

## Transition Cow Management: Solutions to Optimize Dry Matter Intake in Transition Dairy Cows

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## The Dairy Business is the ART of Controlling Variation and Managing Risk

A simple and consistent management will  
allow cows to **eat 1 additional meal per day**  
(DMI ~6 lbs or ~2.5 kg/cow/d)

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## The Potential DMI is a Function of each Individual Cow; However, the Actual DMI Depends Largely on the Diet and Farm Factors

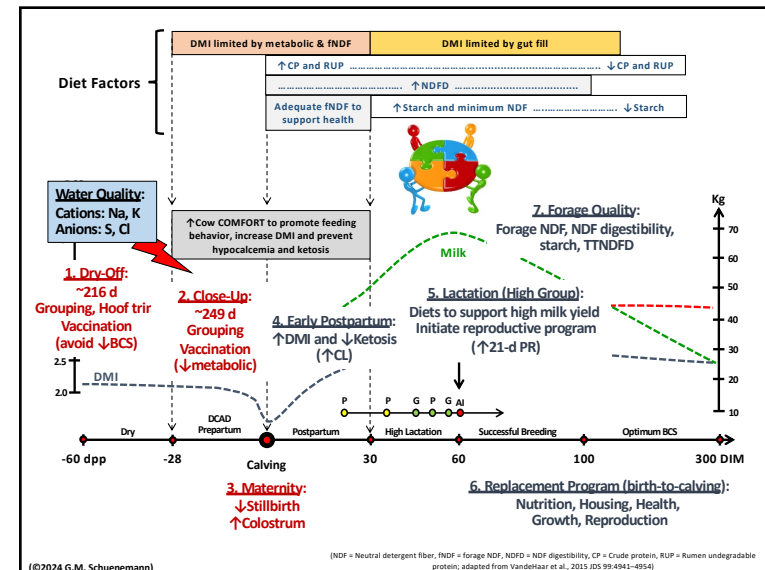
### What is the Goal?

To provide the best possible  
diet and **promote feeding  
behavior** by removing farm  
factors that limit intake



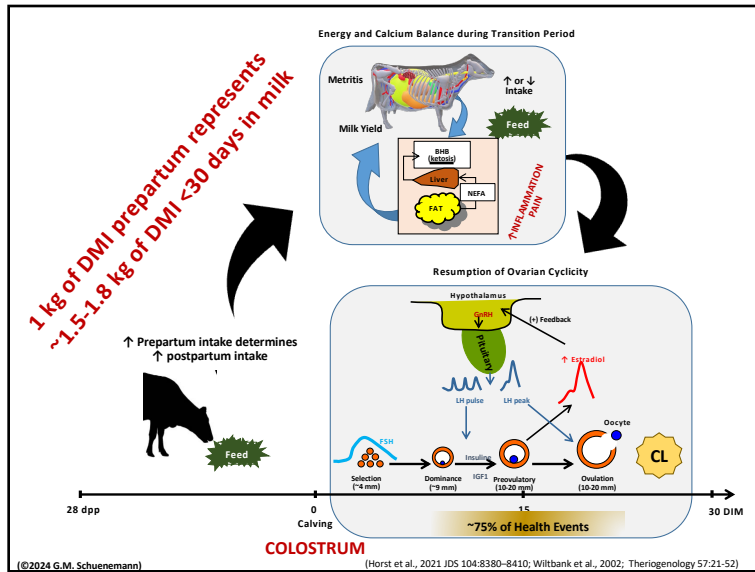
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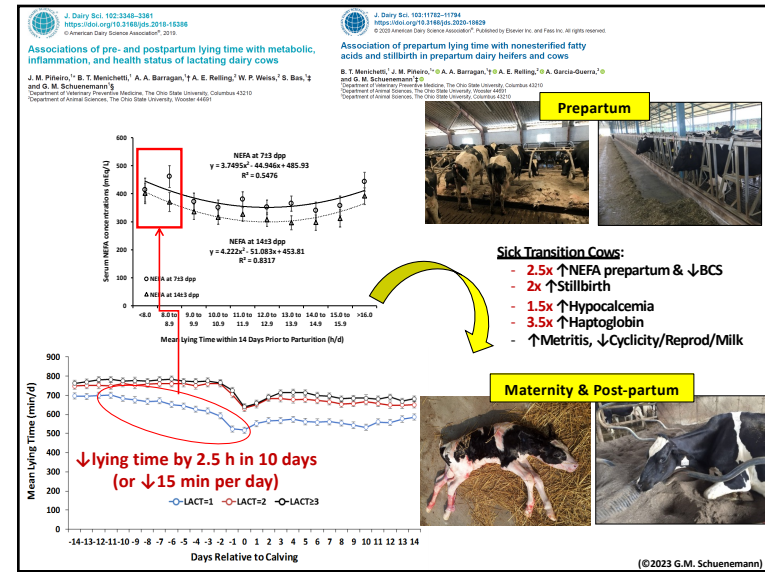


