COW-CALF CONTACT ON DIFFERENT CONTINENTS – CALF FOCUS RESEARCH AND SOUTH AND NORTH AMERICA CONTEXT

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The UNIVERSITY of VERMONT

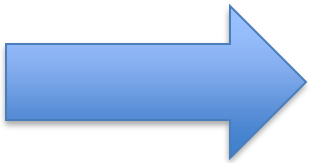
Outline –

- Introduction
  - Critical Period and Plasticity
  - Calf development in Nature

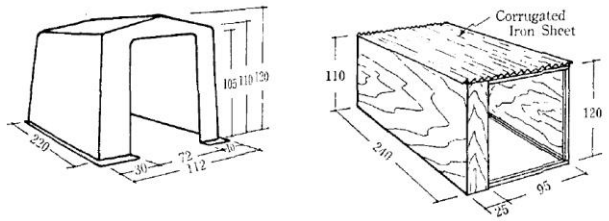
- Early socialization effects: complex systems

- CCC Systems and how did we got here

- Short:
- CCC Systems in South America
- CCC Systems in North America

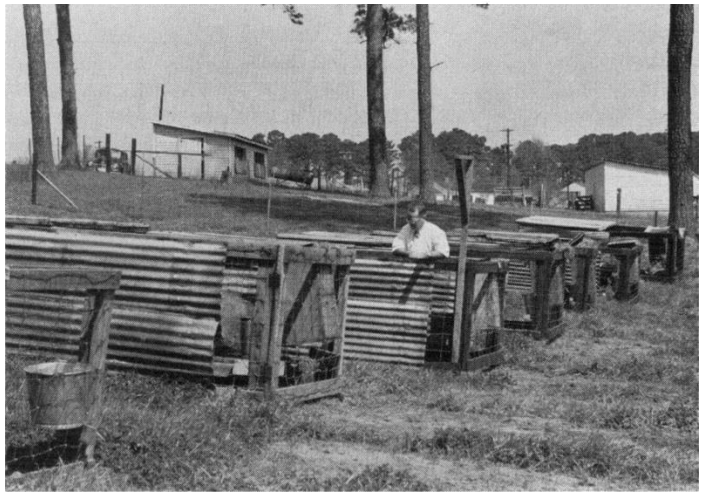


ENVIRONMENTAL CHARACTERISTICS OF CALF HUTCHES

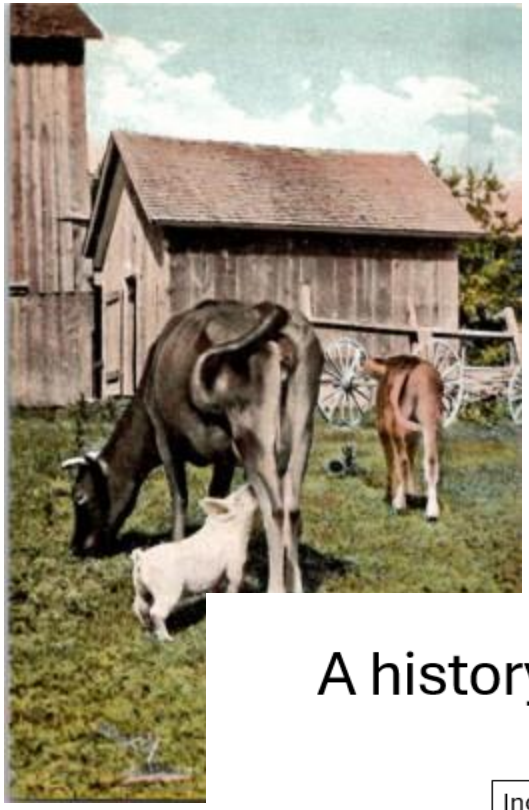


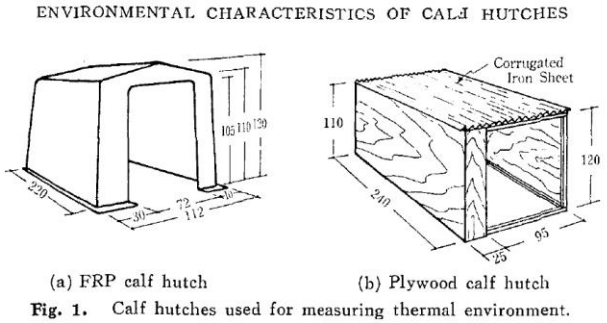
(a) FRP calf hutch (b) Plywood calf hutch

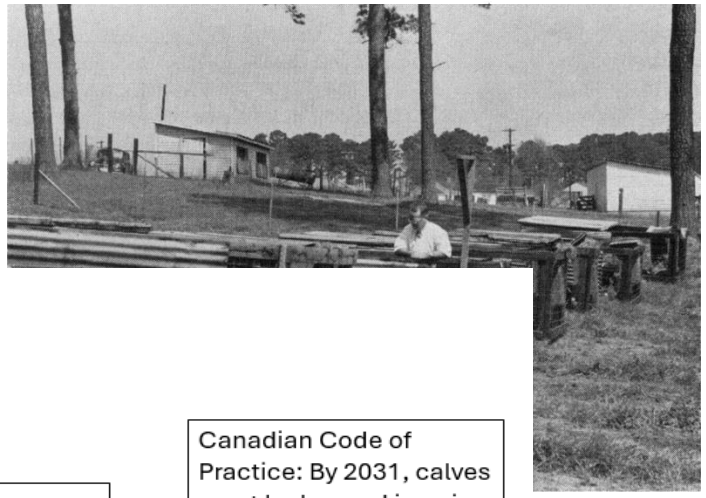
Fig. 1. Calf hutches used for measuring thermal environment.



Early calf hutchs – 1950s - HOSHIBA et al. 1986







A history of dairy calf housing

1930s – 1960s

Calves separated from dams immediately after calving to
- Avoid difficulty bucket training
- Limit the amount of milk consumed (scours)

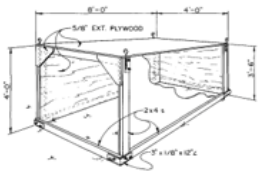
Push for individual housing to
- Prevent cross sucking
- Increase control

1960s – 1980s

Individual housing was standardized for health
Elevated stalls

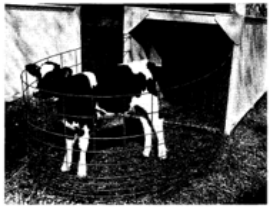
1980s

High mortality (20%)
Start of hutches



1990s – 2000s

75% of calves housed individually



2000s – 2010s

Pushback against individual housing

2024

Canadian Code of Practice: By 2031, calves must be housed in pairs or groups by 4 wks of age

BA et al. 1986

Bates et al., 1980; Moore et al., 2017

Forster cows (surrogate cow systems)

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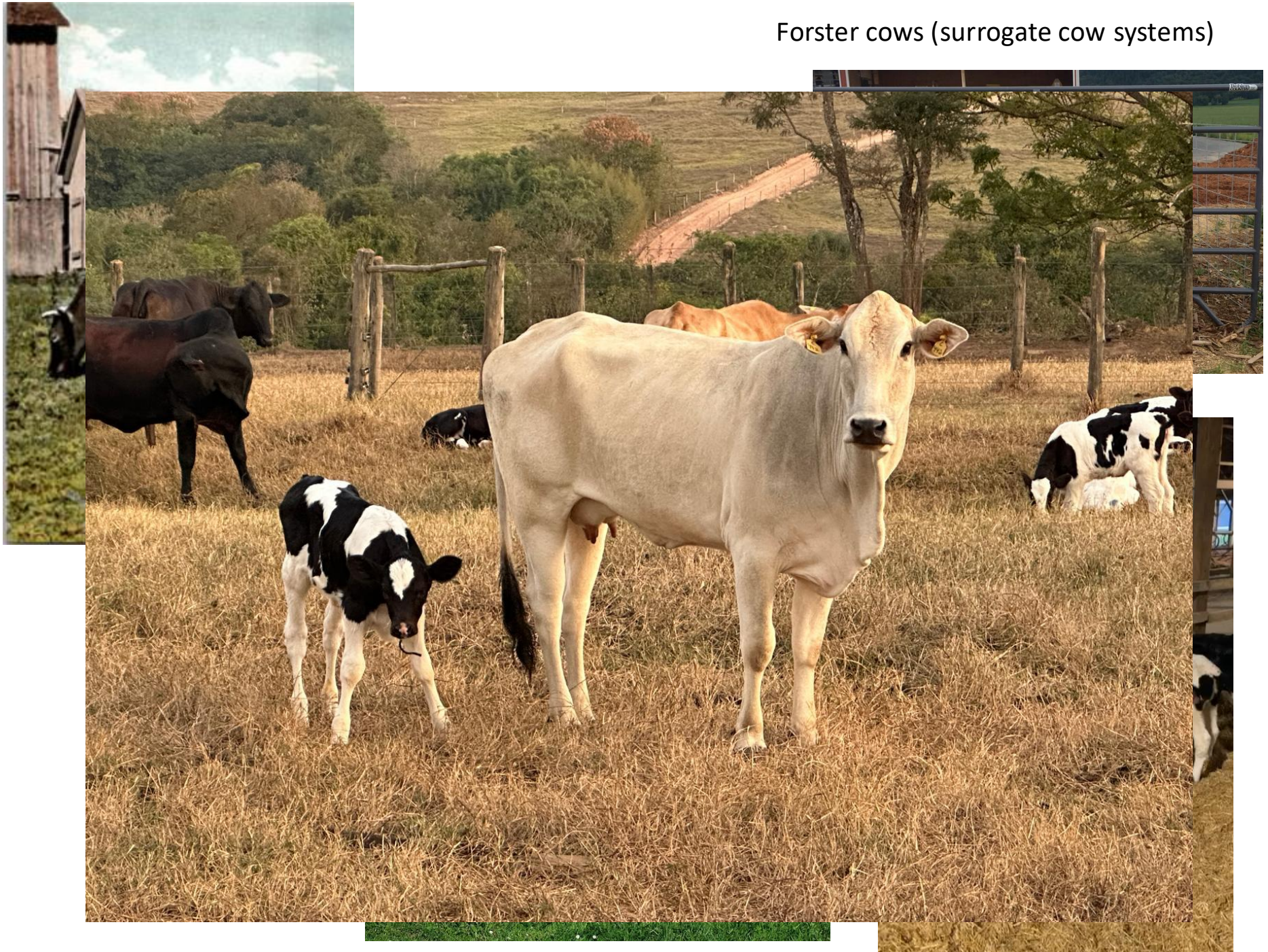

Dam reared systems

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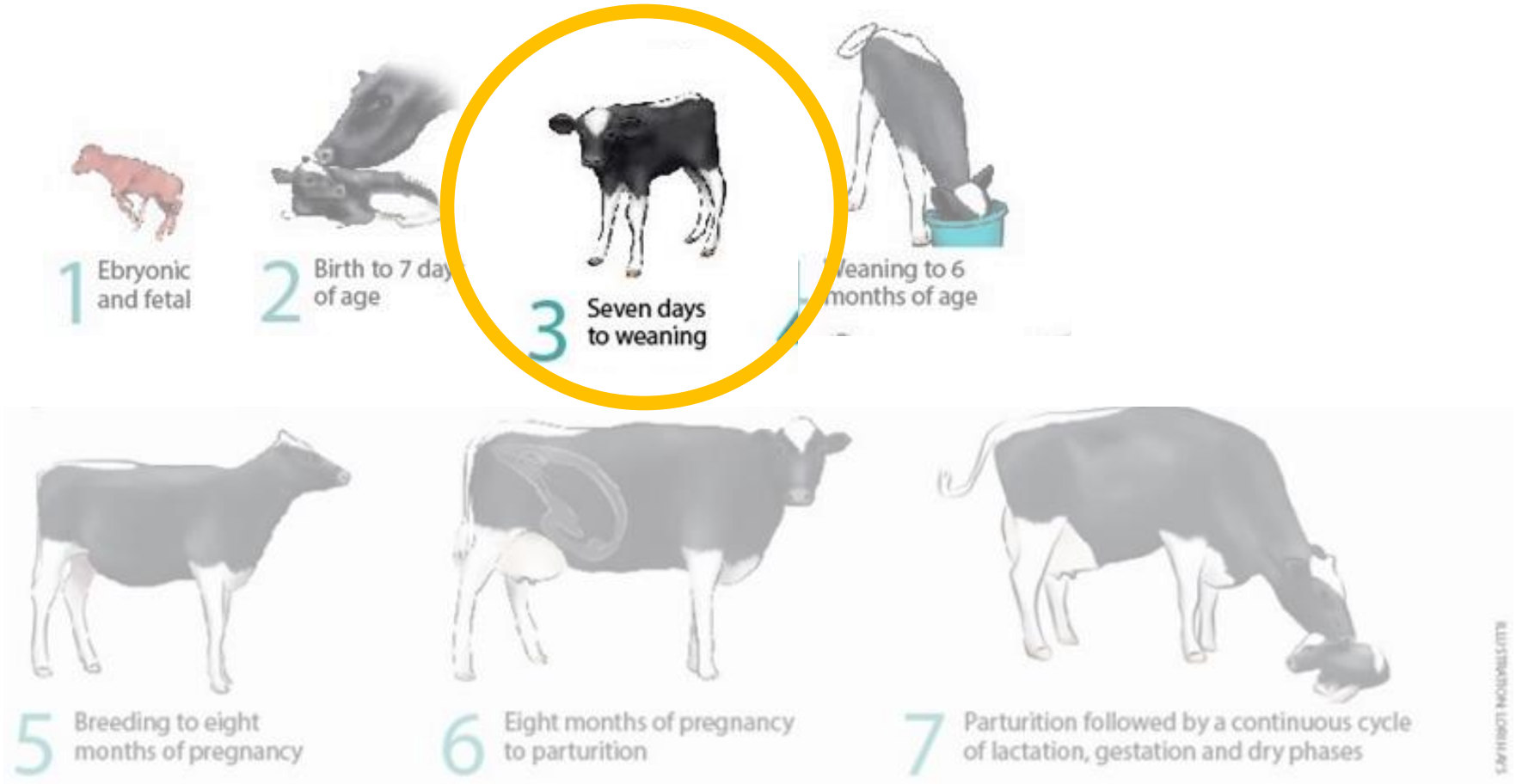
Introduction



©Ilustration Lorih *pt*S

Sensitive period theory

- The **sensitive period theory** is the period in the beginning of life that is **critical for proper social and cognitive development**

- **Social isolation** during development can cause **long-lasting behavioral impairments** and increase **vulnerability** in life

- Little research in cattle

Not just primates!

