10.3168/jds.2018-15386

Associations of pre- and postpartum lying time with metabolic, inflammation, and health status of lactating dairy cows

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Association of prepartum lying time with nonesterified fatty acids and stillbirth in prepartum dairy heifers and cows

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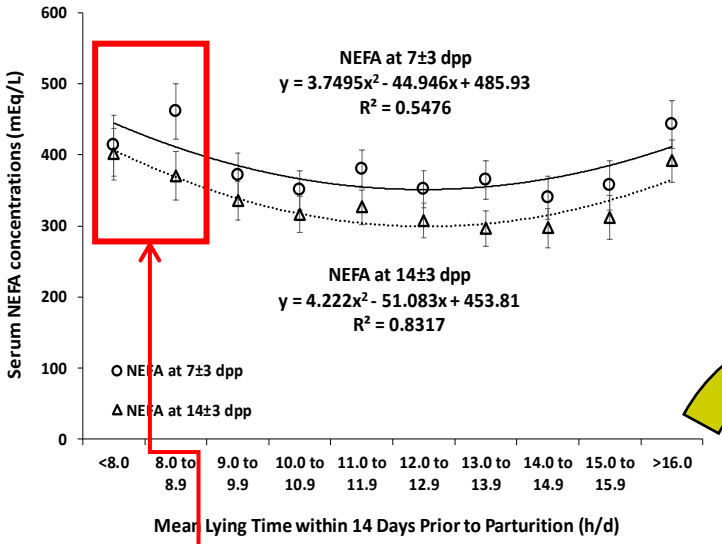
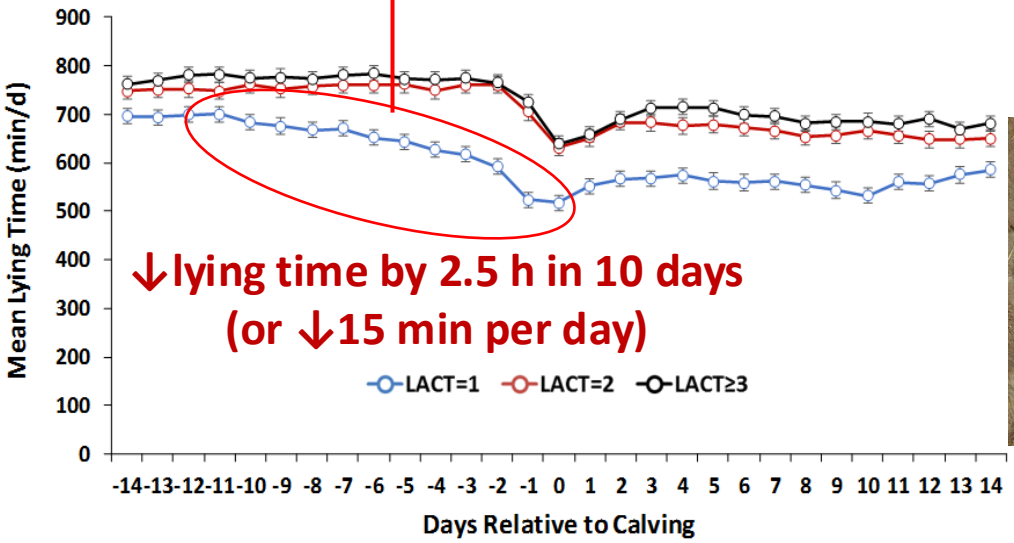
Prepartum



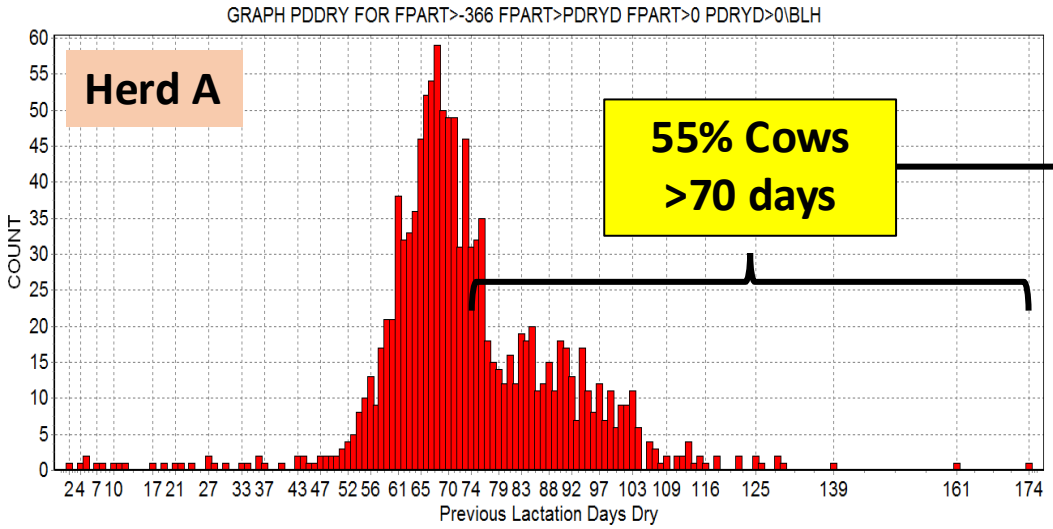
Sick Transition Cows:

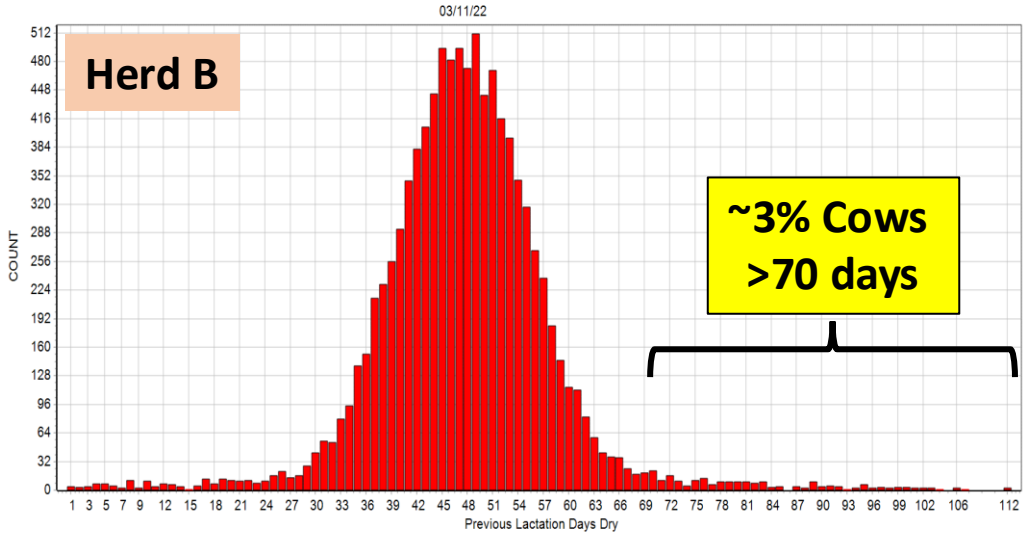
- 2.5x ↑NEFA prepartum & ↓BCS loss
- 2x ↑Stillbirth
- 1.5x ↑Hypocalcemia
- 3.5x ↑Haptoglobin
- ↑Metritis, ↓Cyclicity/Reprod/Milk



Maternity & Post-Partum

Does the Pattern of Previous Dry Period Lengths Match the Management Plan?