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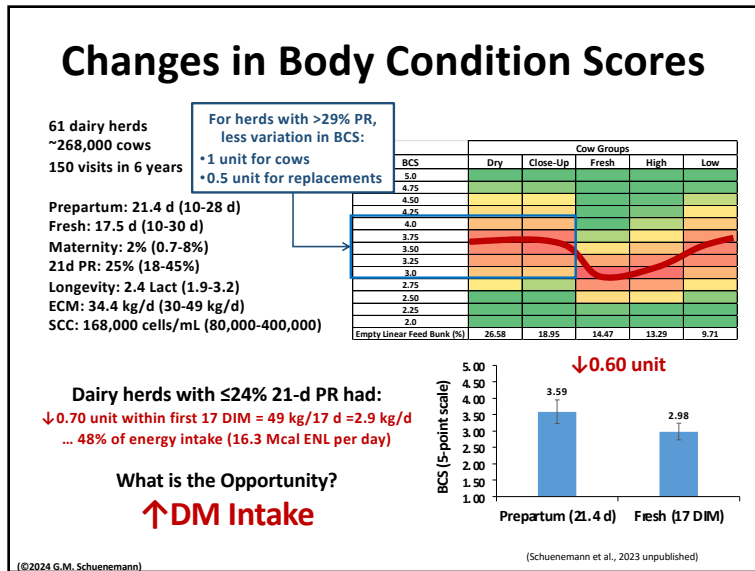
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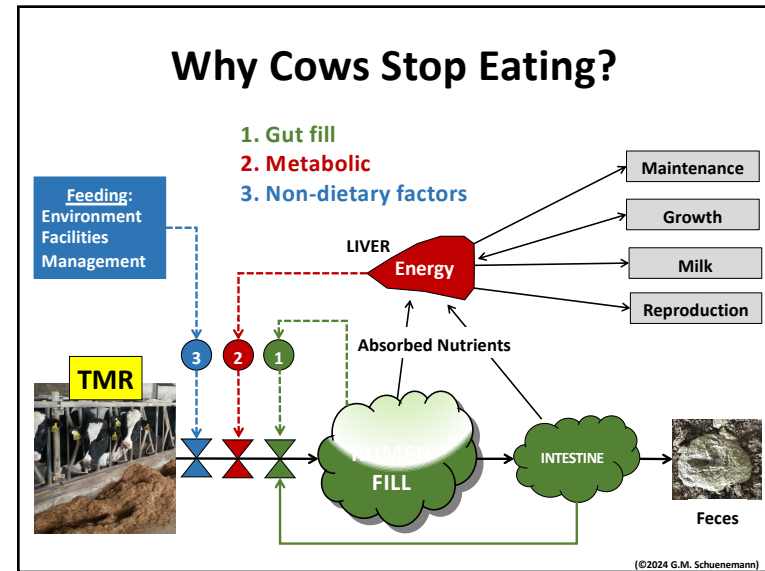
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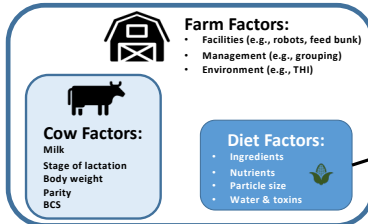


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## What Determine Optimum DM Intake?