- Rodents, birds, pigs, sheep.. and many others
- Most recently, effects have been reported in isolation-reared lizards:
  - submissive,
  - adopted darker and duller colours
  - lack of foraging skills

Ballen et al., 2013

Individual housing is associated with…

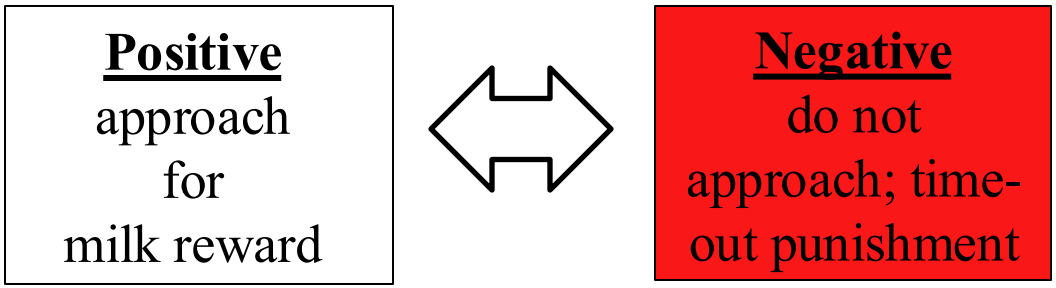
- Lower social ranking and competitive success
- Increased aggressiveness
- Increased fear responses

See review by Costa et al., 2016

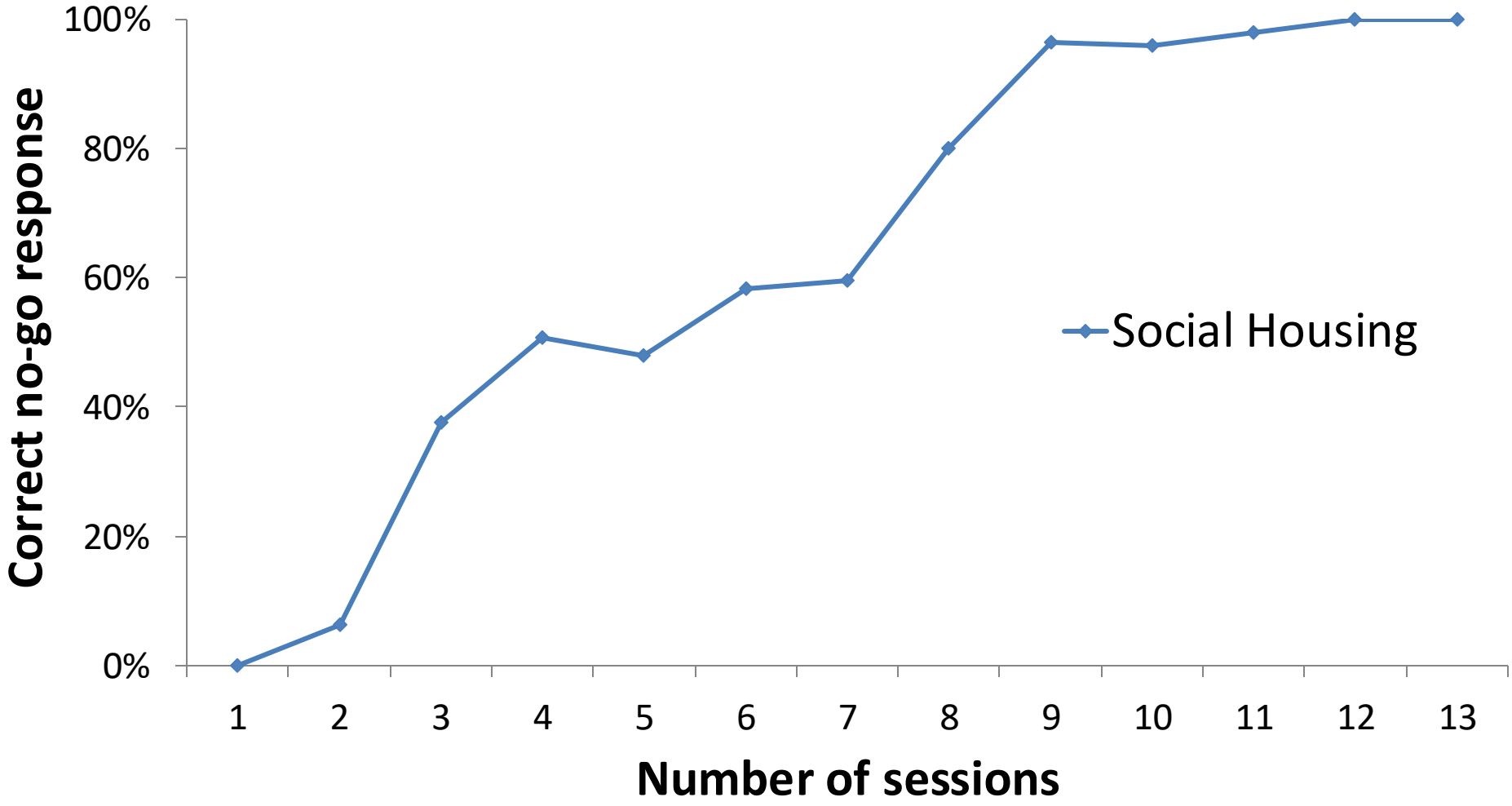
Flexibility effects – Reversal Learning

Effects of social rearing on cognition

Initial Discrimination

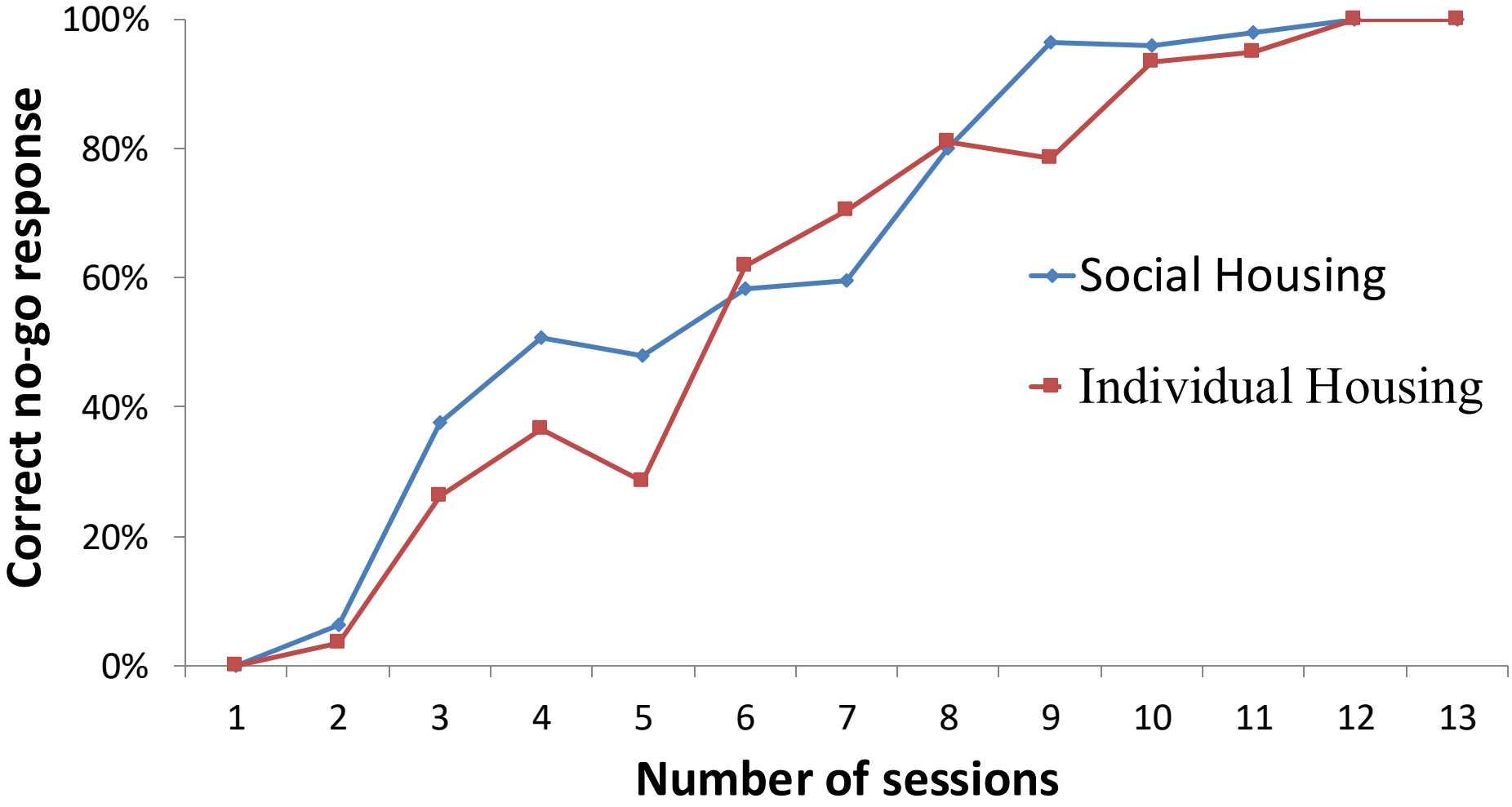


Discrimination learning



Meagher et al., 2015

Discrimination learning



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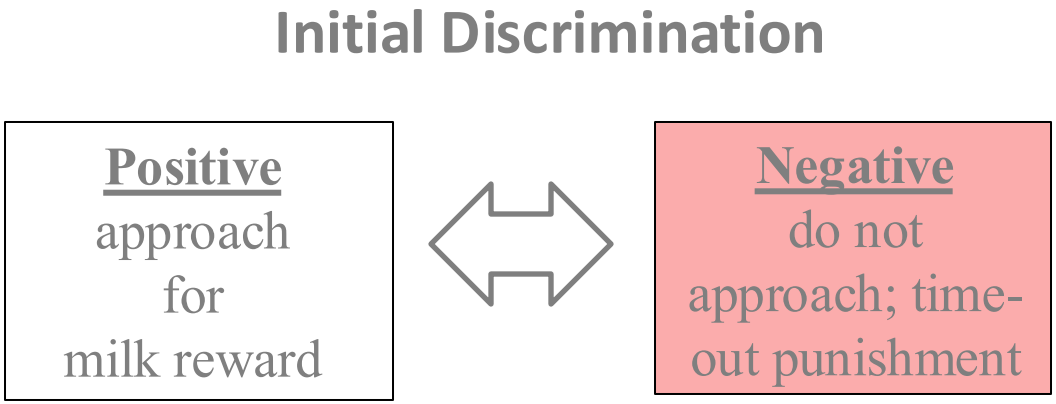
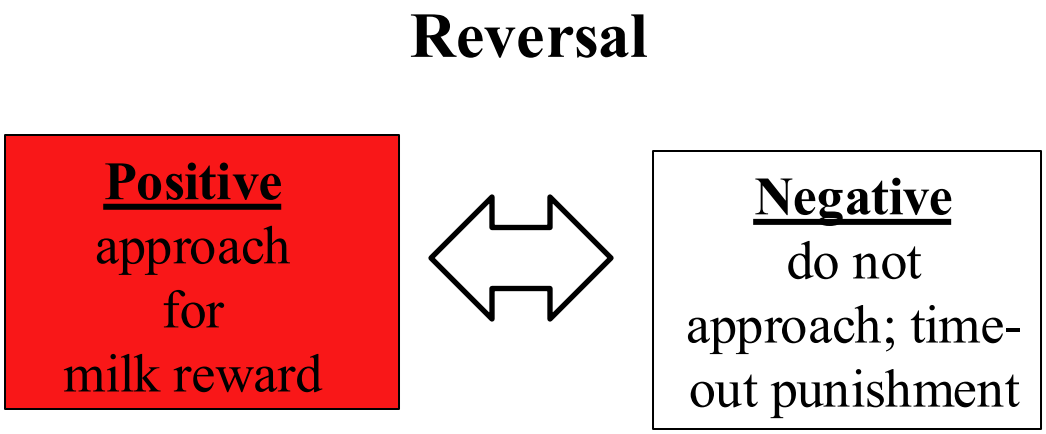
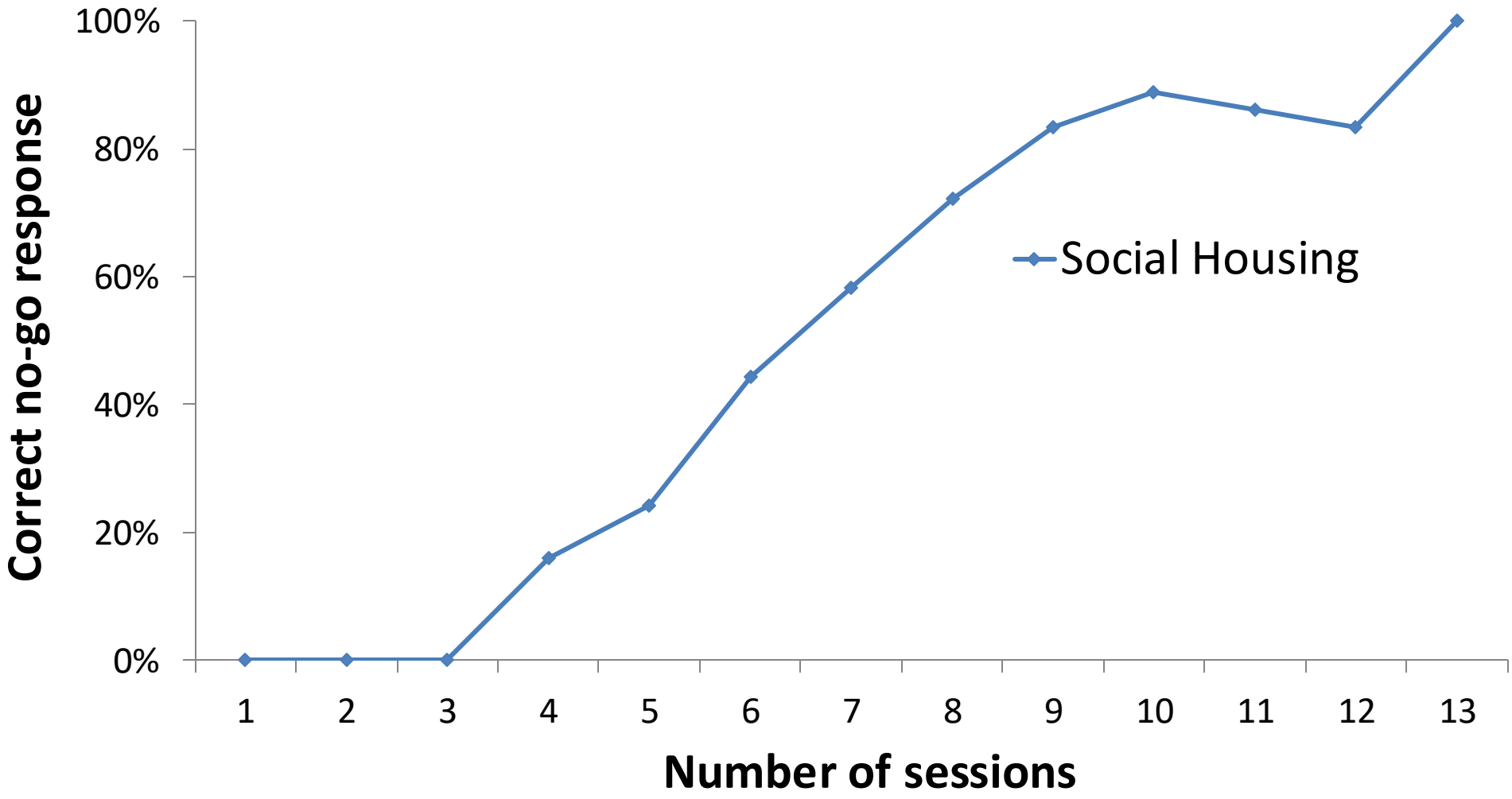
Effects of social rearing on cognition