↑NEFA Prepartum
↑Ketosis Post-partum

If feeding diet high in energy (1.55 Mcal/kg)

~5 Mcal/d x 70 d = 350 Mcal

= ↑0.75 BCS

If anionic diet is fed, vaccinate cows at dry-off 56-60 dpp and at 28 dpp:

↑Energy, ↓hypocalcemia, ↑IgG

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https://doi.org/10.3168/jds.2021-20242
JDS20242

Effect of timing of prepartum vaccination relative to pen change with an acidogenic diet on lying time and metabolic profile in Holstein dairy cows

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Effects of prepartum vaccination timing relative to pen change with an acidogenic diet on serum and colostrum immunoglobulins in Holstein dairy cows

B. T. Menichetti,[1] A. Garcia-Guerra,[2] J. Lakritz,[3] W. P. Weiss,[4] J. S. Velez,[5] H. Bothe,[5] D. Merchan,[6] and G. M. Schuenemann[1]*
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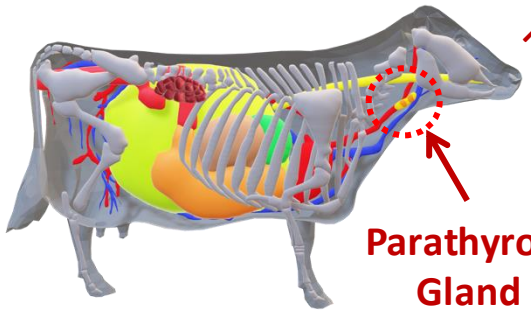
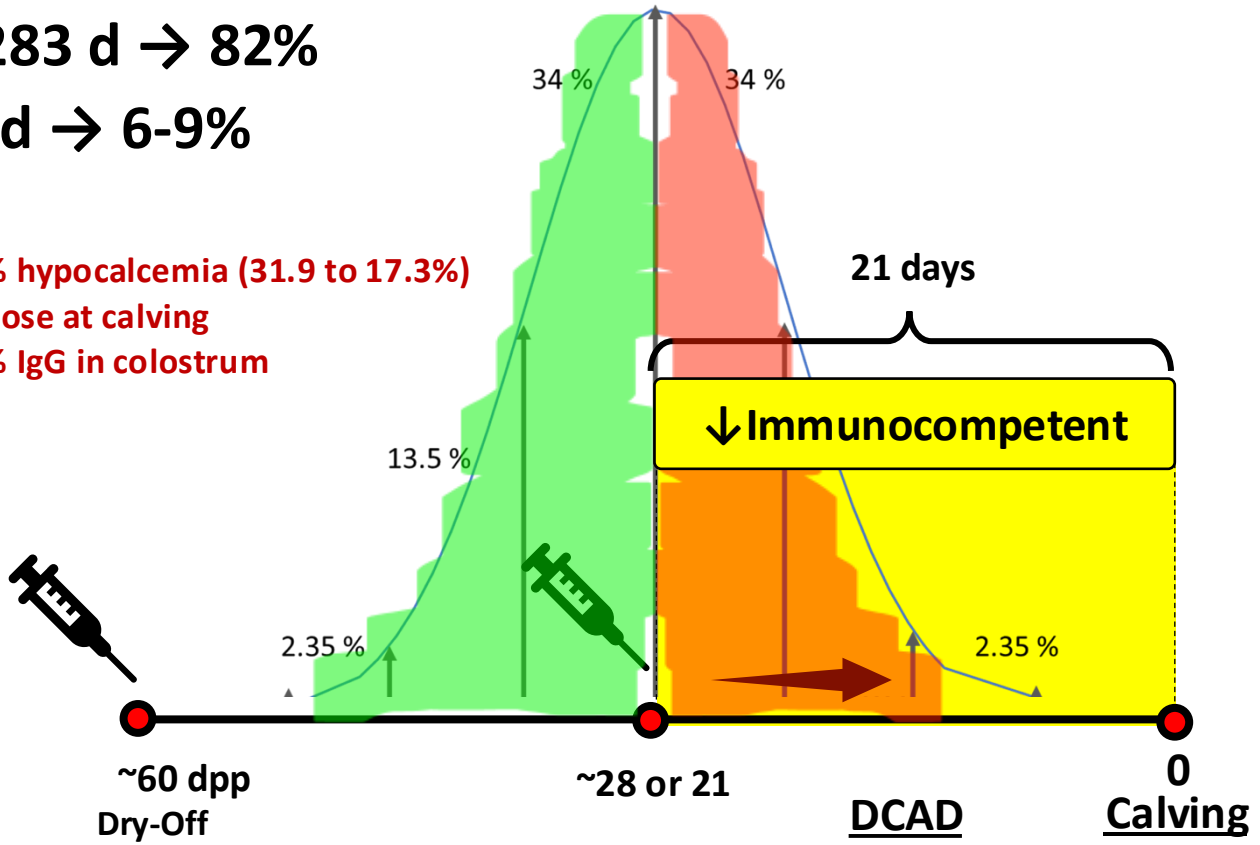
- **Gestation Length of 278 days**
  - Short: 254-269 d → ~9-12%
  - Average: 270-283 d → 82%
  - Long: 284-298 d → 6-9%