### Feeding behavior:

- Meals per day (n)
- Meal length (min)
- Feeding rate (kg consumed per min)
- Meal size (kg)
- Water intake



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

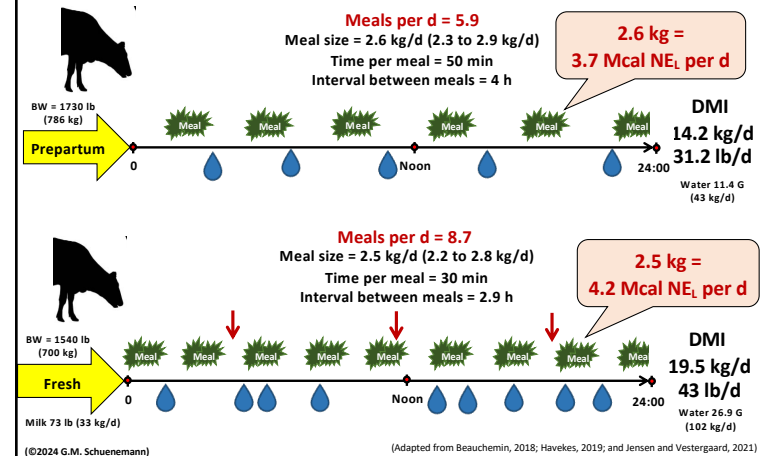
- Mycotoxins
- NDFD & particle size
- fNDF, starch & bypass fat
- RDP

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

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## Feeding Behavior Drives DM Intake



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## 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)

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

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## Why is Cow "COMFORT" Important?

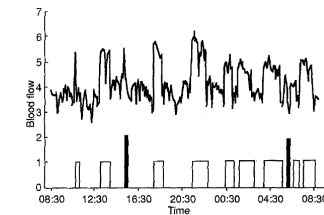


FIG 2: Blood flow through the external pudic artery in a dairy cow over a 24 hour period (continuous line) using a TT flow probe. Time spent lying (□) and the occurrence of milking (■) are also shown (Metcalfe et al., 1992 RVS 53:59-63)

**When lying down, a cow has ~30% more blood flow to the mammary gland compared when standing ... lying down with full rumen ↑MILK**

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

Item	Dry		Lact=1	Lact ≥2
	Far-off 60-21d	Prepartum <21d	Days in Milk	
			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 <sub>L</sub> , 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)

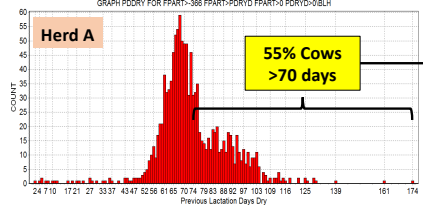
If feeding 19% fNDF and 25% starch, the minimum total NDF is  $19 + (60 - 19 - 25) = 35\%$  NDF



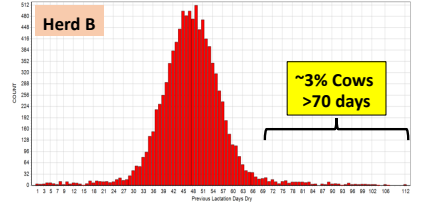
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## Does the Pattern of Previous Dry Period Lengths Match the Management Plan?