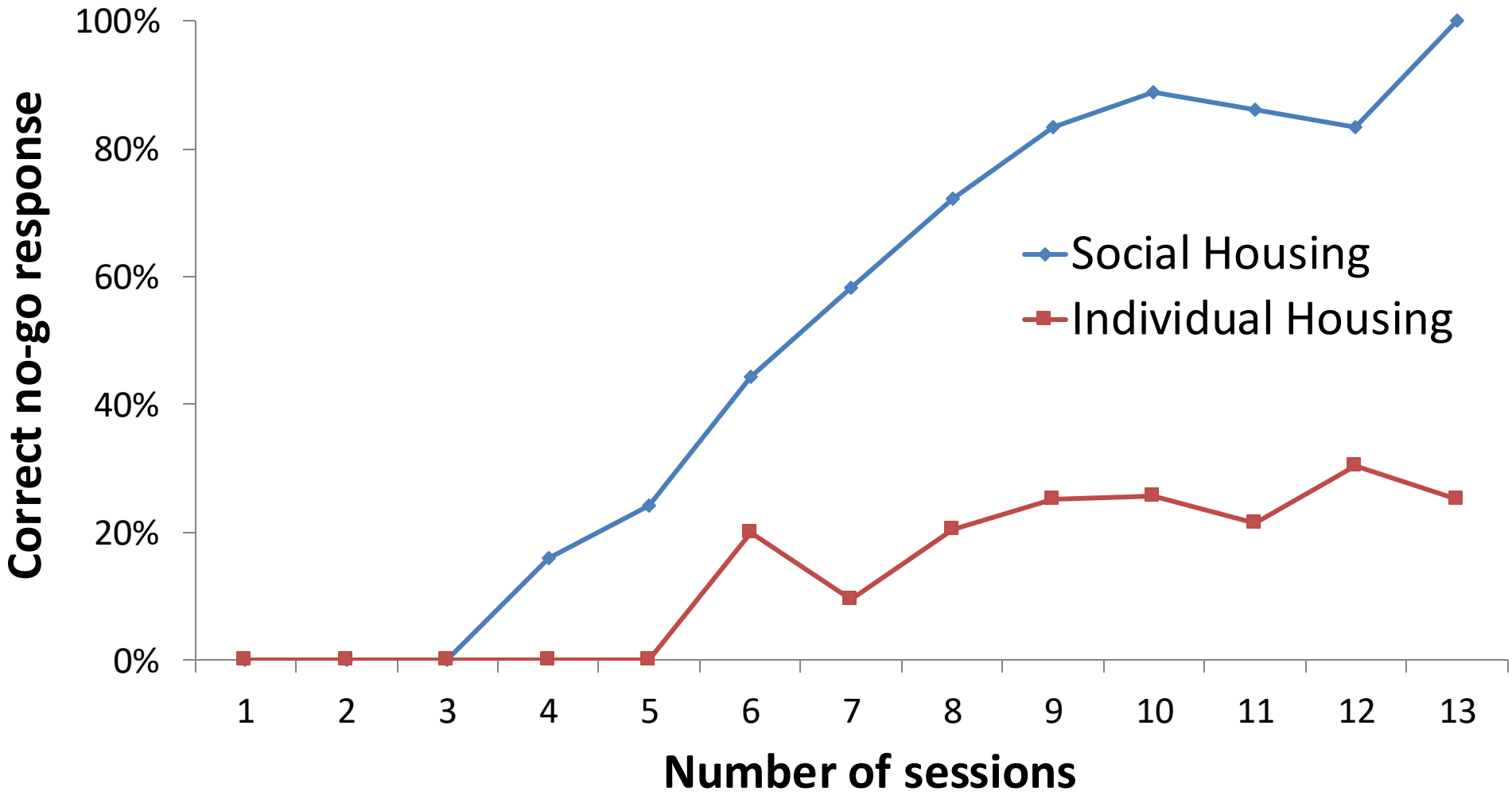


Reversal learning



Meagher et al., 2015

Reversal learning



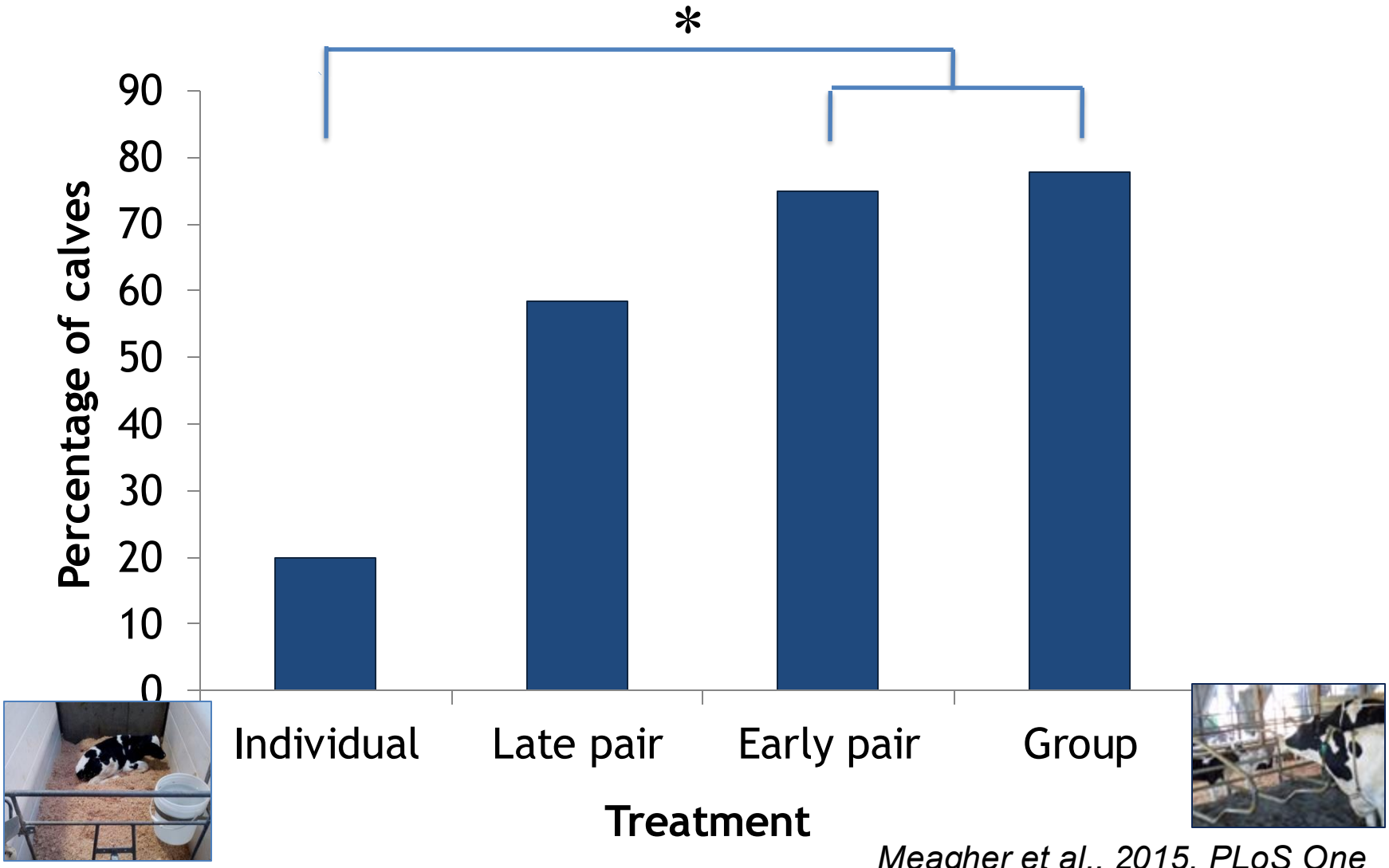
Meagher et al., 2015

What type of contact is needed?


Individual


Group

Success in reversal task – Calves that got the change



Meagher et al., 2015. PLoS One

Judgement Bias

Do dairy calves experience pain after disbudding?

OPEN ACCESS PEER-REVIEWED

RESEARCH ARTICLE

Pain and Pessimism: Dairy Calves Exhibit Negative Judgement Bias following Hot-Iron Disbudding

Heather W. Neave, Rolnei R. Daros, João H. C. Costa, Marina A. G. von Keyserlingk, Daniel M. Weary

Published: December 4, 2013 • http://dx.doi.org/10.1371/journal.pone.0080556

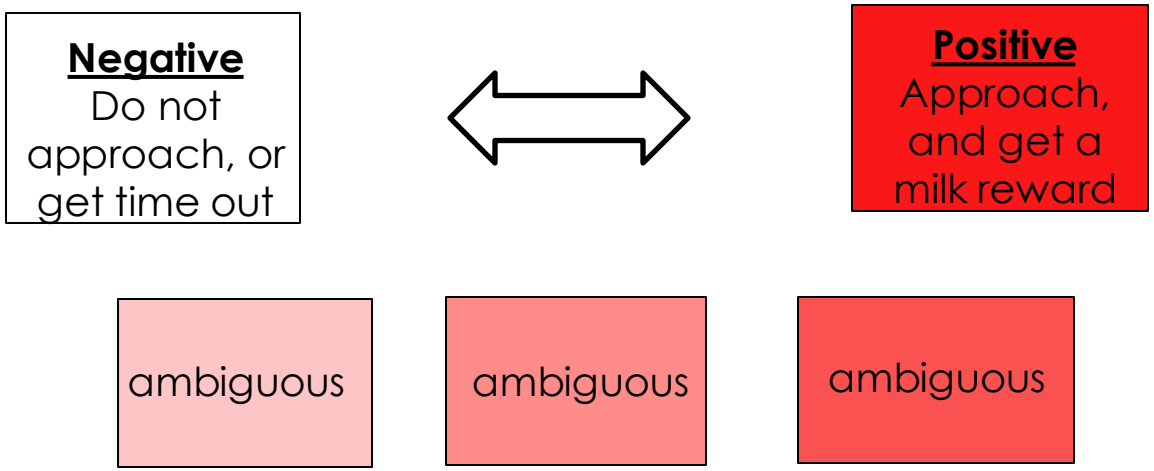
Study objective

Q: What is the effect of disbudding on the emotional state of dairy calves experiencing post-operative pain?

Prediction: Calves will exhibit a pessimistic bias after disbudding

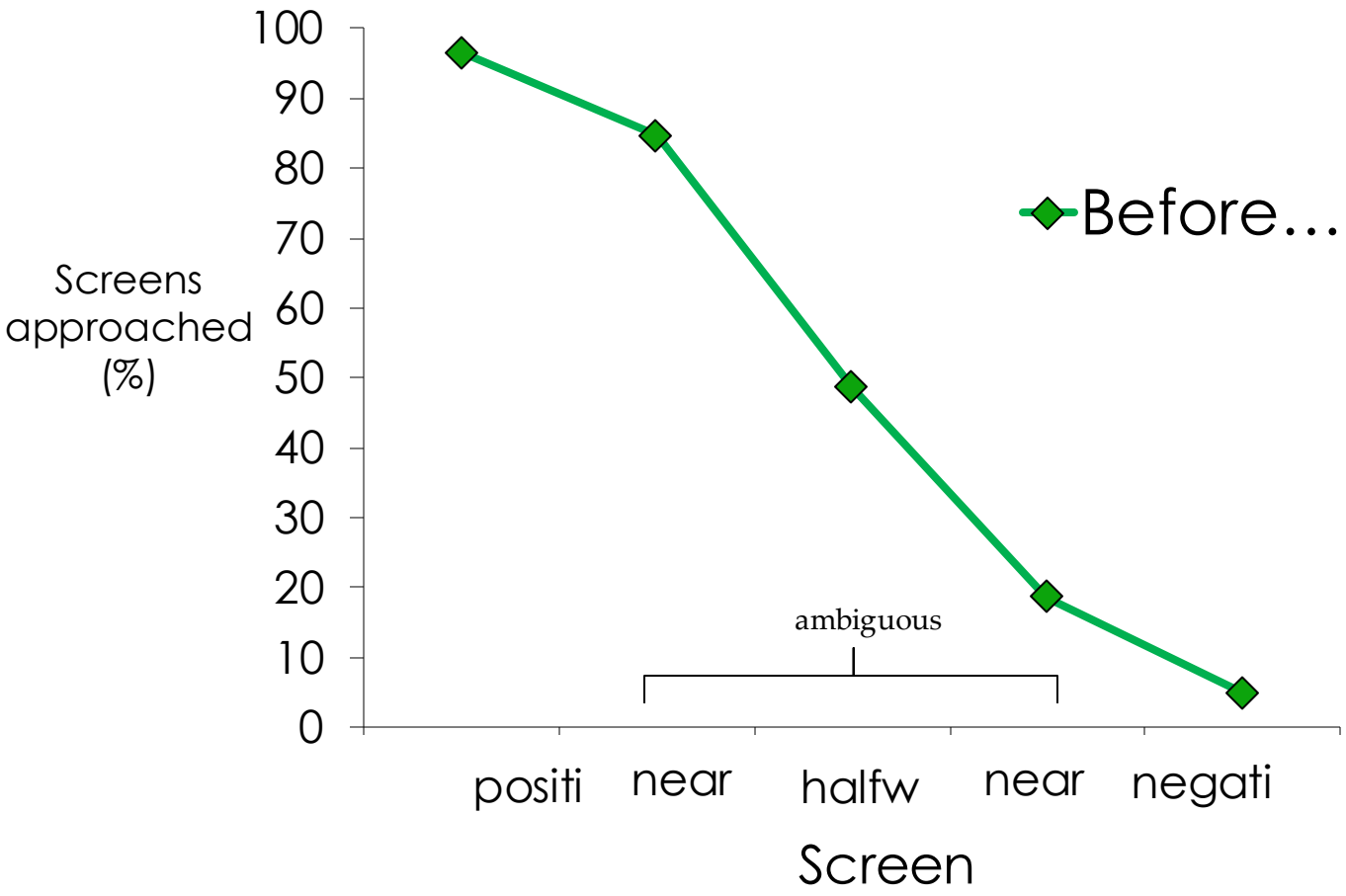
Cognitive bias method

Holstein bull calves trained to perform a visual discrimination task



Approach ambiguous screens?

Results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Screens approached (%)
Before…
ambiguous
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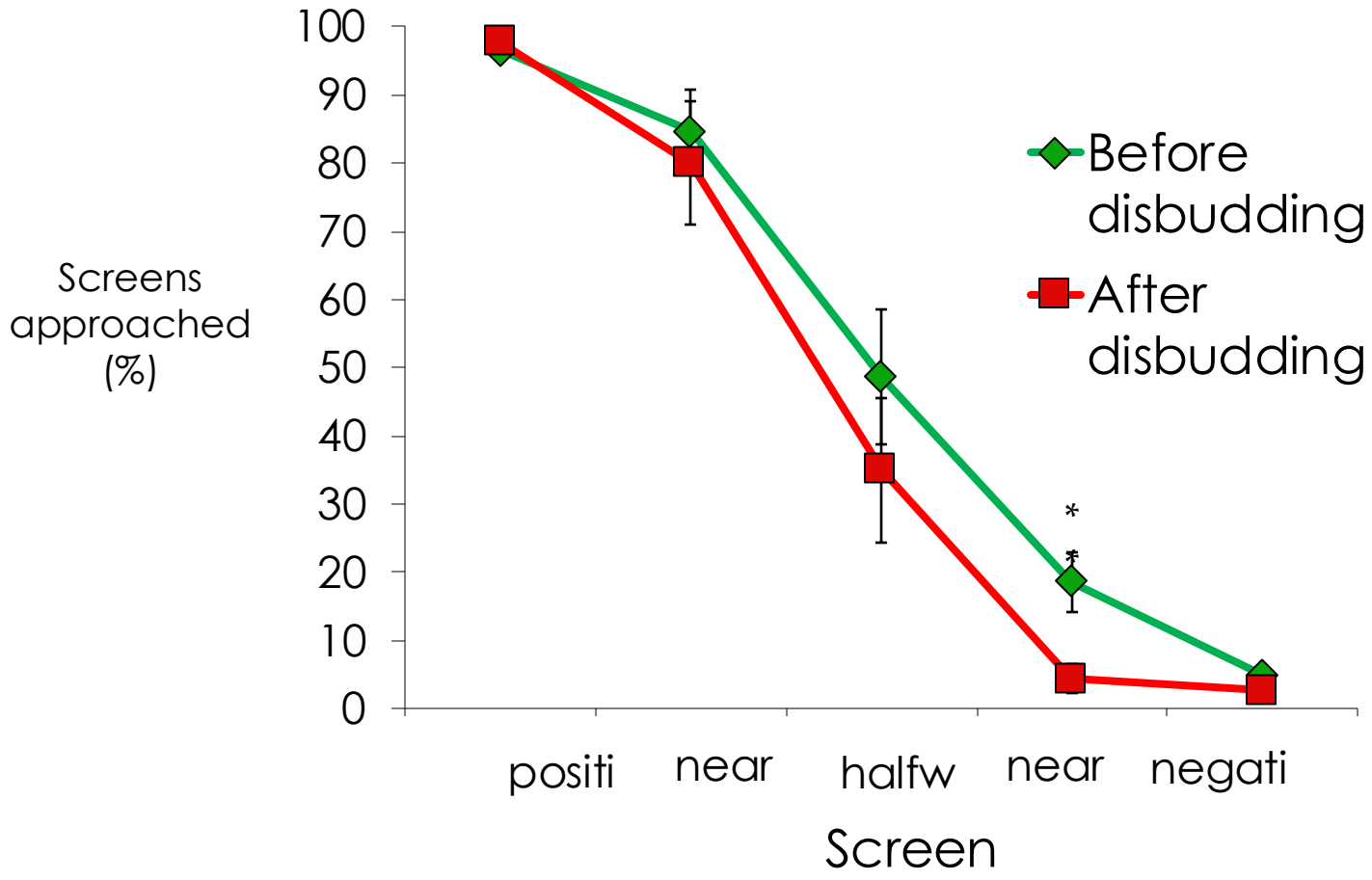
Results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Before disbudding
After disbudding
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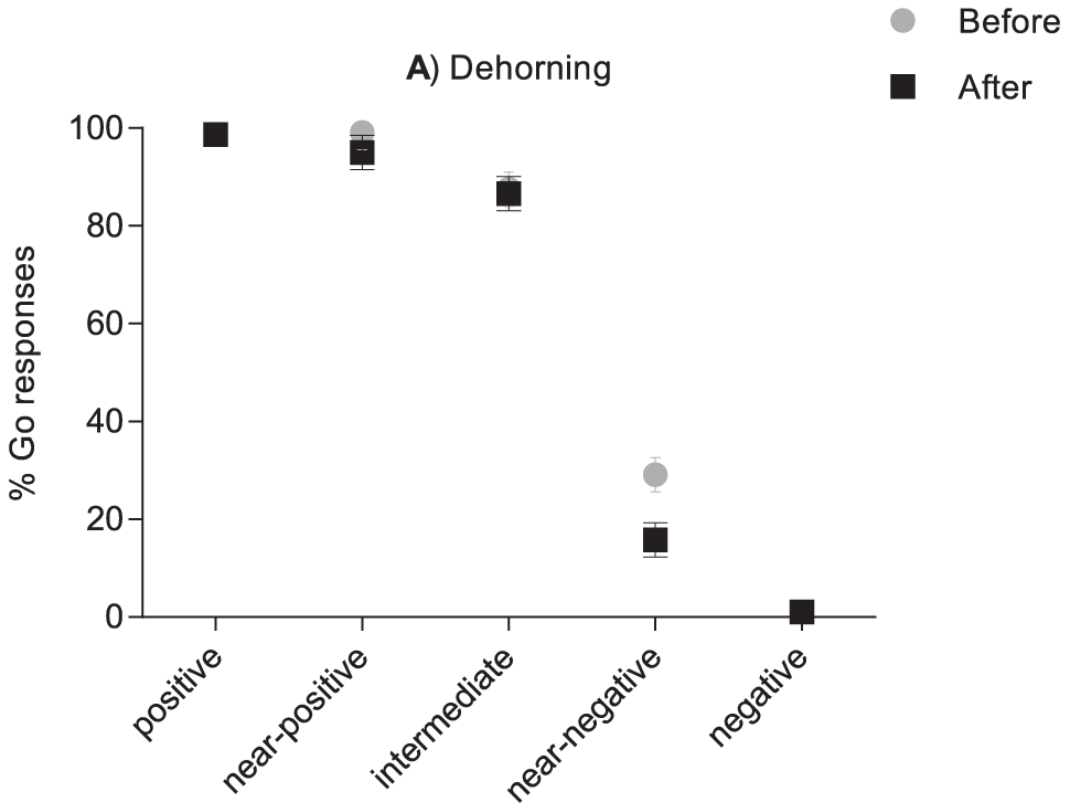
Separation from the Dam Causes Negative Judgement Bias in Dairy Calves