↓~46% hypocalcemia (31.9 to 17.3%)
↑ Glucose at calving
↑~20% IgG in colostrum



Parathyroid Gland

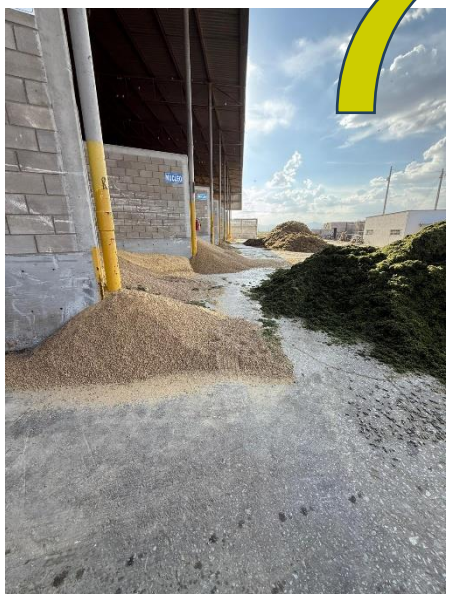


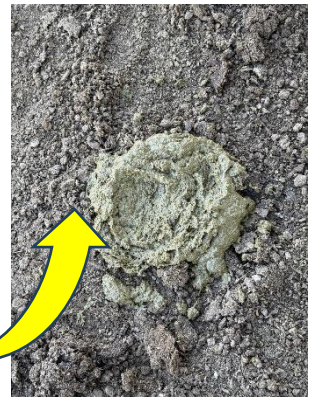
>80% Wheat Straw Samples Contaminated with DON (50% >1000 ppb)

(Schuenemann et al. 2025 with 150 samples; Revealing the mycotoxin risk in straw, 2022. Source: https://www.allaboutfeed.net/all-about/mycotoxins/revealing-the-mycotoxin-risk-in-straw/?utm_source=chatgpt.com

~30% Wheat Straw in Prepartum

TMR AUDIT: Hygiene & Variation to ↑DMI >> ↑Health/Rumen >> ↑MILK (↑%F and ↓SCC) and ↑Reproduction (↓abortion)





Team

The 4 Pillars of Feed Hygiene Assessment

Dirt/Mineral Contamination:

- Ash %, fermentation profile (butyric acid), heavy metals (Cd, As, and Pb)

Microbial Stability:

- Molds, yeasts, pathogenic bacteria

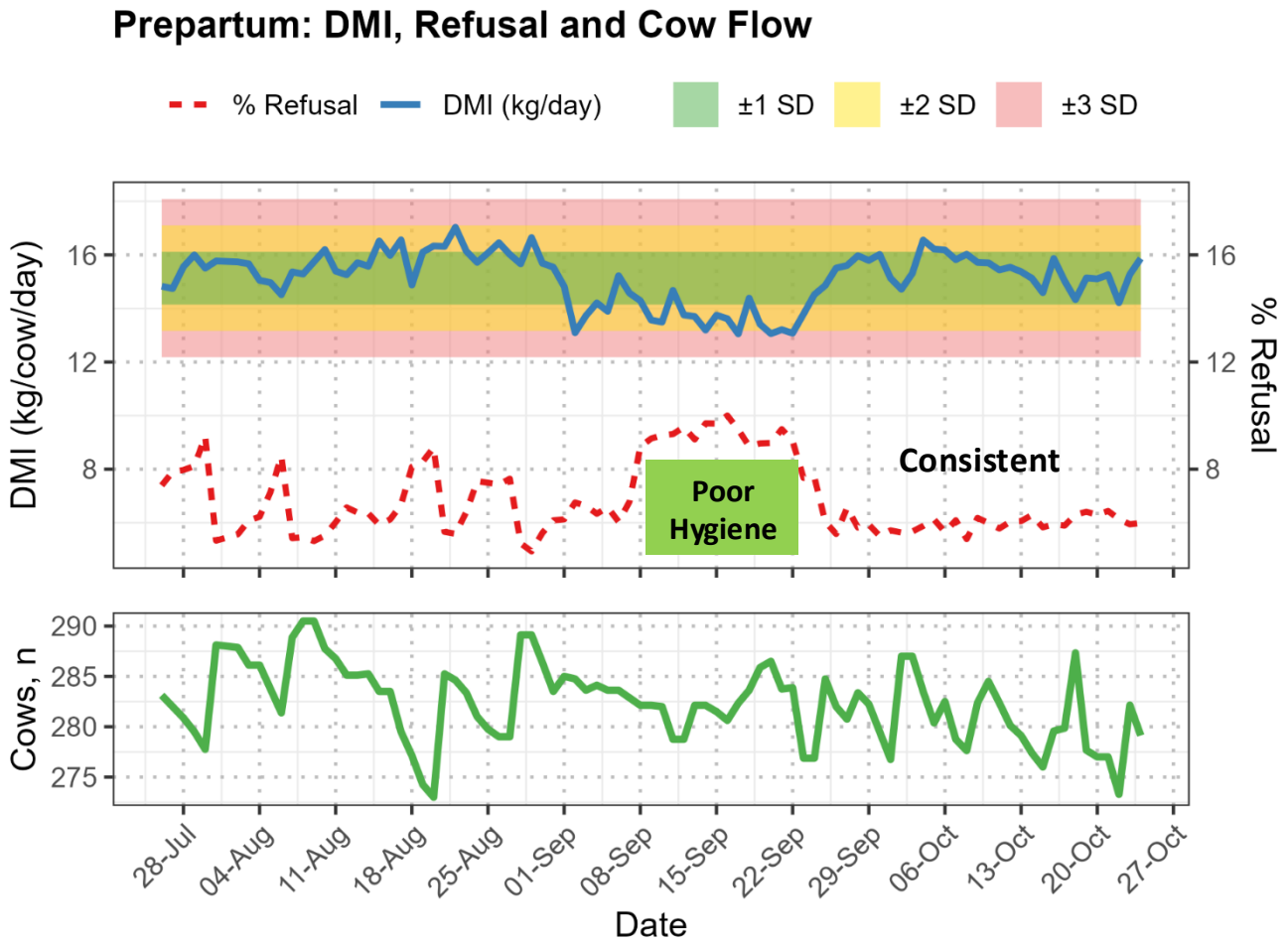
Mycotoxins:

- Single + multi-toxin risk index

Cow-Level Indicators:

- Milk fat, DMI, gestation length, culling, stillbirth

Effect of Poor Hygiene in Corn Silage and Wheat Straw

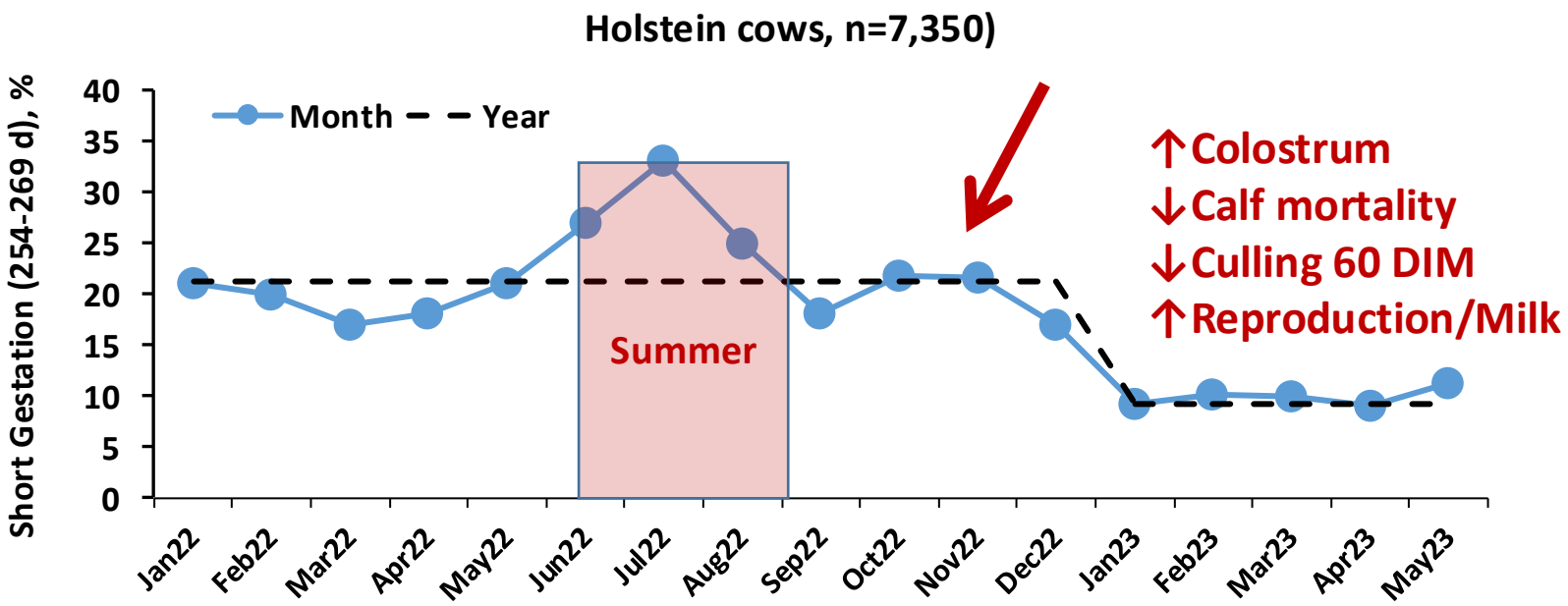


SUM PDCC=269 PDCC=284 BY LCTGP FOR LACT>0 PDCC>254 PDCC<299

Short Gestation Reduced by 50%

DON (1090 ppb), ZEA (360 ppb), FUM (1600 ppb) & T-2 toxin (145 ppb)

(Schuenemann et al. 2026, on-going study)



"Ash" (% DM) in TMR ↓54% (from 11 to 5%)

Each % point over 5% represents ~10 kg (22 lb) of dirt per Tn feed

(60 kg dirt / 42 or 62 cows = ~1.4 or ~1 kg/d/cow)

↓Inflammation = Precision Nutrition + Management/Environment

For transition cows, rumen-protected AA (e.g., meth, lys, cho) promotes metabolic resilience (↓inflammation, ↑liver function, and ↑immune response), ↑DMI, and ↑Milk (components)

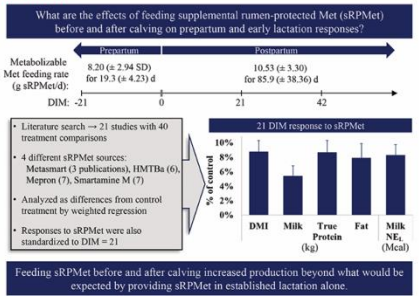
BUT if cows don't eat, nothing works!

JDS Communications®
2024; 5:293–298
https://doi.org/10.3168/jdsc.2023-0512
Short Communication
Animal Nutrition and Farm Systems

Systematic review and meta-analysis of dairy cow responses to rumen-protected methionine supplementation before and after calving

G. I. Zanton[1]* and M. Z. Toledo[2]†

Graphical Abstract



J. Dairy Sci. 103:282–300
https://doi.org/10.3168/jds.2019-16842

Meta-analysis of the effects of supplemental rumen-protected choline during the transition period on performance and health of parous dairy cows

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Why Cows Stop Eating?

1. Gut fill
2. Metabolic
3. Non-dietary factors

Feeding:
Environment
Facilities
Management

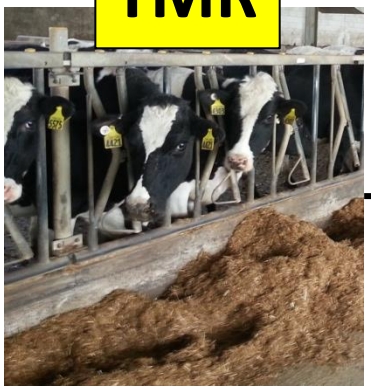
Maintenance
Growth
Milk
Reproduction

LIVER
Energy

Absorbed Nutrients

3
2
1

TMR

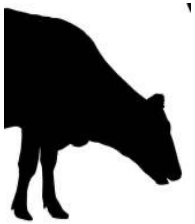


RUMEN FILL

INTESTINE

Feces

Feeding Behavior Drives DM Intake



BW = 1730 lb
(786 kg)

Prepartum

Meals per d = 5.9

Meal size = 2.6 kg/d (2.3 to 2.9 kg/d)

Time per meal = 50 min

Interval between meals = 4 h

2.6 kg =
3.7 Mcal NE_L per d

Meal Meal Meal Meal Meal Meal

0 Noon 24:00

DMI
14.2 kg/d
31.2 lb/d

Water 11.4 G
(43 kg/d)

BW = 1540 lb
(700 kg)

Fresh

Milk 73 lb (33 kg/d)

Meals per d = 8.7

Meal size = 2.5 kg/d (2.2 to 2.8 kg/d)

Time per meal = 30 min

Interval between meals = 2.9 h

2.5 kg =
4.2 Mcal NE_L per d

Meal Meal Meal Meal Meal Meal Meal Meal Mea

0 Noon 24:00

DMI
19.5 kg/d
43 lb/d

Water 26.9 G
(102 kg/d)

(Adapted from Beauchemin, 2018; Havekes, 2019; and Jensen and Vestergaard, 2021)

What are the Top 3 Non-Dietary Factors Reducing DMI Potential?