**Herd A**  
55% Cows >70 days



**Herd B**  
~3% Cows >70 days

↑ NEFA Prepartum  
↑ Ketosis Post-partum



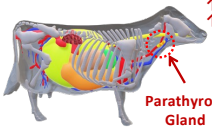
If feeding diet high in energy (1.55 Mcal/kg)  
~5 Mcal/d x 70 d = 350 Mcal  
= ↑ 0.75 BCS

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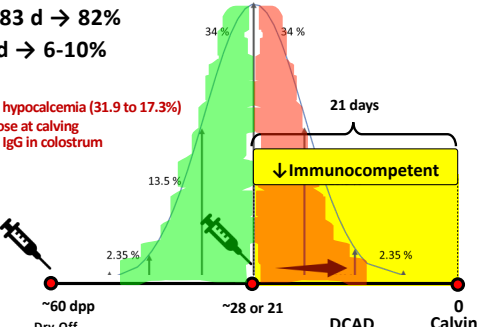
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## If anionic diet is offered, vaccinate cows at dry-off 56-60 dpp and at 28 dpp: ↑ Energy, ↓ hypocalcemia, ↑ IgG

- **Gestation Length of 276±6 days**
  - Short: 255-269 d → ~9-12%
  - Average: 270-283 d → 82%
  - Long: 283-296 d → 6-10%



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



21 days


↓ Immunocompetent

~60 dpp Dry-Off      ~28 or 21      0 Calving

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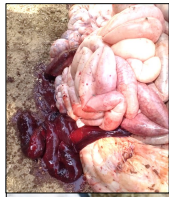
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## Corn Silage or Concentrated Feed Contaminated with Mycotoxins




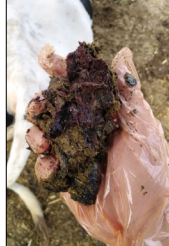
↑ Fungi ↑ "fermentation" of plant proteins

↓ Favoring Overgrowth of Undesirable Bacteria



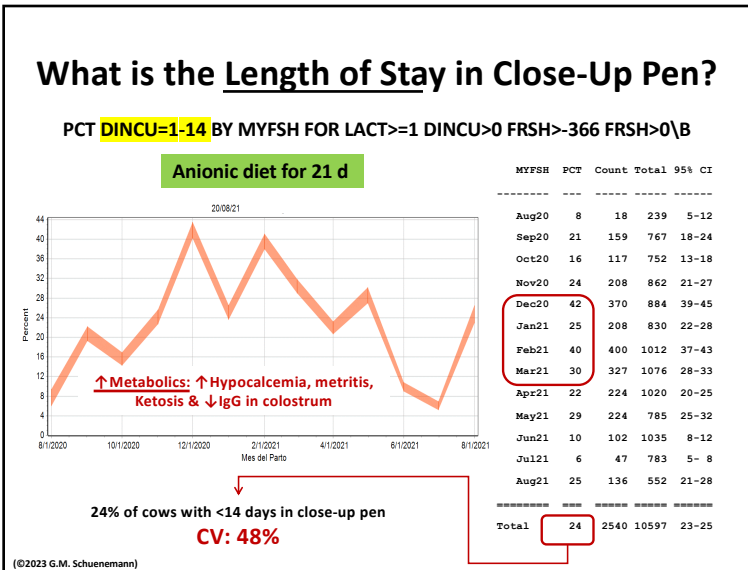
- *C. Perfringens*
- *C. difficile*
- *C. botulinum*
- *C. Butyricum*
- *C. Tyrobutyricum*
- *Listeria monocytogenes* & *E. coli*

**High Risk for Intestinal Hemorrhagic Syndrome**

(Driehuis et al., 2018 JDS 101:4093-4110)

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### ↓DCAD is Effective to ↓Hypocalcemia, but Aggressive Assistance at Calving ...

... ↓DMI >> ↑Metabolics/Metritis!