Rolnei R. Daros, João H. C. Costa, Marina A. G. von Keyserlingk, Maria J. Hötzel, Daniel M. Weary

Published: May 21, 2014 • http://dx.doi.org/10.1371/journal.pone.0098429



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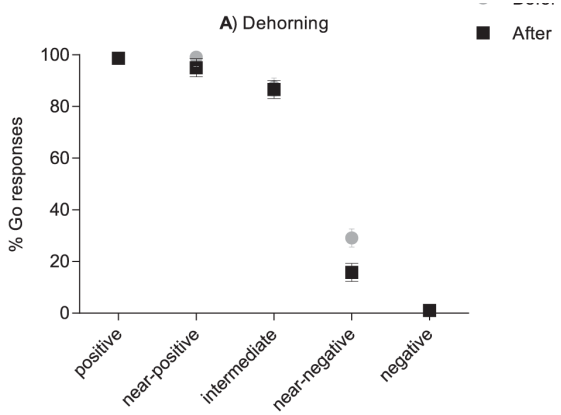

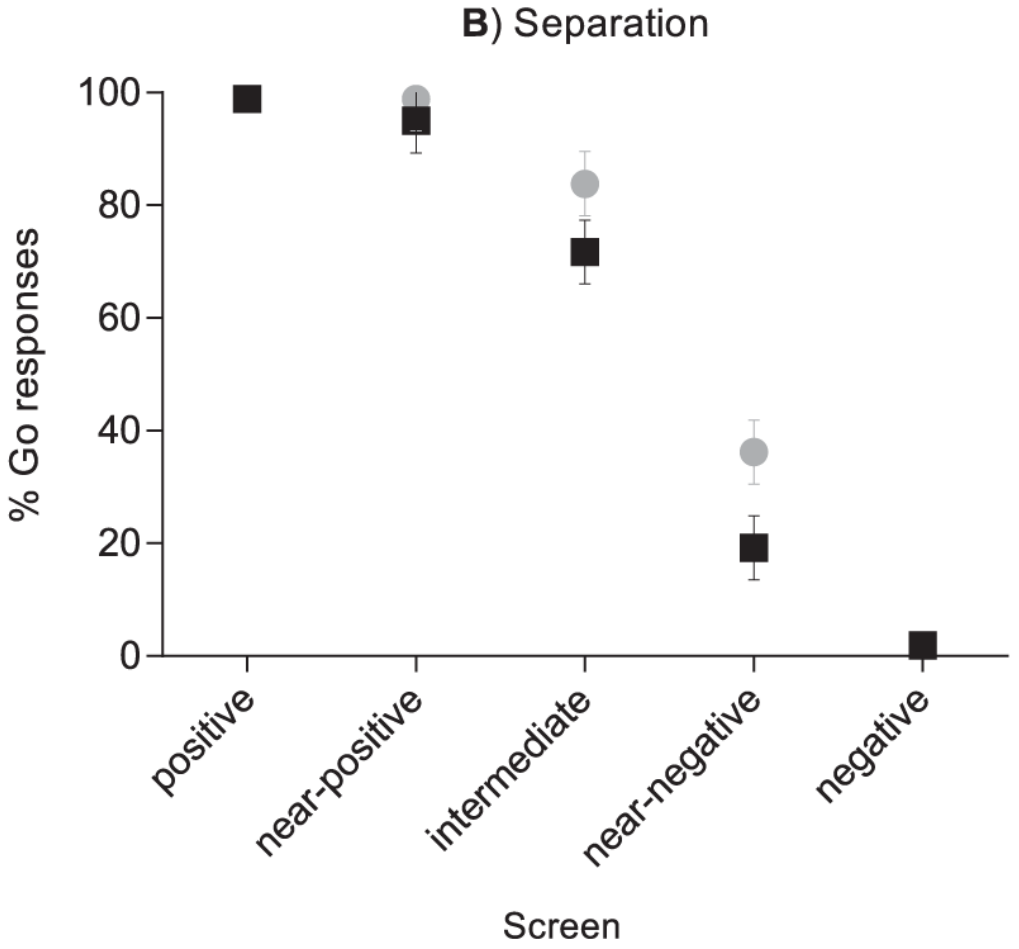

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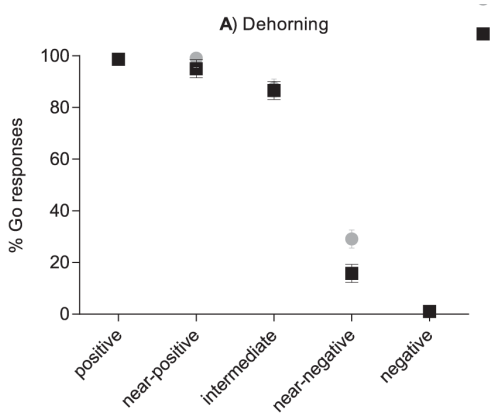
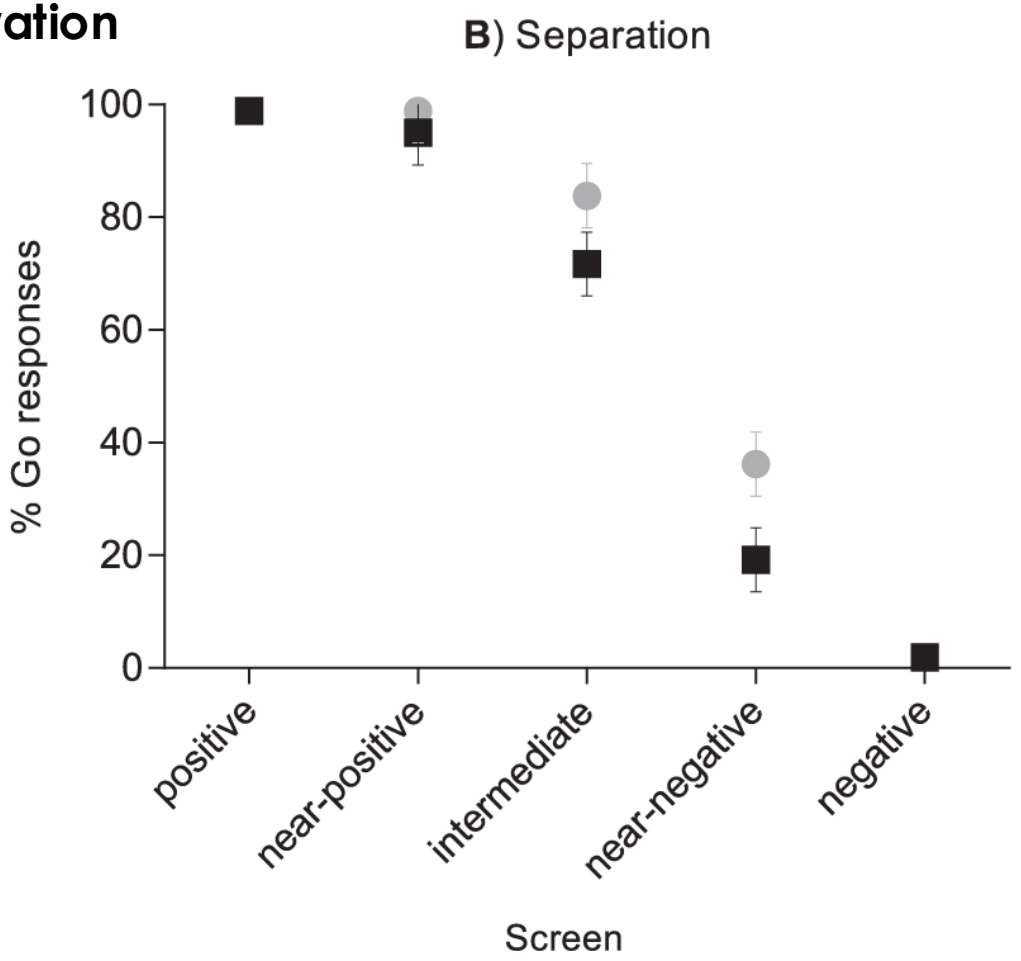
Separated calves show a negative bias 36 hours after separation





What about feeding behavior?

Food neophobia test

- 70 d of age
- Presented 2 kg of:
  chopped carrots (n = 8)

- The test lasted 30 min and was repeated 3 times per calf

Costa et al., (2015) J Dairy Science: 97:7804–7810

Food neophobia test

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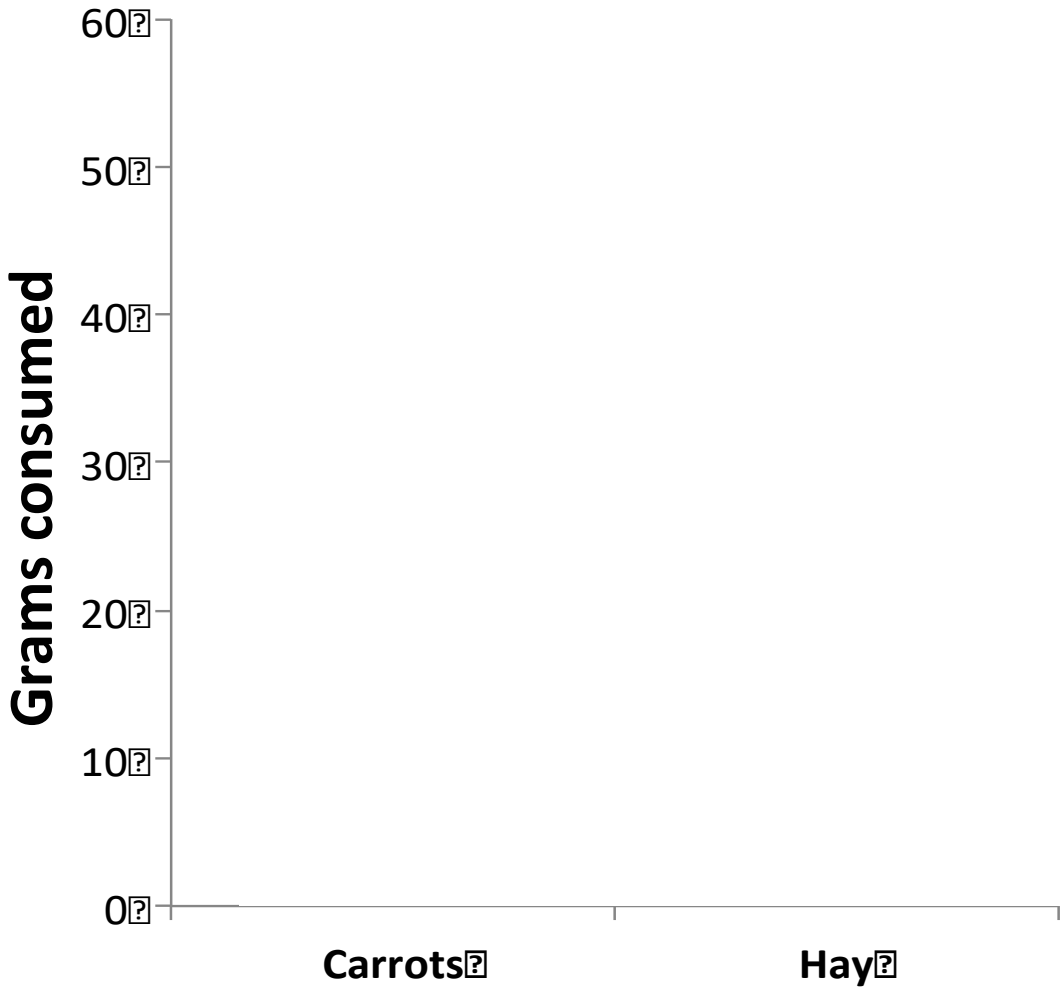
How much novel food did they eat?



Individually

Socially housed

Costa et al.., (2015) J Dairy Science: 97:7804–7810

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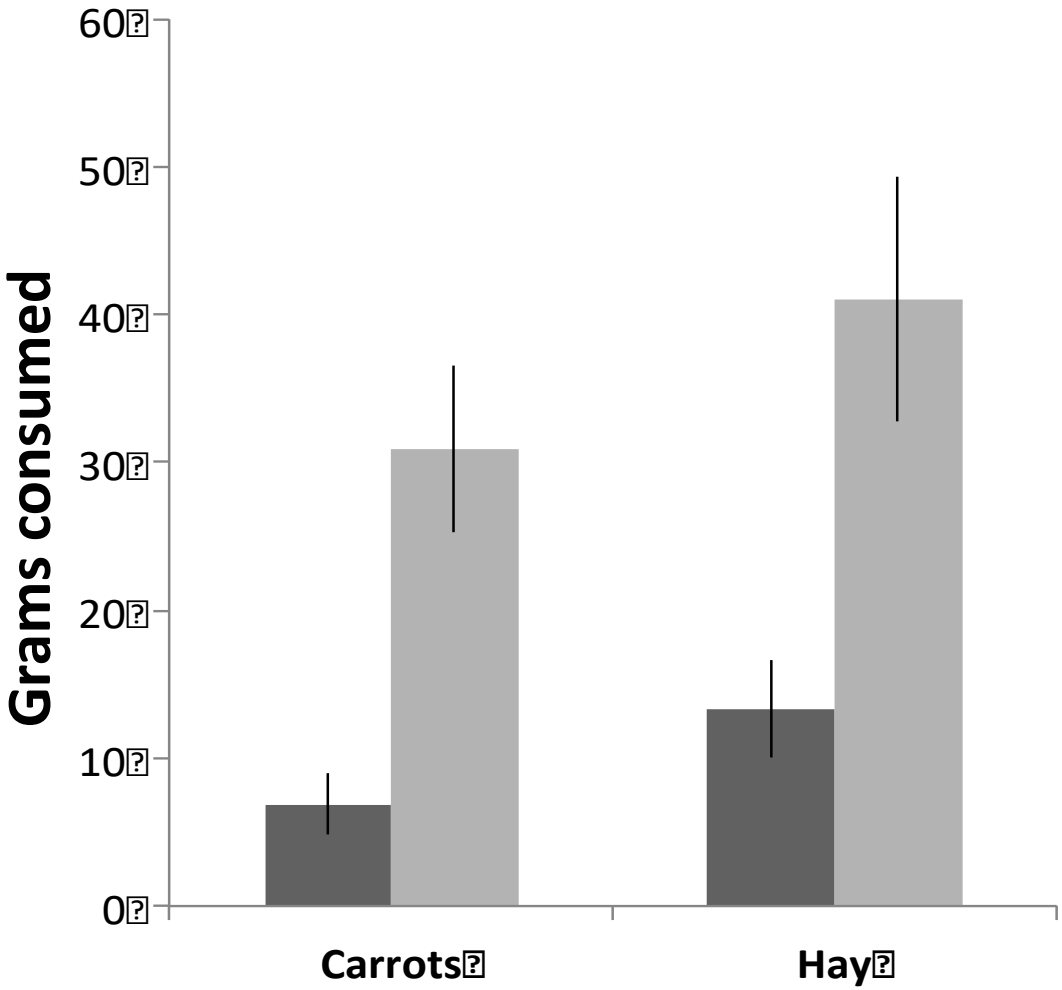