- **Cow COMFORT:**
  - **Defined by 5 principles of animal welfare**: 1) access to water, 2) access to TMR, 3) thermo-neutral, 4) be able to express natural behavior (eat, walk, resting), 5) free of pain and not fearful of people. Largely determined by people (management), facilities, and environment (e.g., heat stress)
  - ***People can overcome facility limitations, but great facility design cannot replace poor management***
- **Linear feed bunk and water space per animal:**
  - 80 cm per cow (30 in) with feed available within reach of animals for at least 22 h/d
  - Provide 10 cm (4 inches) of linear water space per cow with a at least 38 L (10 gallons) of water flow per min
- **Frequency of feed push-ups:**
  - Feed transition cows 2x per day with push-ups every 1-hour interval (~12x per day)

(Grant and Albright, 2001; Huzzey et al., 2006 JDS 90:3220–3233.Bach et al., 2008 JDS 91:3259–3267)

Changes in Eating Time by Management and Facilities

Items[1]	Changes in Eating Time, min/d
Limiting feed bunk space:	
50 vs 80 cm/cow (Goal)	↓30
20 vs 80 cm/cow	↓60
Feed bunk design:	
Headlock vs Neck rail	↑18
↑Frequency of feed delivery per day:	
From 1x to 2x	↑10
From 3x to 4x	↑14

[1]On average, the feeding time of a Holstein cow is ~280 min/d. Adapted from Grant and Albright, 2001; DeVries et al., 2005; Huzzey et al., 2006)

↓2 kg DMI (cow/d) with overcrowded transition pens (<50 cm/cow & bedding). Solution: ↑TMR (8% residual) with full feed bunk 22 of 24 h

Agressive Fresh Cow Program: ↓DMI and ↑Ketosis

Why is Cow "COMFORT" Important?

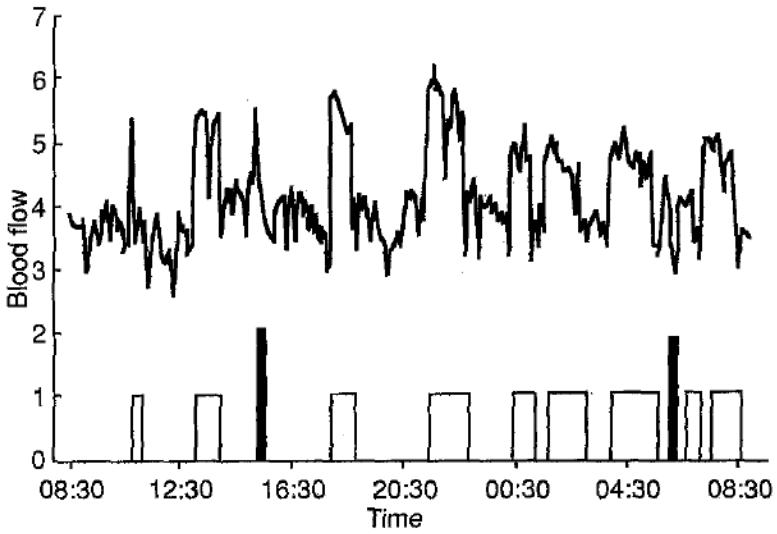


FIG 2: Blood flow through the external pudic artery in a dairy cow over a 24 hour period (continuous line) using a TT flow probe. Time spent lying (□) and the occurrence of milking (■) are also shown

(Metcalf et al., 1992 RVS 53:59-63)

When lying down, a cow has ~30% more blood flow to the mammary gland compared when standing …

lying down with full rumen ↑MILK

Cow COMFORT ↑Milk

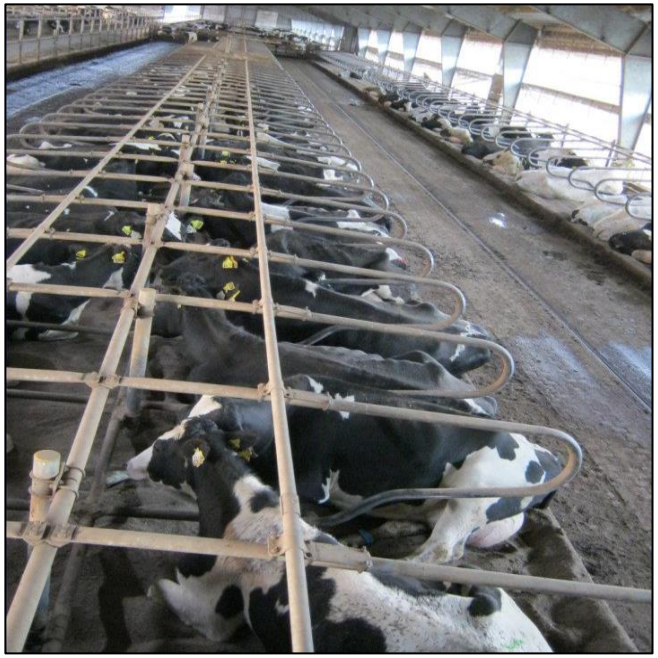
(Field response observation; Schuenemann et al. 2018-2024)

Cow COMFORT ↑Stall Usage

(Field observation: Fontana and Schuenemann, 2019; Schuenemann, 2020-2026)

Compacted Sand Bedding with <50% Stall Usage

<u>Stall Usage Index</u>: >85%
2 h before morning milking



Strong Negative Correlation (r = –0.82) between THI and DMI

(↓0.45 kg/d for every 1-unit ↑ above the threshold of 68 THI)

Fans and Sprinklers with intermittent water at 1.3 L/min (3 min "ON" followed by 9 min "OFF") ↓heat stress: DMI ↑ >1 kg/d

(Chen et al., 2016 JSD 99:4607-4618)

Transition and high milk-yield cows: 30 min session (Wind + 1 min shower every 3 min), 3x per day ↓heat stress: ↑DMI >2 kg/d

(adapted from Honig et al., 2012 JSD 95 :3736–3742)