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### Changes in Eating Time of Holstein Cows by Management and Facilities

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

↓5 lbs or 2.2 kg DMI (cow/d) with overcrowded transition pens (<50 cm/cow & bedding >100% occupancy).  
**Solution:** ↑TMR (8% residual) with full feed bunk 22 of 24 h

**Programa Agresivo en Vacas Frescas:**  
 ↓CMS y ↑Cetosis

<sup>1</sup>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

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### Changes in Eating Time of Holstein Cows by Management and Facilities

Items <sup>1</sup>	Changes in Eating Time, min/d
<b>Increasing frequency of push-ups per day:</b>	
From 1x to 4x	↑25
<b>Amount of formulated feed refusal per day:</b>	
6 vs 3%	↓50
<b>Timing of TMR delivery:</b>	
Halfway between milkings vs at milking	↑25
<b>Grouping strategy:</b>	
Primiparous separated from multiparous	↑30

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

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## Cows Prefer Softer Surfaces (e.g., Sand) Compared to Mattresses

Rubber Mat with Recycled Paper



Deep Sand Bedding



Board interferes when cow is standing up!

### For rubber mattress:

- Body weight is a confounder → Large cows (>1500 lb or <700 kg) had ↓ lying behavior than small cows (<1100 lb or <500 kg)
- Adding a bedding substrate may help (e.g., recycled manure with ~80% DM)

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(Tucker et al., 2003 JDS 86:521-529)

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## Cow COMFORT ↑10% Milk

(Field response observation; Catrachia, Gorgerino and Schuenemann, 2018)



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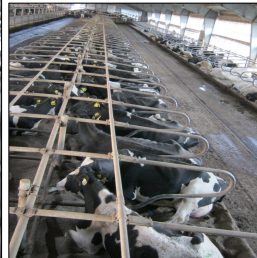
## Cow COMFORT ↑Stall Usage, ↑10% Milk

(Field observation: Fontana and Schuenemann, 2019; Schuenemann, 2020, 2021)

Compacted Sand Bedding with <50% Stall Usage



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



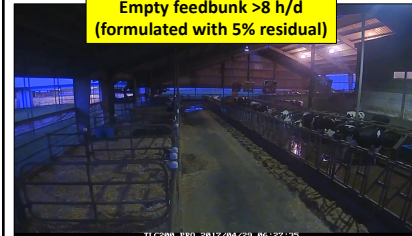
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## Monitor %DM to ↑DMI and ↓Sorting

**Goal: TMR Should be 45-47% DM**

Empty feedbunk >8 h/d  
(formulated with 5% residual)

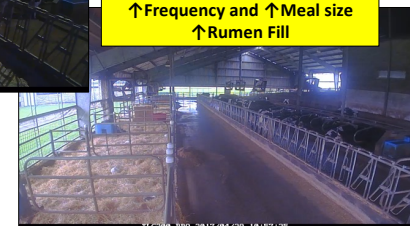


(TMR 2x day)

↑NEFA  
↑Ketosis  
↑DA



↑Frequency and ↑Meal size  
↑Rumen Fill



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## Cows Have a Strong Behavioral Need to Rest (Lying Time; h/d) ... a priority over DMI

- For **every 3 minutes** of lost resting time, cows sacrifice **1 minute** of "DM intake"
- Example "pre- and postpartum cows":
  - Resting ↓2 h/d – **DM intake ↓40 min/d (~2.5 kg)**
- Factors associated with **Lying Time**:
  - Consistency of TMR delivery/bunk management
  - Bedding surface (wet, grooming stalls)
  - Milking frequency (2x, 3x or 4x)
  - Stocking density, vaccination/cow movement
  - Fresh cow program (>1 h per d)
  - Grouping transition cows (comingling cows and heifers)
  - ...


(Metz, 1985; Hopster et al., 2002; Munggaard et al., 2005; Cooper et al., 2007; Grant, 2015; Schuenemann et al., 2022 on-going study)

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## 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 ISD 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 ISD 95: 3736-3742)

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## 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)



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## 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., 2024; 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 TMR/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)

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**Which Reproductive Hormone or Antibiotic will Fix this Problem?**  
**1 meal (~6lb or 2.5 kg) makes the difference at the end of the day!**



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**THANK YOU!**

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