Individually

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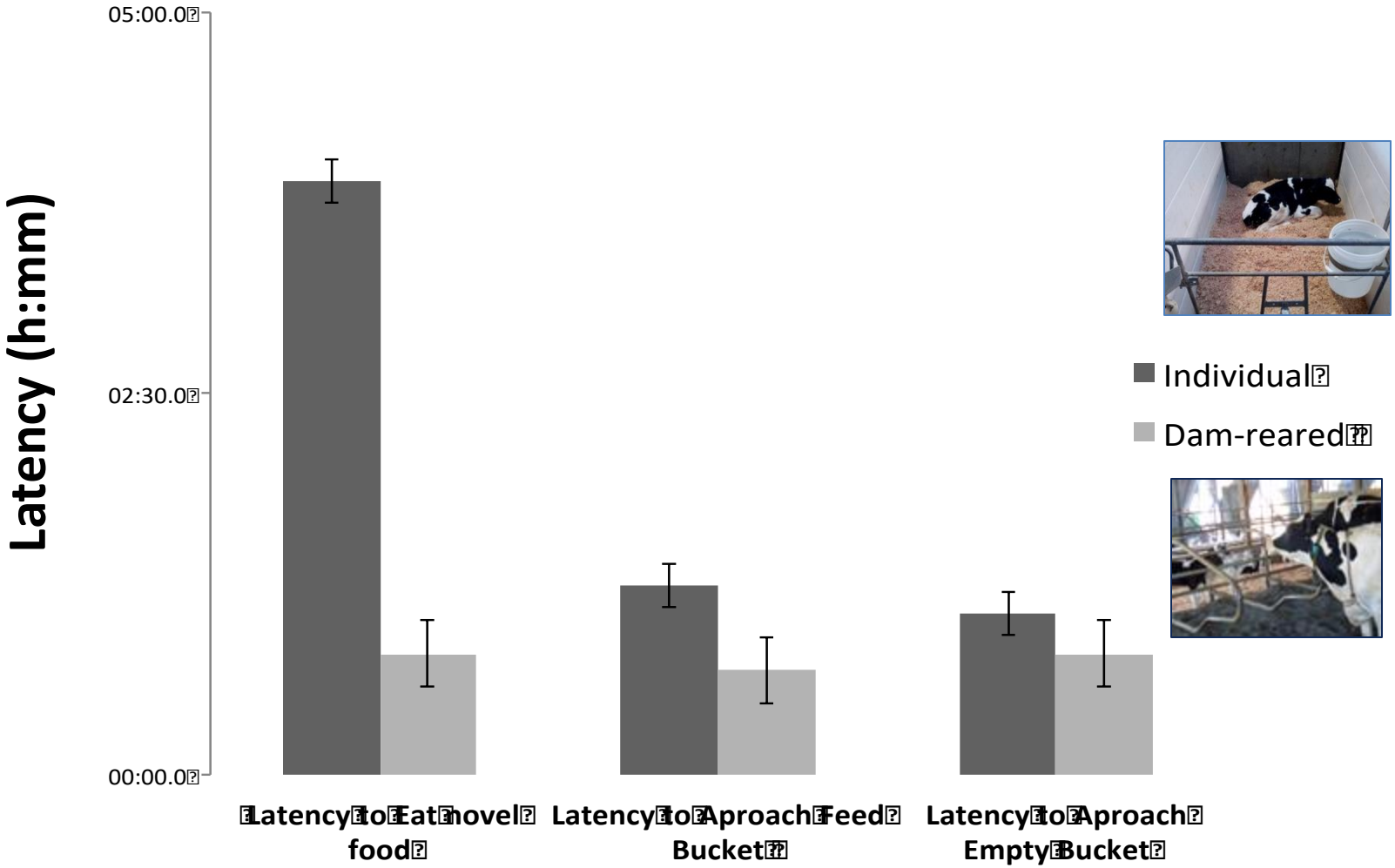
Latency to eat and approach buckets



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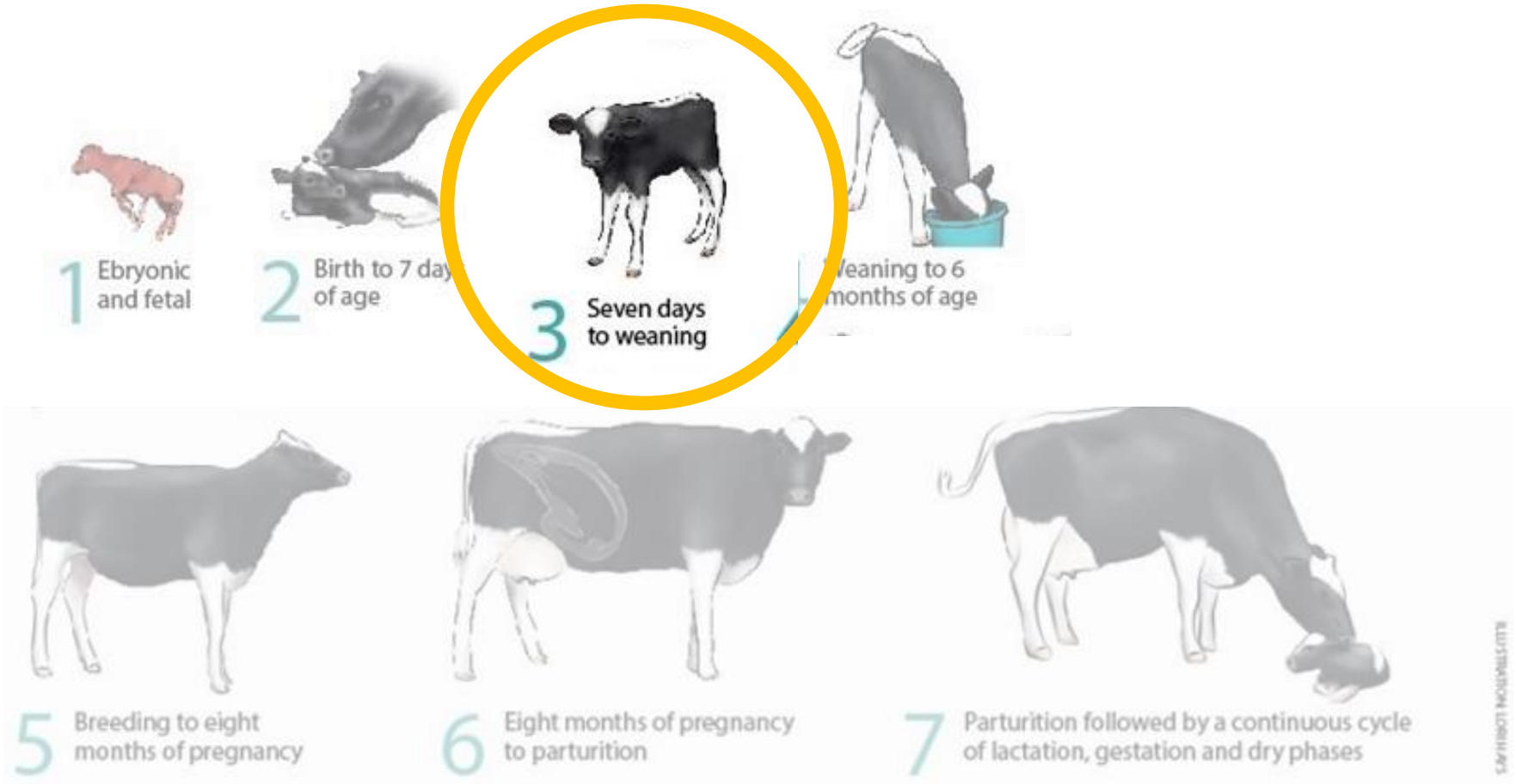
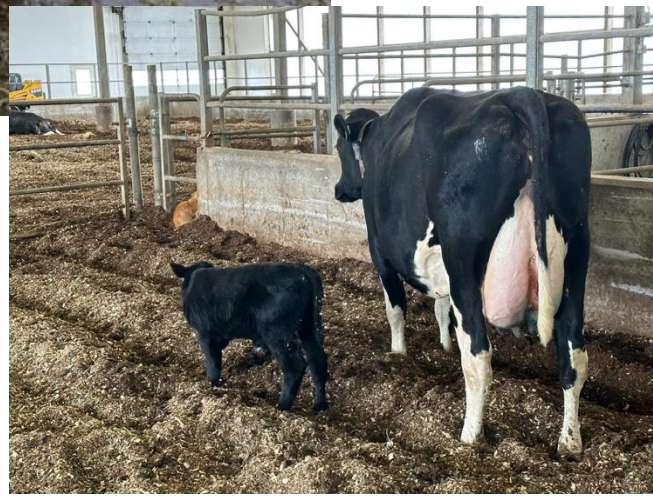
The calf…



North American Systems



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Dairy cattle health and welfare in cow-calf contact systems on commercial farms in North America

Marine DURRENWACHTER
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Emeline Nogues
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Dave Renaud,
Joao H.C. Costa &

Dr. Kate C. Creutizinger

University of Vermont

North American Systems

Dairy cow-calf contact systems: a characterization of practices in the USA and Canada

Marine DurrenWachtter

3 visits in the Spring, Summer and Fall 2024

University of Vermont

Project funded by USDA NIFA

North American Systems

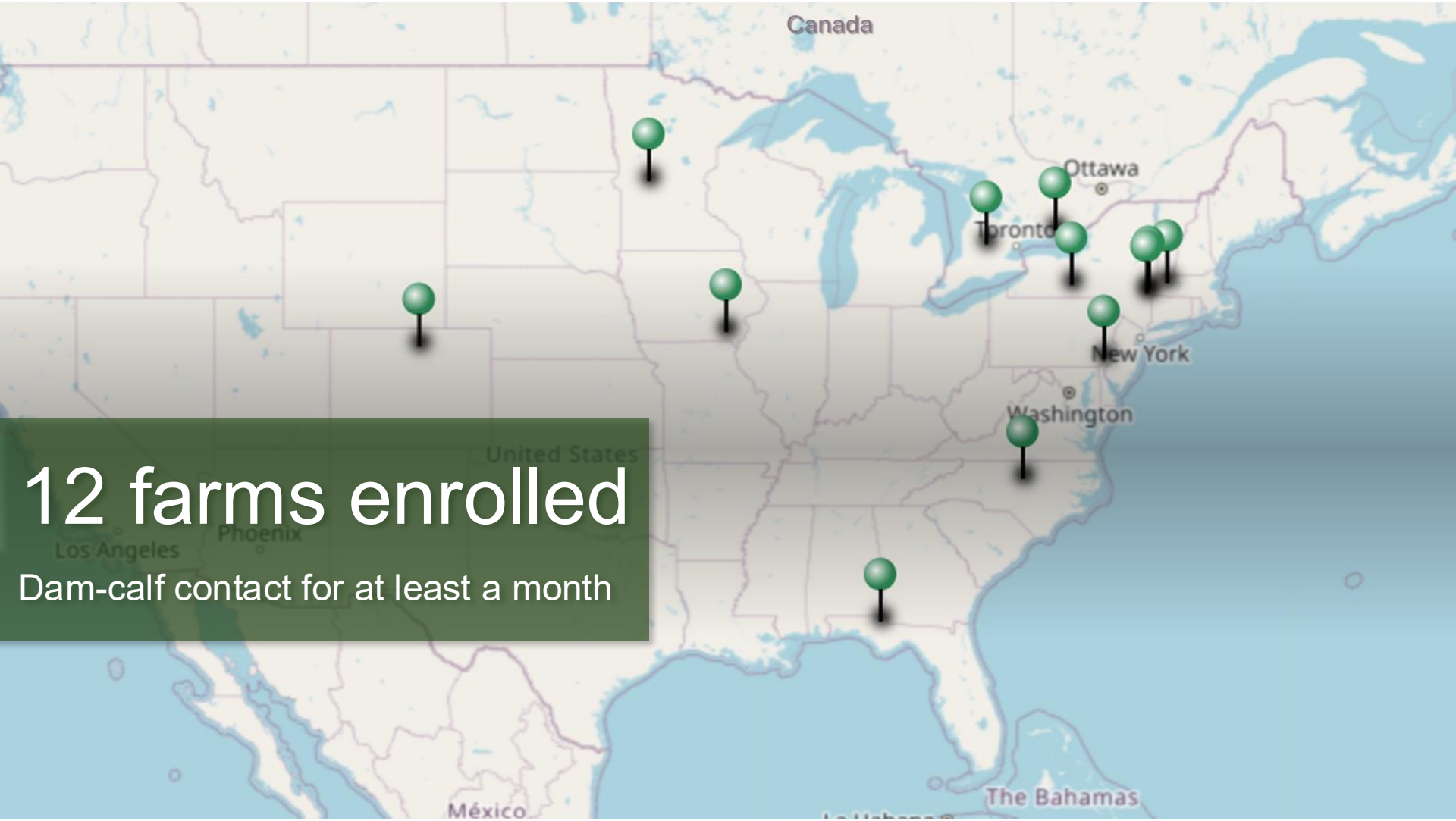
Objectives

- Investigate CCC systems, including:
  - Health exams on every pre-weaned dam-calf pairs
  - Milk composition
- Describe the housing and animal care practices on the farms implementing CCC systems in the USA and Canada