Forage NDF and Starch are Key for Optimum DM Intake, BUT …

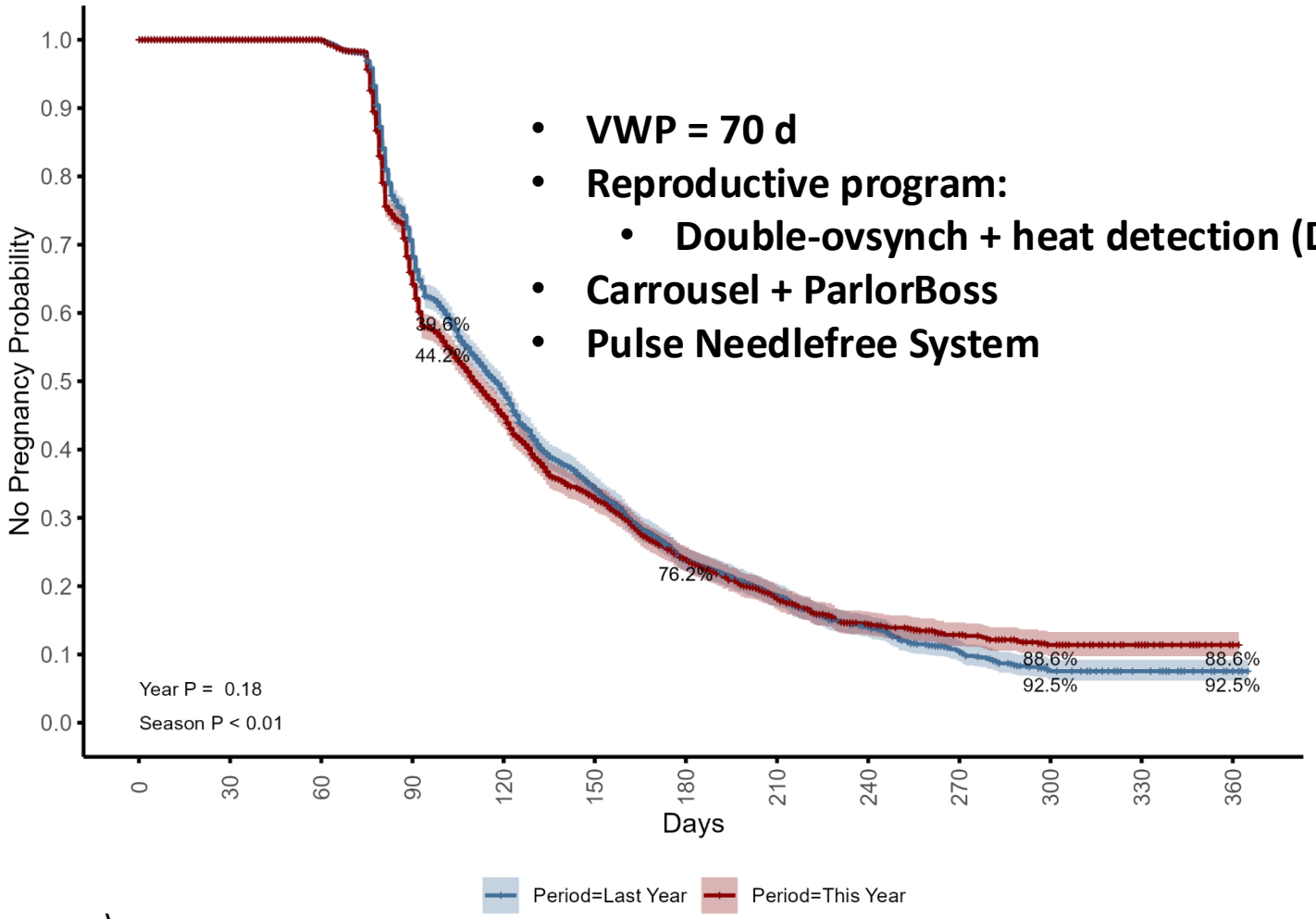
	Dry		Lact=1	Lact ≥2
			Days in Milk	
Item	Far-off 60-21d	Prepartum <21d	15	20
BW, kg	740	740	570	700
DMI, kg/d	13.9 (11)	12.3 (11)	20.8	25.8
DMI, % BW	1.87	1.66	3.6	3.7
NE_L, Mcal/kg	1.28	1.49	1.58	1.70
CP, %	12	14.3	18.5	17.5
NDF, min %	39-41	35-39	30-32	30-32
fNDF, min %	19-25	19-25	19-25	19-25
Starch, max %	15-20	15-20	22-30	22-30

(NASEM, 2021)

If feeding 19% fNDF and 25% starch, the minimum total NDF is 19+(60-19-25) = <u>35% NDF</u>

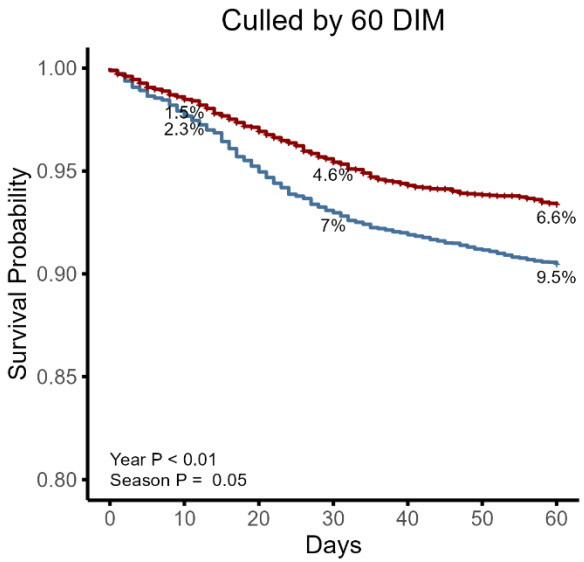
Effective Transition Program Drives Reproductive Success

4500 Holstien cows (BW ~780 kg), cross-vented barns, 52 kg/d ECM (4.2%F, 3.4%P, 147000 SCC), ~6.6% culling 60 DIM, ~31% PR (~7% abortion), and 100% beef x dairy bulls (~2% stillbirth)

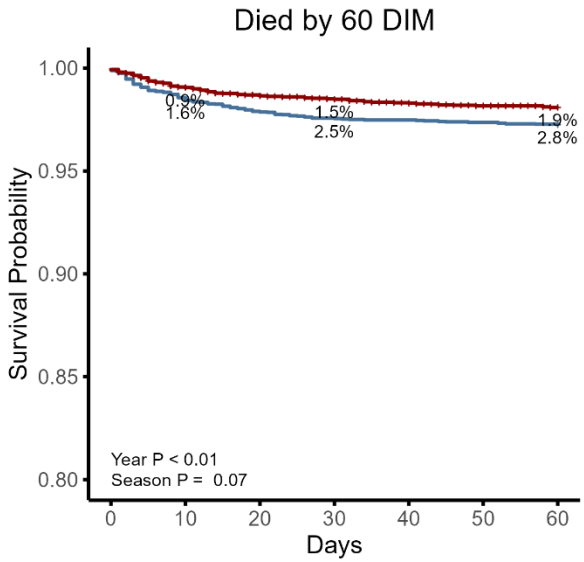


- **VWP = 70 d**
- **Reproductive program:**
  - **Double-ovsynch + heat detection (DelPro)**
- **Carrousel + ParlorBoss**
- **Pulse Needlefree System**

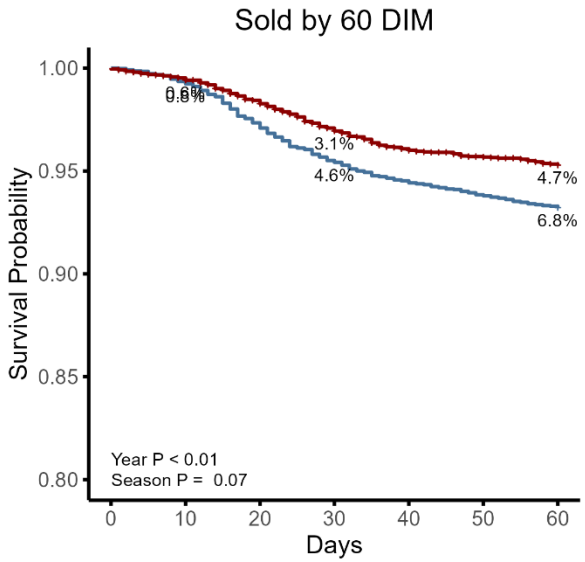
Early Cow Removal Costs You CASH!



YearGroup	LCTGP 1	LCTGP 2	LCTGP 3
Last Year	5.8%	4.9%	14.4%
This Year	2.9%	4%	9.9%



YearGroup	LCTGP 1	LCTGP 2	LCTGP 3
Last Year	0.8%	1.4%	4.6%
This Year	0.2%	1.1%	3.4%



YearGroup	LCTGP 1	LCTGP 2	LCTGP 3
Last Year	5%	3.4%	9.8%
This Year	2.7%	2.9%	6.5%

<u>GOAL for first 60 DIM</u>:

- **Overall: <6%**
- **Lact=1: <35% of overall culling (~2%)**

Your heifer replacement program will determine quality of first-calf heifers at calving

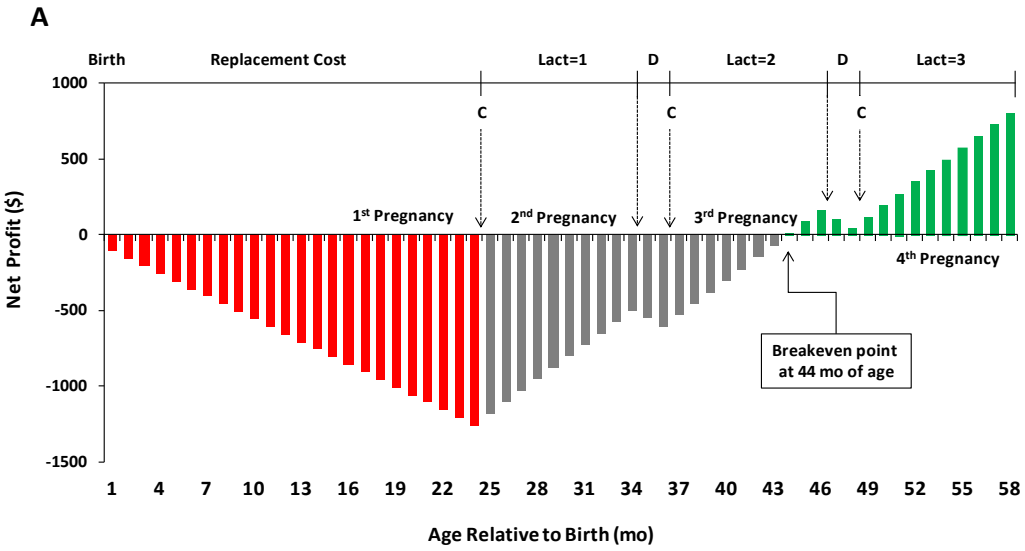
How Many Lactations Does It Take to Pay Back a Replacement Heifer?

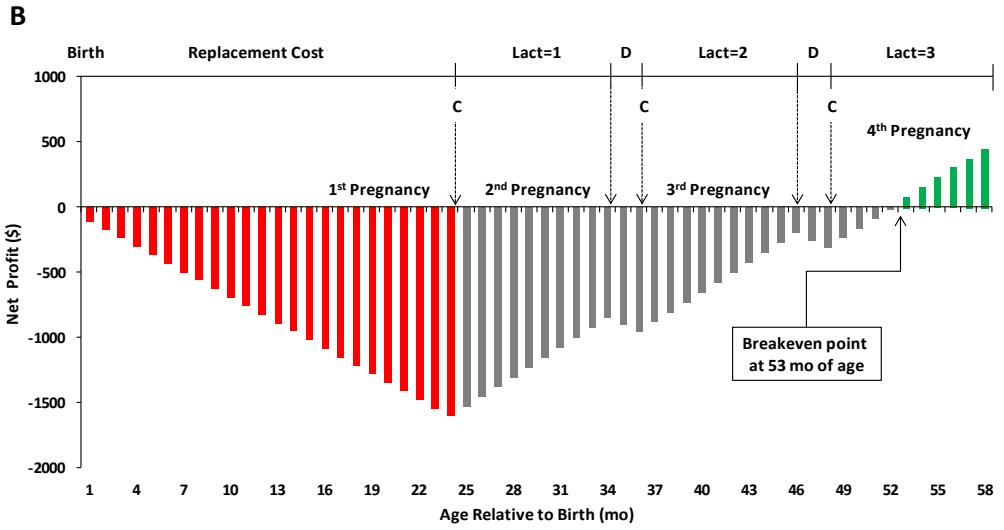
(Schuenemann et al., 2017 ADSA; Schuenemann et al., 2026 on-going study)

$2680

- Milk price
- Feed price
- Culling cow price
- Replacement costs

$2900





What Problem Needs to be Addressed to Improve Your Work?