3 visits in the Spring, Summer and Fall 2024

University of Vermont

Project funded by USDA NIFA



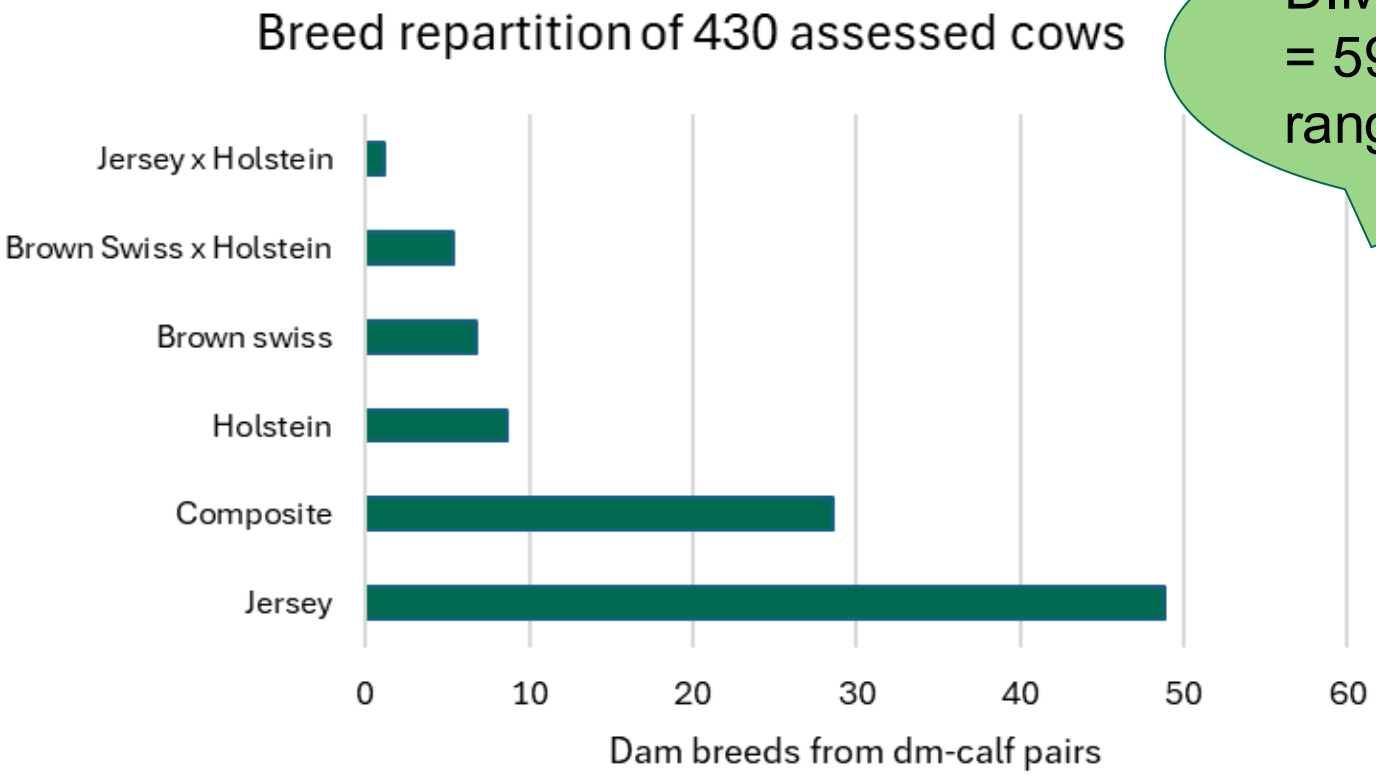
12 farms enrolled

Dam-calf contact for at least a month

Farm demographic data

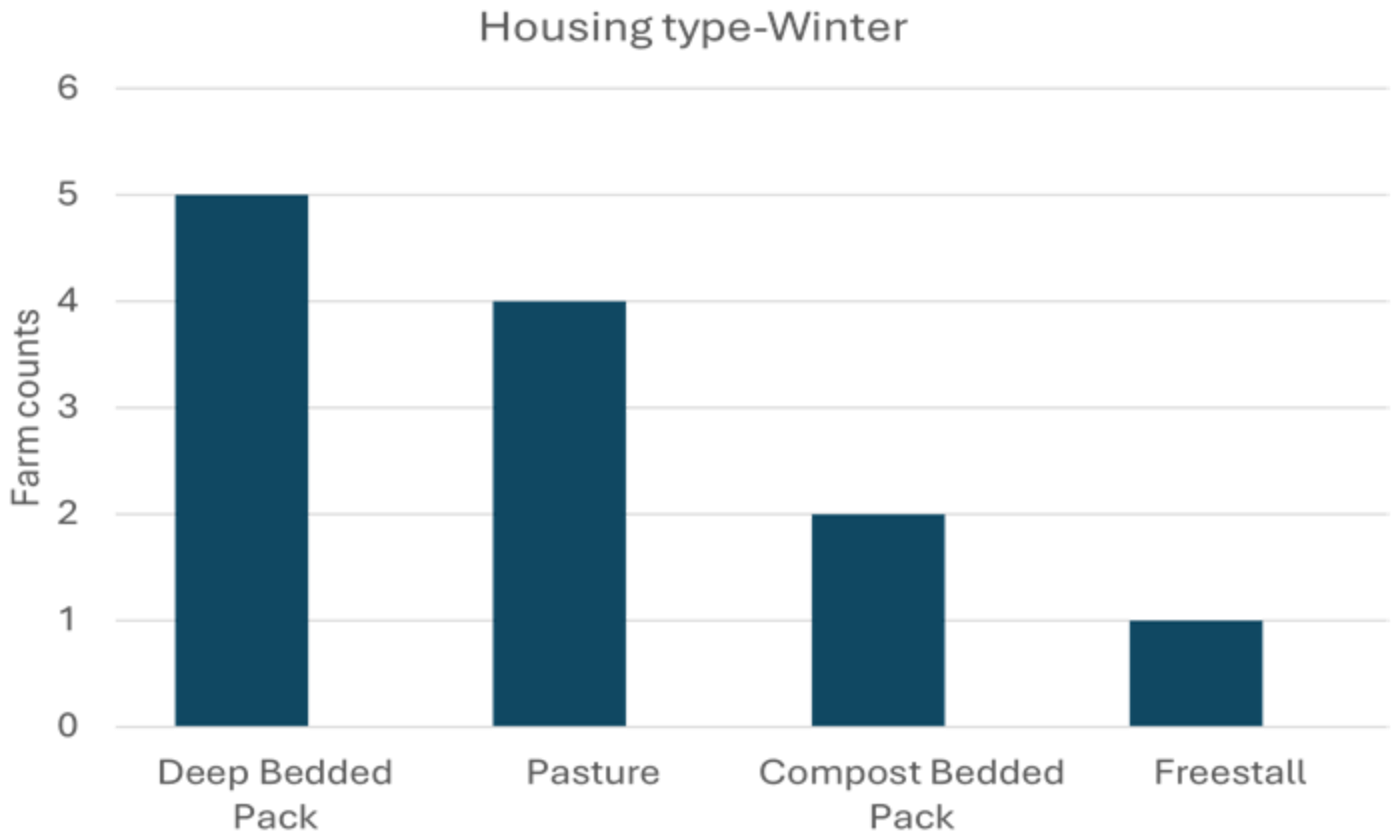
- Cow-calf pairs = 430
- Average per farm = 36 ± 27 cow-calf pairs (range: 14 – 96)
- 10 farms sell dairy and/or other food animal products direct to consumer
- 10 have all-year calvings, and the others calve seasonally in both spring and fall.

Majority of the cows asssessed are single-bred dairy breed



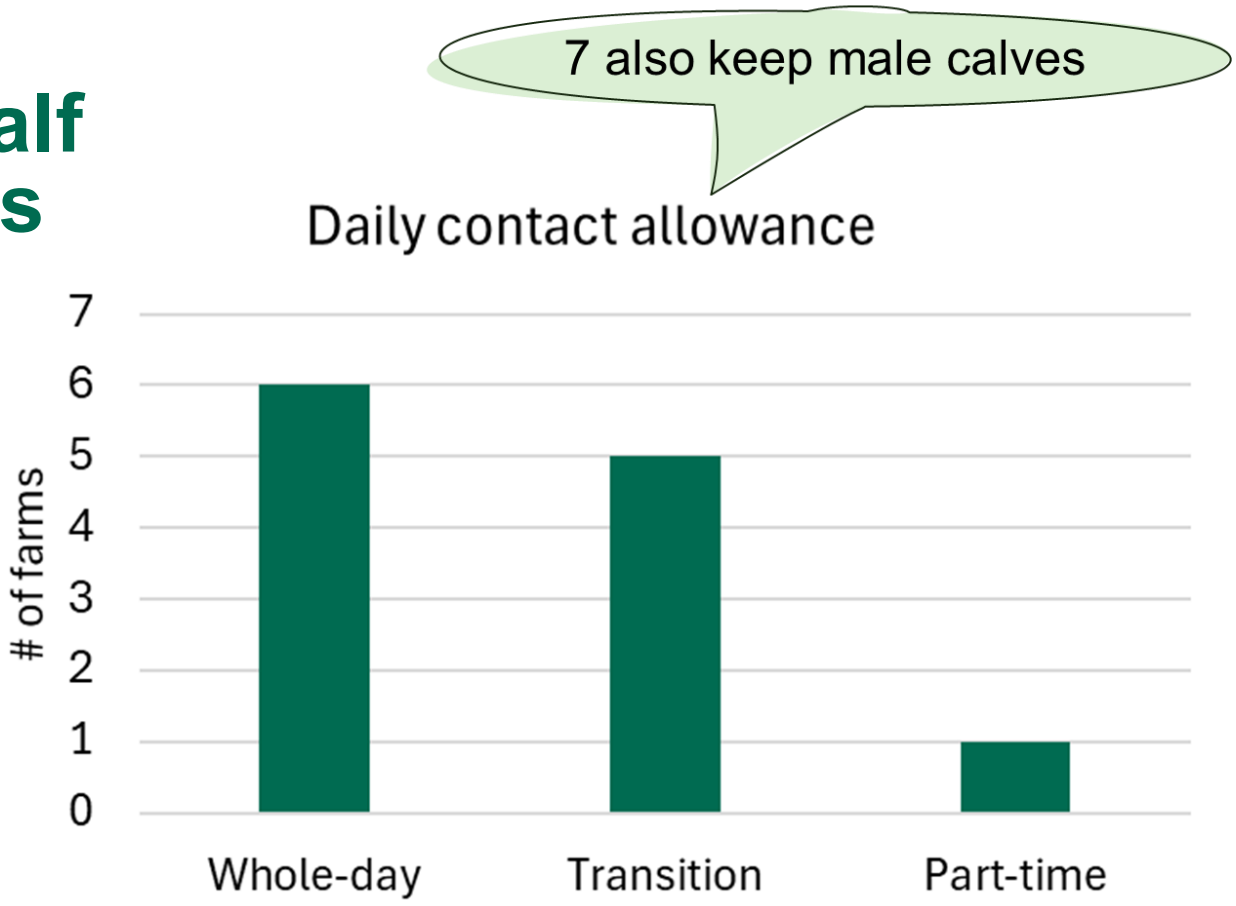
DIM (mean ± SD) = 59.5 ± 57.9, range = 0 to 306

Most of the cows rearing their calves are housed indoor during winter

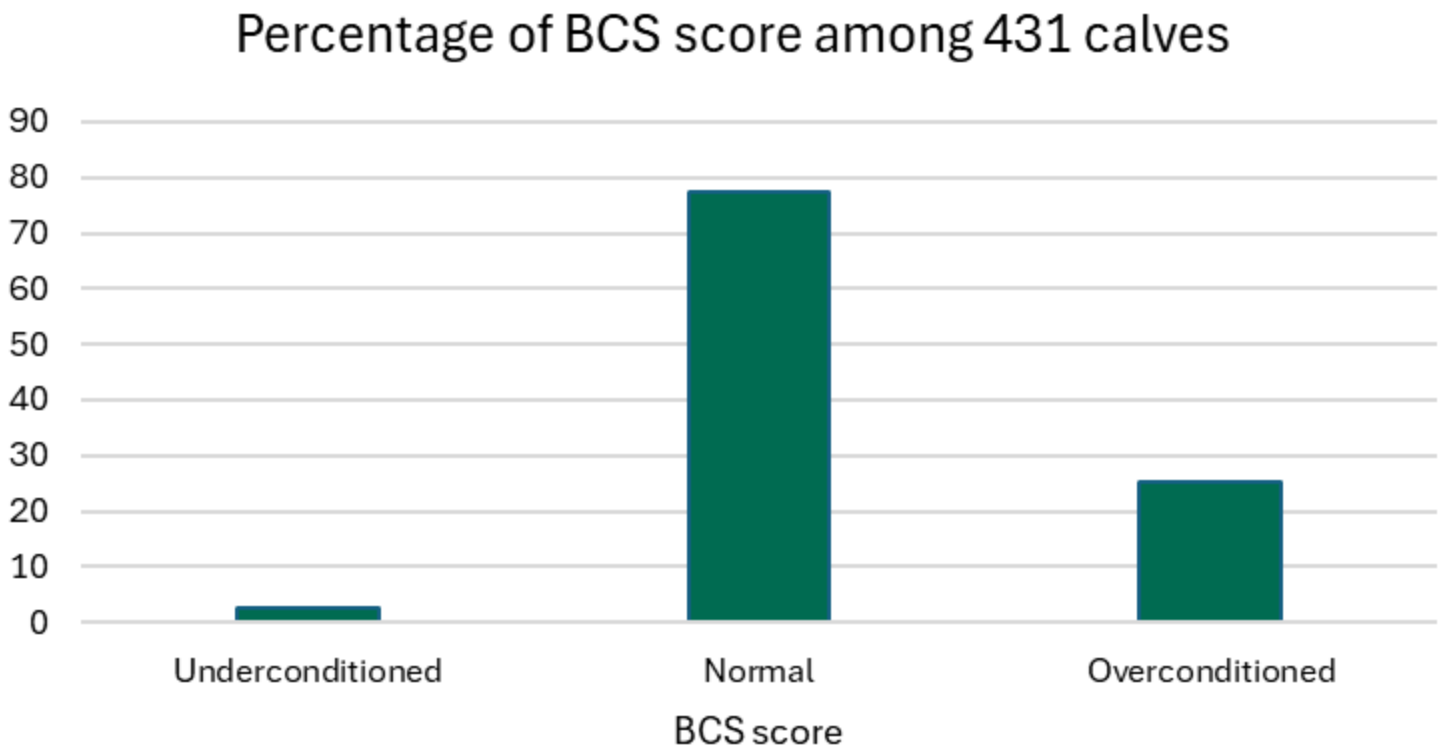


Some variation between dalm-calf contact practices

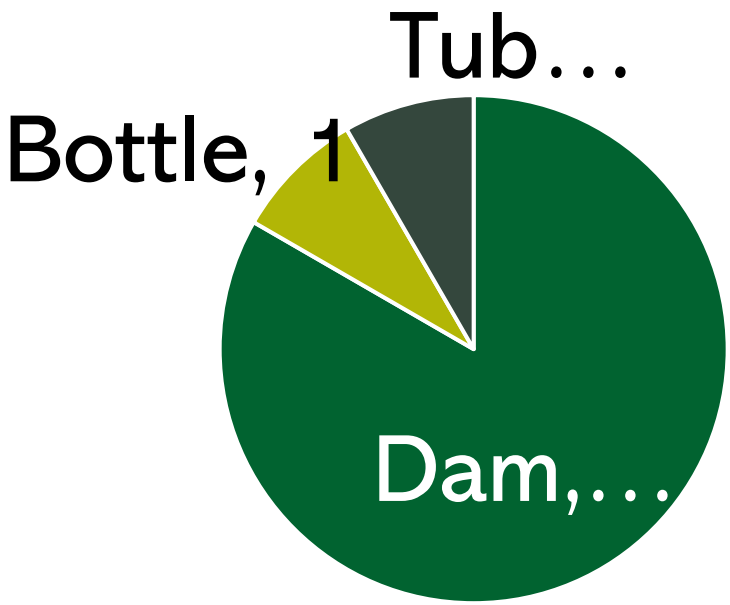
- Weaning age:
  - females: 3.6 months [1.5-6 months]
  - males: 4.5 months [2-6 months]



Calves in had overall good nutritional balance status



Most of the farms relied primarily on the dam for colostrum administration



Primary colostrum administration

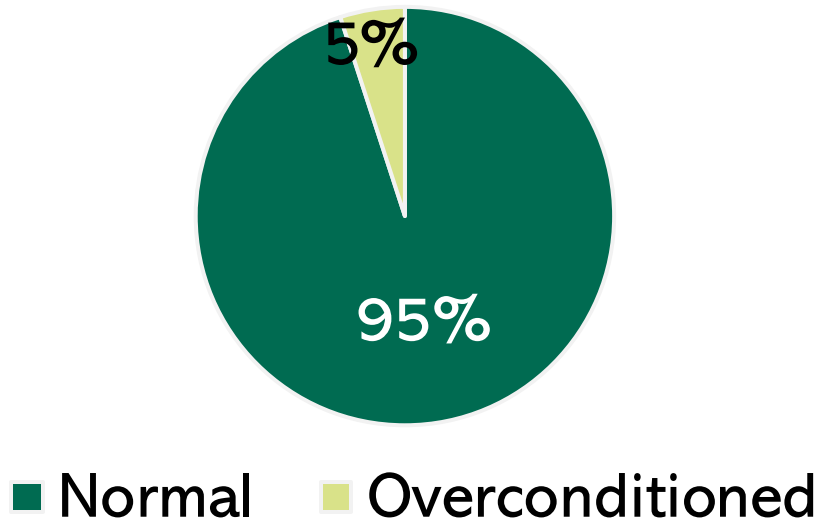
Dam colostrum administration

Most cow health variables were at expected levels

Cow health prevalence estimates 95% CI

- Severe lameness prevalence: 8.9 % 95% CI: 6.3 - 12.3 %
- Dirty: 4.5% 95% CI: 2.7 – 7.3%
- Chapped skin on at least 1 teat: 3% 95% CI: 1.4 – 5%