(feedback from 2,900 workers, 450 dairy herds, and 11 US states)

(Schuenemann et al., 2017 ADSA)

Teamwork is "KEY" for Success

Performance

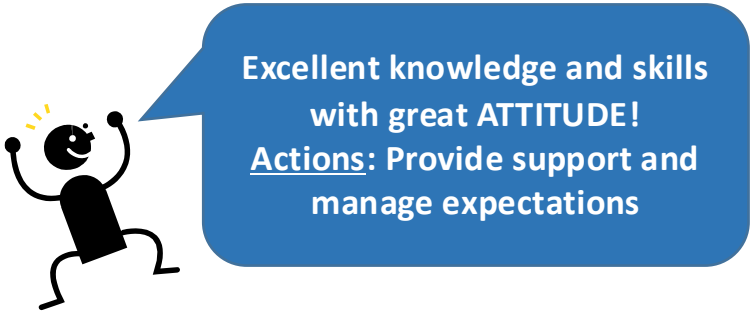
$$P = (K + S) * A$$

Knowledge

Skills

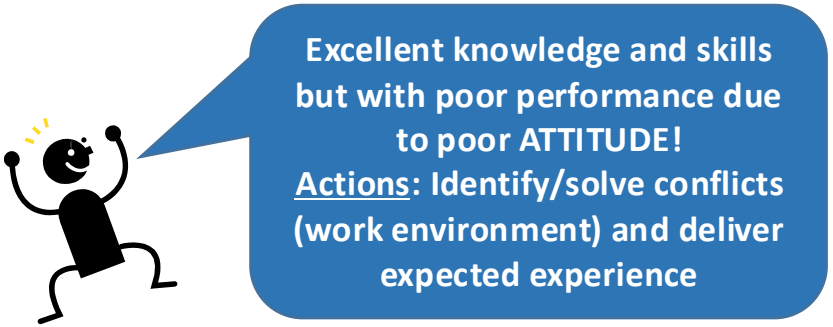
Attitude

Knowledge and Skills are Important, BUT ATTITUDE Defines Performance!



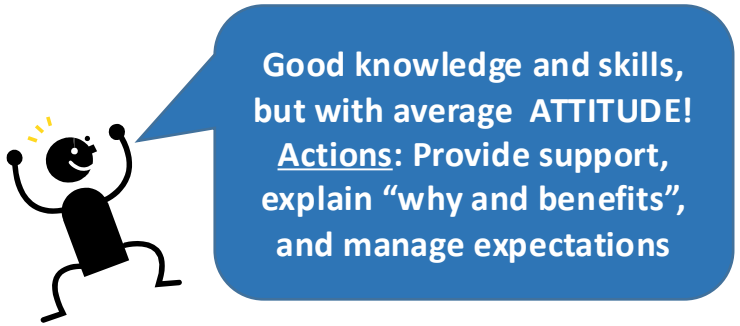
P=(0.95+0.95)*0.90 = 1.71

↑Performance



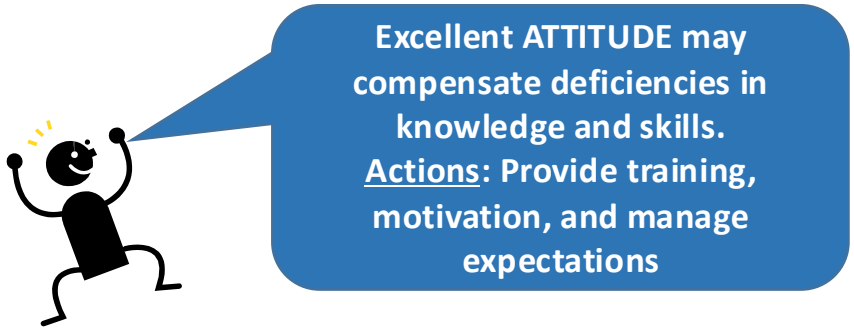
P=(0.90+0.90)*0.30 = 0.57

↓Attitude



P=(0.80+0.80)*0.65 = 1.04

Average



P=(0.70+0.70)*0.95 = 1.33

↑Attitude

4 Points that Characterize the Best US Dairy Herds

Holstein Cows: Maternity (~1% stillbirth with beef bulls), reproductive efficiency (≥30% 21-d PR & <5% abortions), milk quality (≥90 lbs/d with 4% F, 3.4% P & <150,000 SCC/mL) and longevity ≥3.2 lact with positive financial results

(Schuenemann et al., 2026; on-going study)

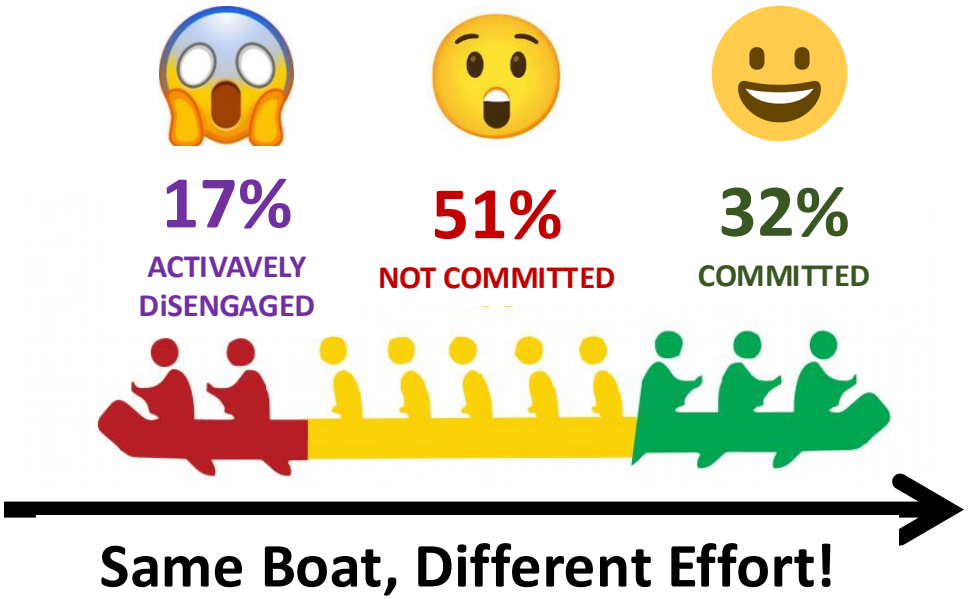
1) Committed and well-organized herd managers
2) Management program designed for transition cows
3) Record-keeping designed to monitor "processes"
4) Training program integrated and consistent with established protocols

Promote feeding behavior (COMFORT):

1. Access to quality water, adequate linear feed bunk/bedding space
2. Adequate maternity management & control of THI
3. Feed 2x or 3x times per day & monitoring %DM content (5x or 3x/week)
4. Feed push-ups every 1 h and separate feed delivery from milking
5. Adequate effective fiber in diet (peNDF $_{>8mm}$ = 14-18%)
6. Separate lact=1 from multiparous cows (rubber floor for Lact≥4 cows)

Achieving Farm Consistency is Not Accidental, It is the Product of Strong Teamwork

Hire for ATTITUDE, Mentor for Excellence!



(Source: US Workplace Engagement, 2025 Gallup Report)

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THANK YOU!