No cows showed emaciated state



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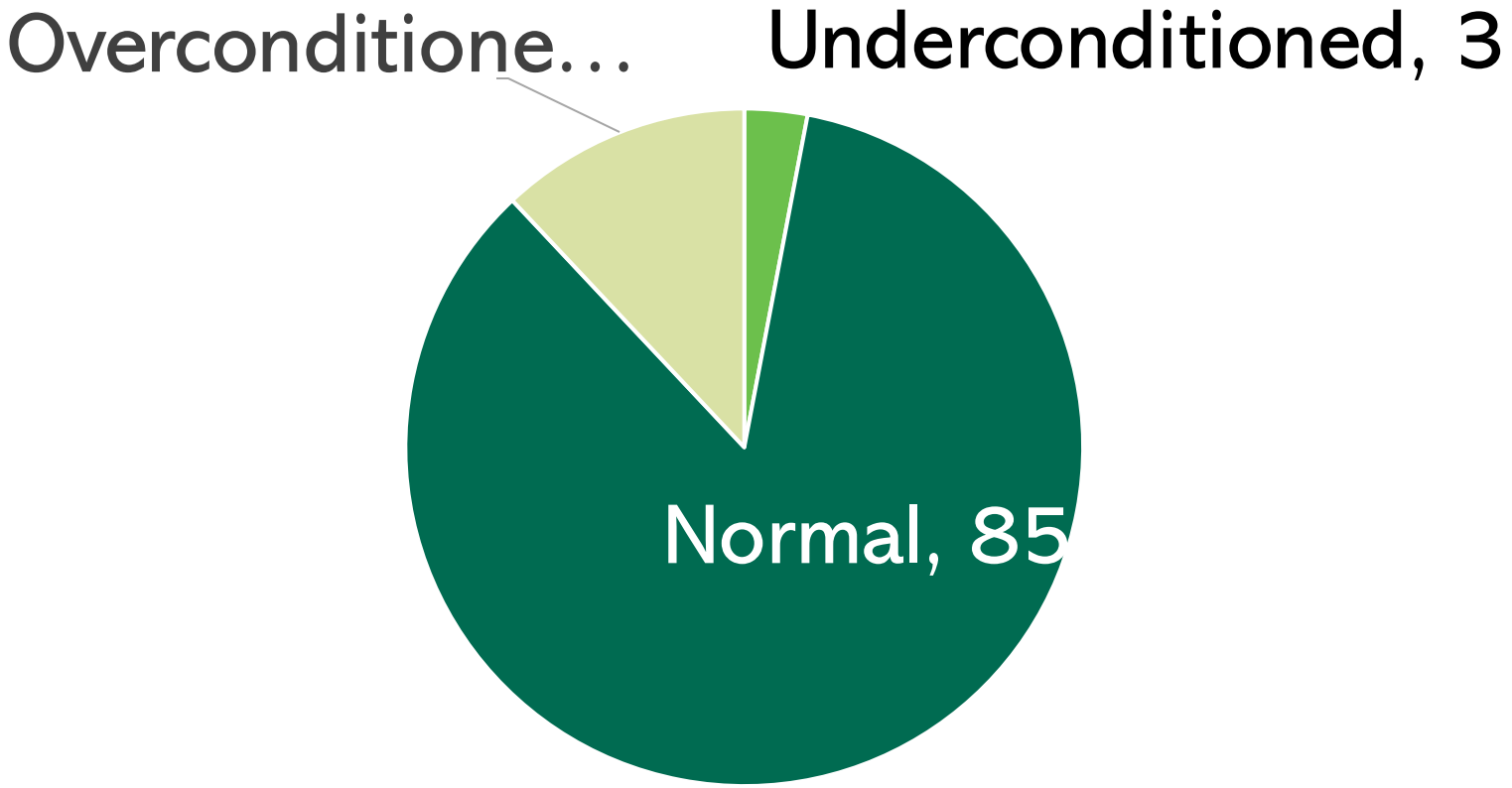
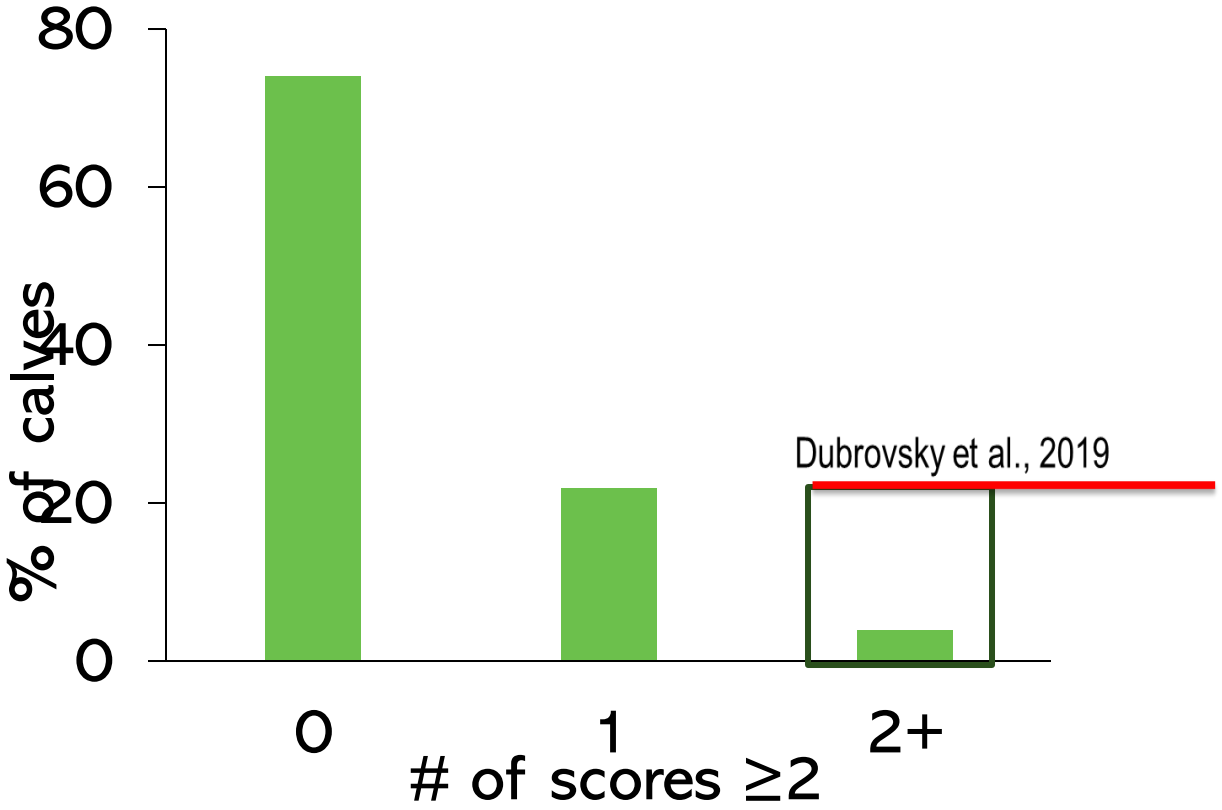
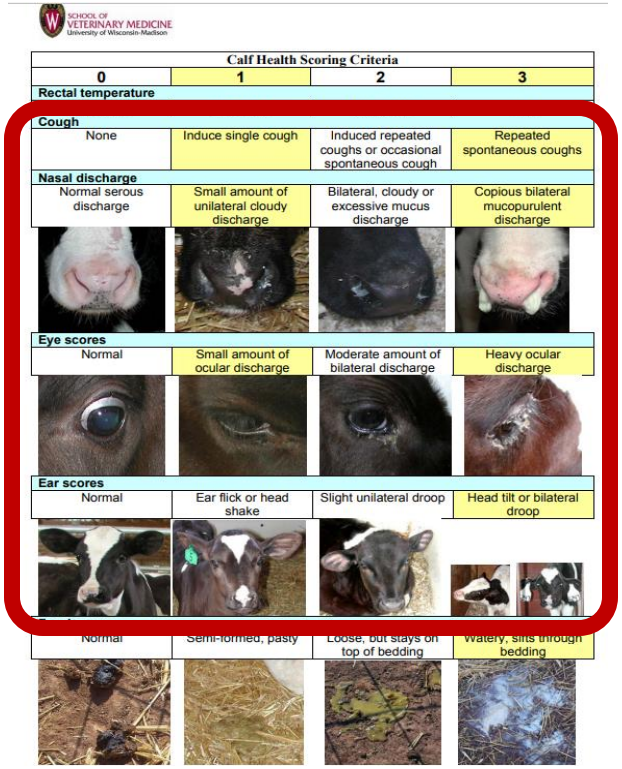


Very few calves were ‘positive’ of respiratory disease





Take home message

Calf-rearing practices vary by farm and within farm depending on calf sex

Dairy cows and their calves are generally healthy….

A few cows seem to have a negative energy balance and severe mastitis

Objective of the study

Dr. Emeline Nogles

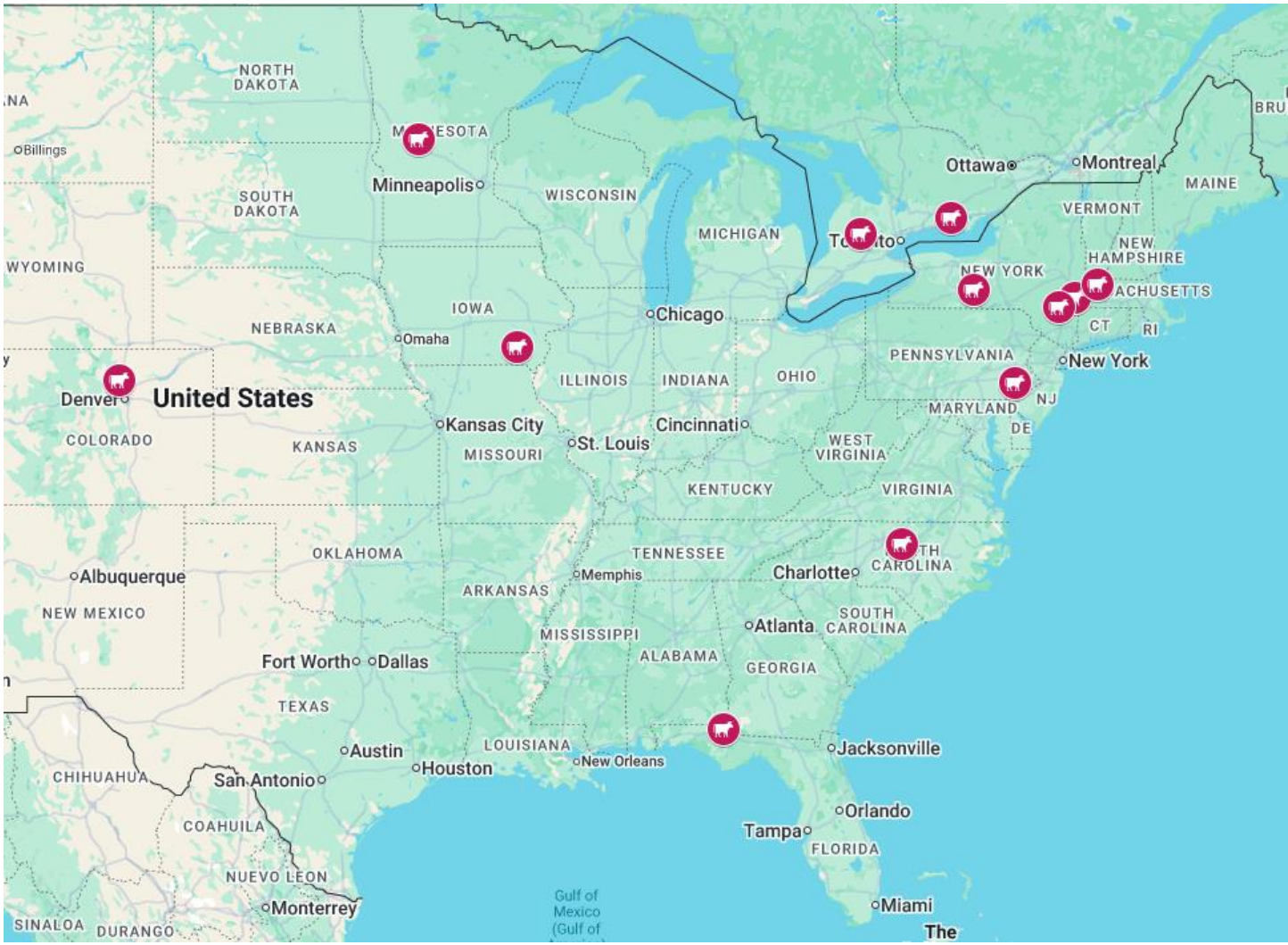
Understand how early adopters of dam-calf rearing in the USA and Canada perceive this practice.

University of Vermont

12 farms
18 interviewees

♂11 ♀ 7

< 40 years old	6
40 – 60 years old	9
> 60 years old	3



University of Vermont

Semi-structured interview guide

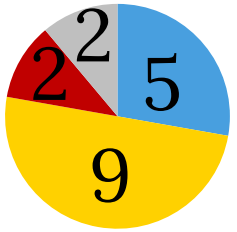
6 alone	52 ± 19 min (41–90 min)
12 in pairs	72 ± 20 min (43–98 min)

mean ± SD (range)

Applied thematic analysis

Framing assessment:

- Positive
- Negative
- Neutral
- Not discussed



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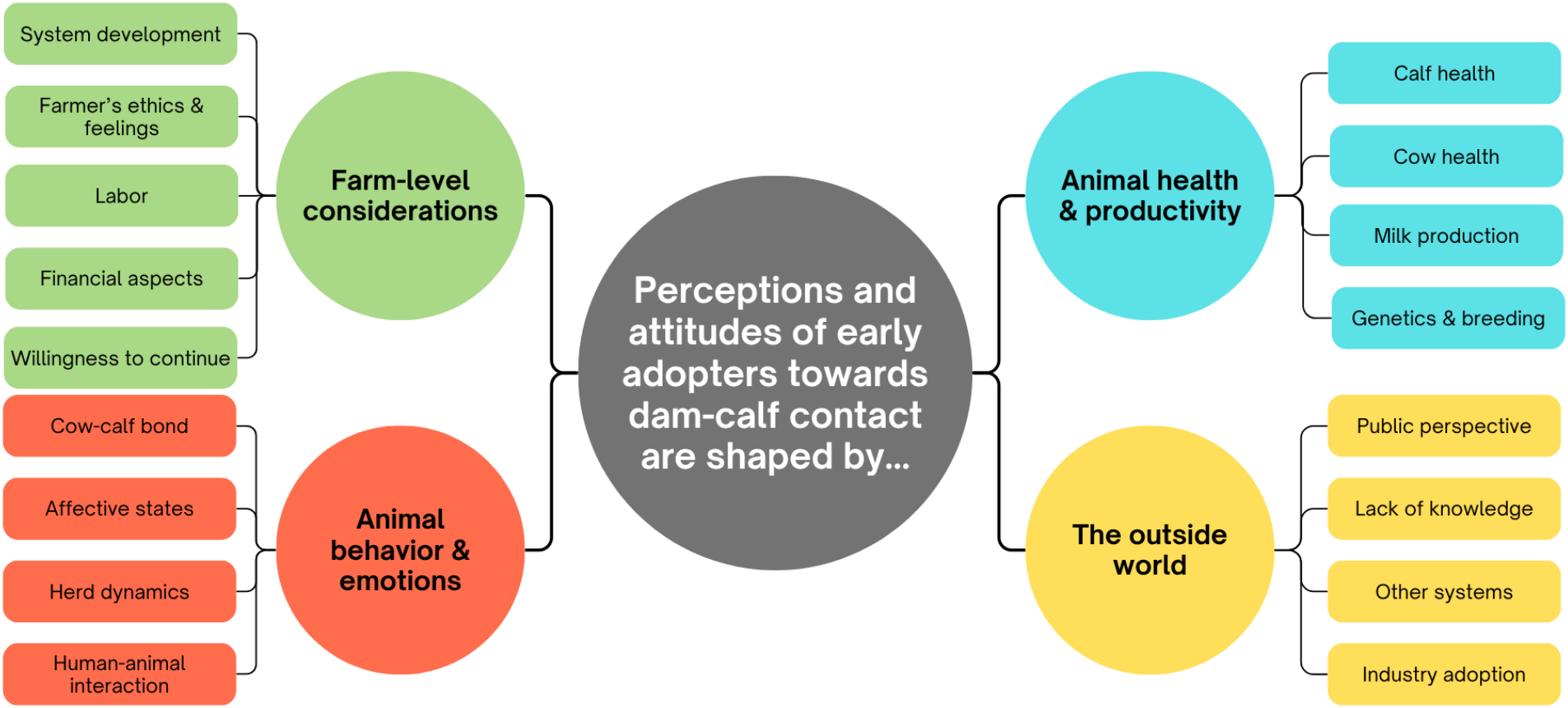

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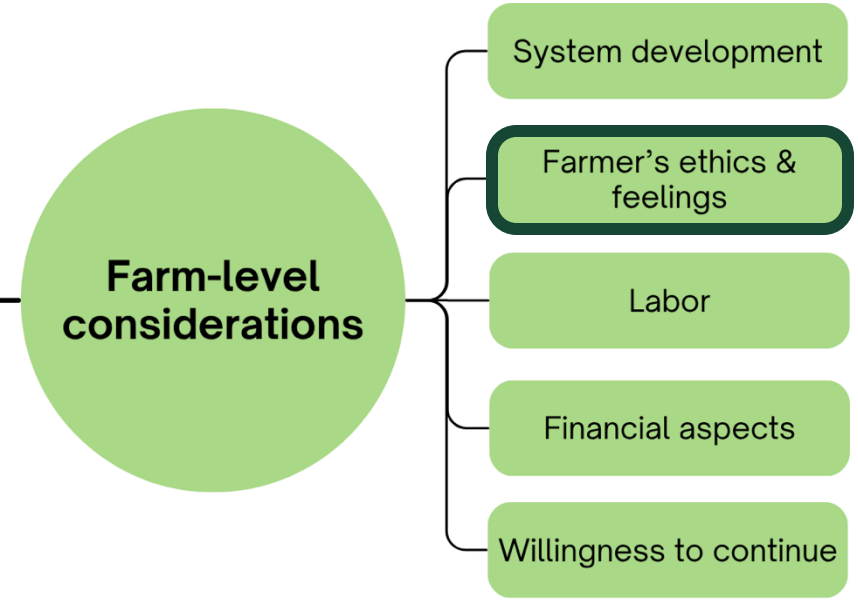
Framing assessment:

- Positive
- Neutral
- Negative
- Not discussed

18



"*It does feel like you're respecting the cow in a way that you wouldn't otherwise.*" (A1)

"*It makes the job a little funner [...] Happiness and joy [are] contagious.*" (J1)

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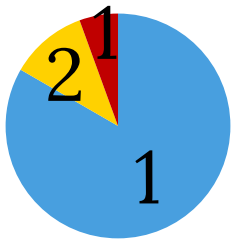
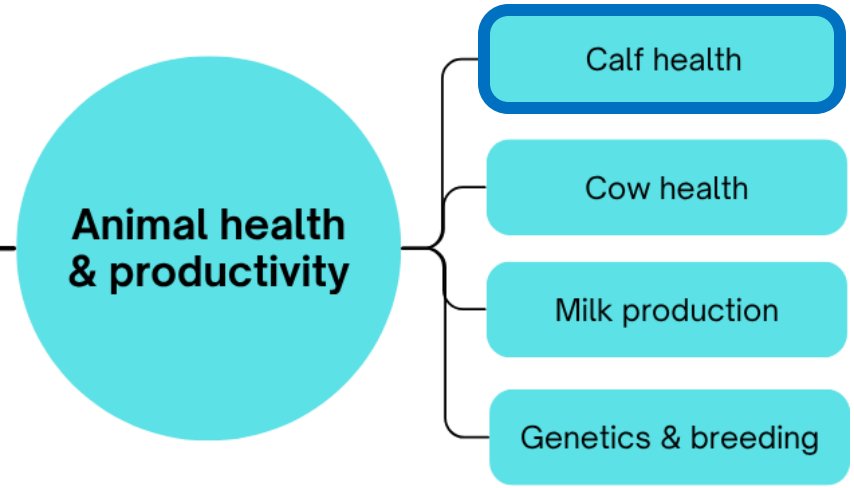
Framing assessment:

- Positive
- Neutral
- Negative
- Not discussed





"They're just bigger, healthier animals from the get go." (B1)

"Why is [the calf's] immune system so much healthier?" (E1)

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Framing assessment:

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- Negative
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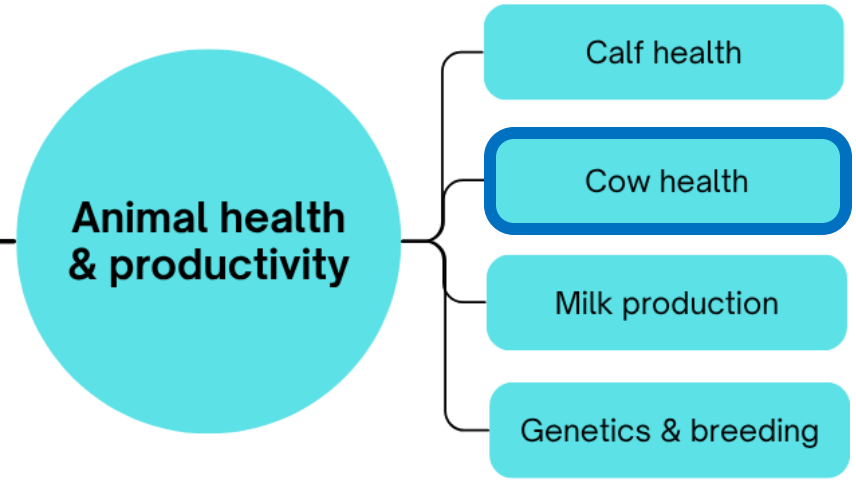

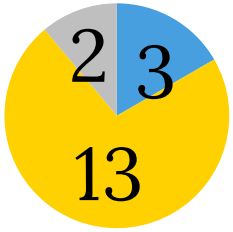

"*[Calves] still definitely help keep [the teat] clean.*" (B1)

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Framing assessment:

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- Negative
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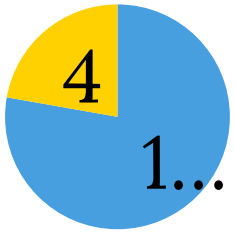

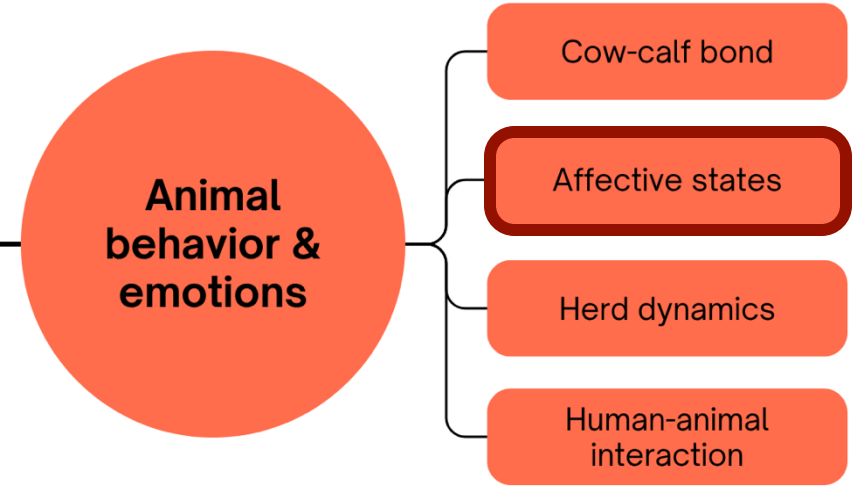

"*Actually weaning does not seem to be super stressful at all.*" (E1)

"*It's usually a couple nights where [...] you just hear the calves out in the pen [...] mooing.*" (B1)

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Framing assessment:

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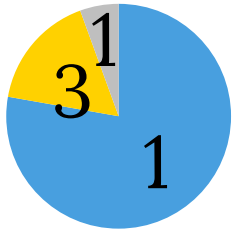
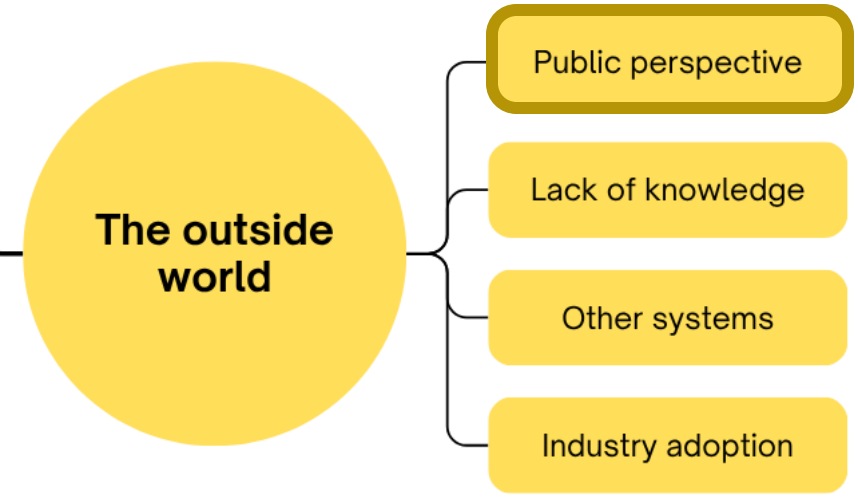
- Not discussed





> *"We would have to have a really good solid explanation and reason for our customers to justify changing that practice at this point in time."* (E1)

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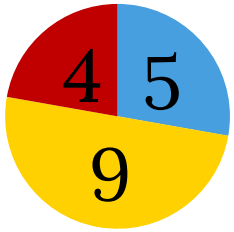

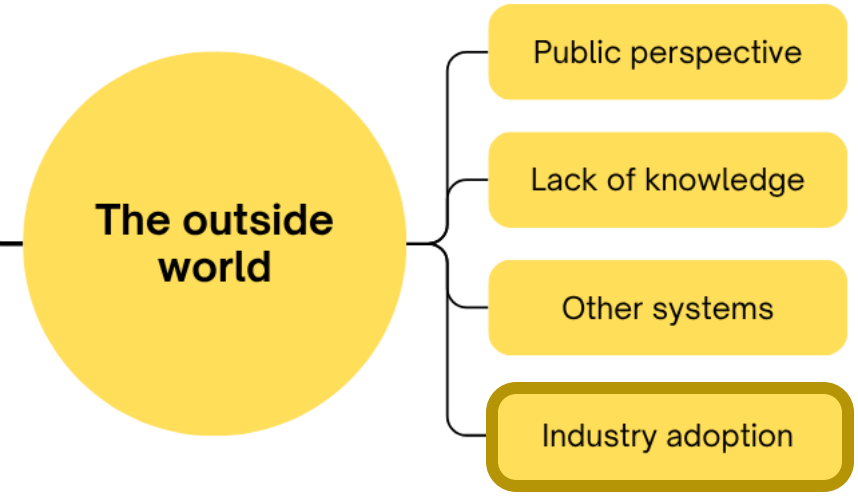

"I think it'll catch on and become the norm." (F1)

"I am not sure that farms are going to be willing to adopt anything that reduces production possibility." (A1)

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Conclusions

- Different relative importance attributed to each factor
- Overall, dam-calf contact considered as a positive change
- Major and challenging shift requiring reconsideration of a farmer's approach to dairy farming

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Take home message

Calf-rearing practices vary by farm and within farm depending on calf sex

Dairy cows and their calves are generally healthy….

More assessment on mastitis and energy balance is needed.

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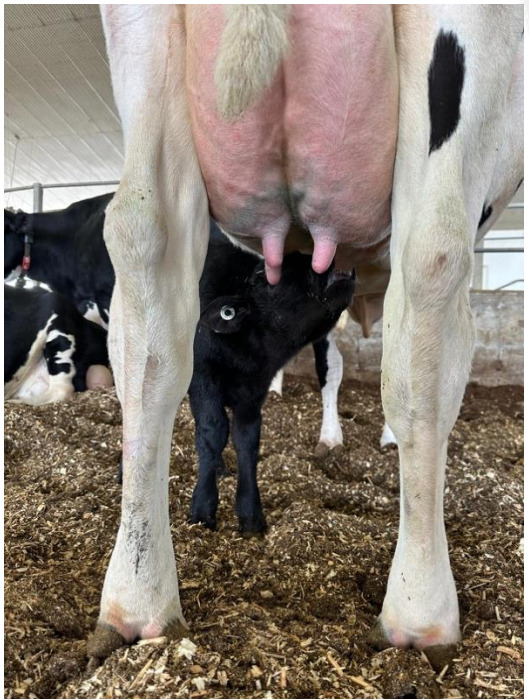
- Rowan Yuan
- Peers from Creutizinger and Costa's lab



South American Systems

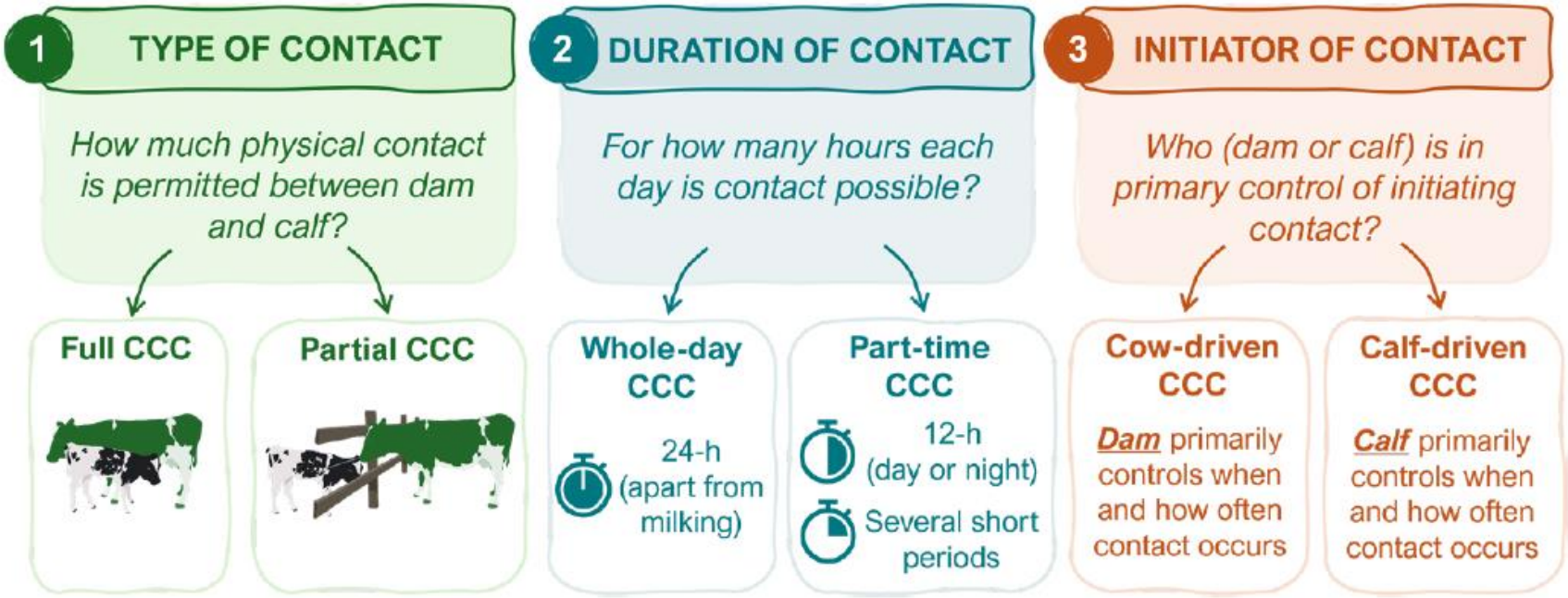


Figure 1. Terminology used to describe cow-calf contact (CCC) systems based on the type, duration, and primary initiator of contact, as adapted from Sirovnik et al. (2020).

Once a day milking – Half Day Contact

Twice a day milking – Restrict Contact

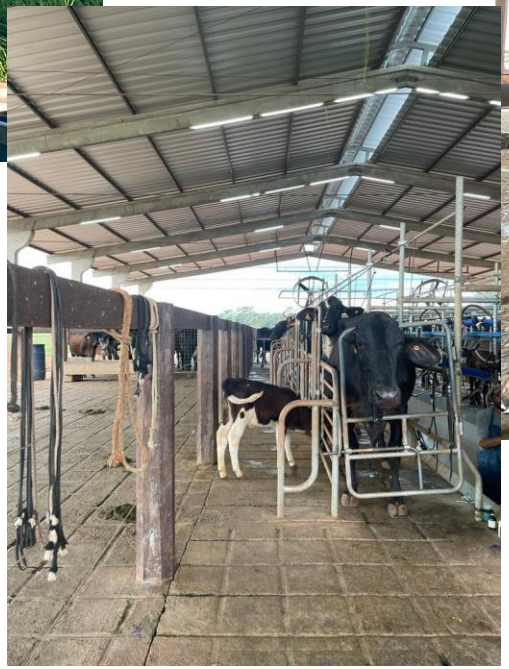


Figure 1. Terminology used to describe cow-calf contact (CCC) systems based on the type, duration, and primary initiator of contact, as adapted from Sirovnik et al. (2020).

Twice a day milking – Restrict Contact

Figure 1. Terminology used to describe cow-calf contact (CCC) systems based on the type, duration, and primary initiator of contact, as adapted from Sirovnik et al. (2020).

Twice a day milking – Milking time Contact

Figure 1. Terminology used to describe cow-calf contact (CCC) systems based on the type, duration, and primary initiator of contact, as adapted from Sirovnik et al. (2020).

ET Into receipts Cows

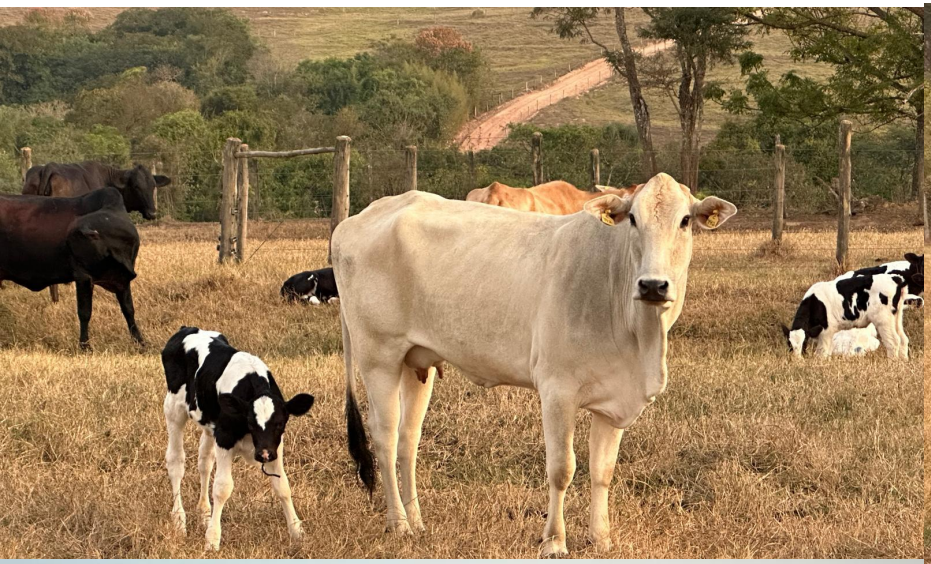


Figure 1. Terminology used to describe cow-calf contact (CCC) systems based on the type, duration, and primary initiator of contact, as adapted from Sirovnik et al. (2020).

Questions?

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Financial relationships:

Dr. Costa Works for the University of Vermont, previously at University of Kentucky (2017-2023)

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