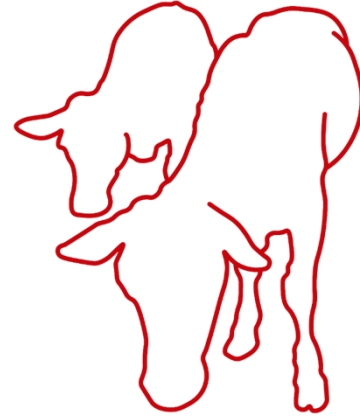


## Two heads are better than one: Strategies for successful social housing of dairy calves

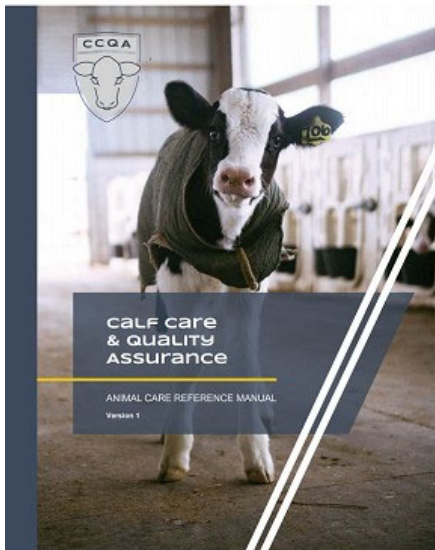


**Jennifer Van Os**  
Assistant Professor  
Extension Specialist in Animal Welfare

*VVMA Winter CE Conference  
Saturday, February 3, 2024*



## Calf Care & Quality Assurance Program



<https://www.calfcareqa.org/>

## Outline

### 1. Lecture:

- Review status of U.S. industry
- Benefits of pair or group housing of calves
- Common challenges and potential solutions



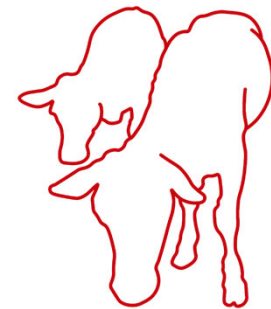
### 2. Interactive examples:

- Are these farms ready to move to pair or group housing?
- Housing and management decisions to support a successful transition to pairs or groups



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## Two heads are better than one: A starter guide to pairing dairy calves



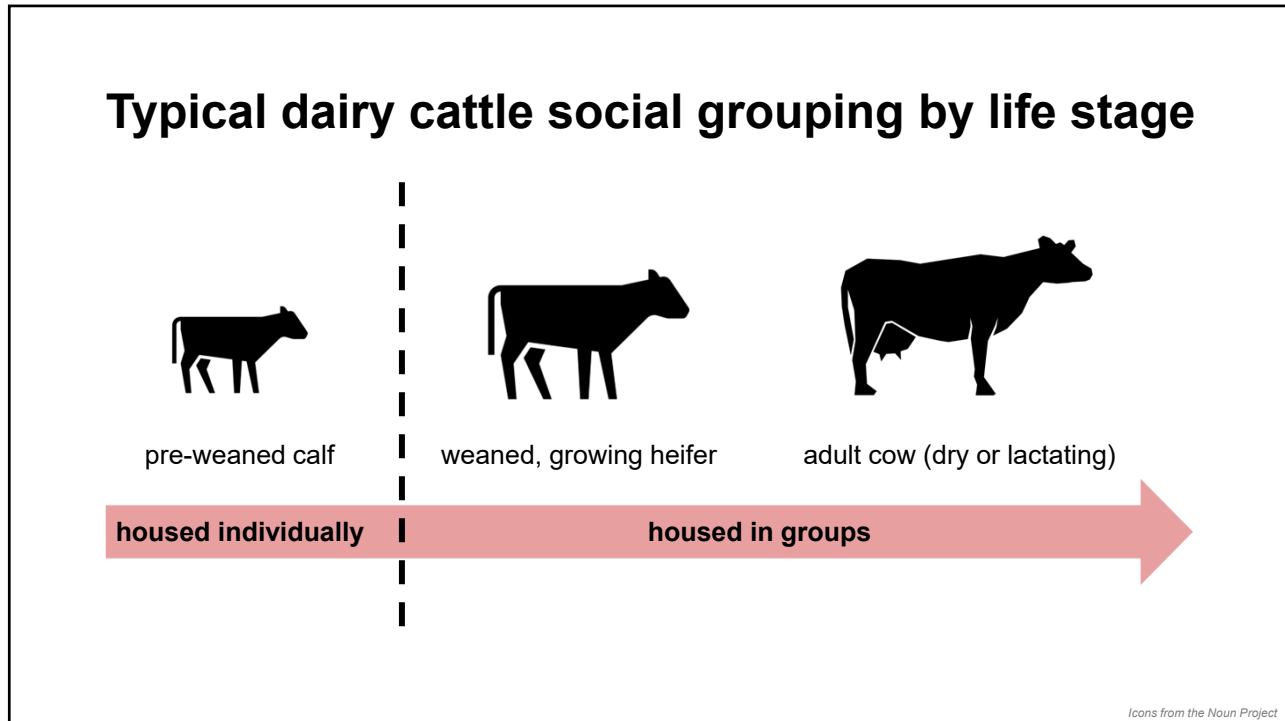
### Topics

1. Why all the fuss about pair housing?
2. Benchmarks for calf health before pair housing
3. Hygiene practices
4. Options for housing pairs or groups
5. Grouping strategies
6. Feeding practices and reducing cross sucking
7. Disbudding and dehorning considerations



[https://animalwelfare.cals.wisc.edu/calf\\_pairing/](https://animalwelfare.cals.wisc.edu/calf_pairing/)



Created by Jennifer Van Os with contributions from Sarah Adcock, Joao Costa, Courtney Halbach, Tina Kohlman, Emily Miller-Cushon, Theresa Ollivett, Donald Sockett, and Sandra Stuttgen



### The 1960s

## Calf hutches, dairy feeding and UW-Extension

In the mid 1950s, the Wood County Board appropriated \$16,000 for construction of a service building with an office, meeting room and kitchen. An addition, housing a soil testing laboratory and other research space, was built in the late 1950s. Wood County contributed \$7,500 for the project, and the City of Marshfield added \$2,500. Rapid growth of the station's dairy extension program spurred more construction. By the 1970s, the facility had nearly doubled in size with the addition of a forage testing laboratory and a large meeting facility.

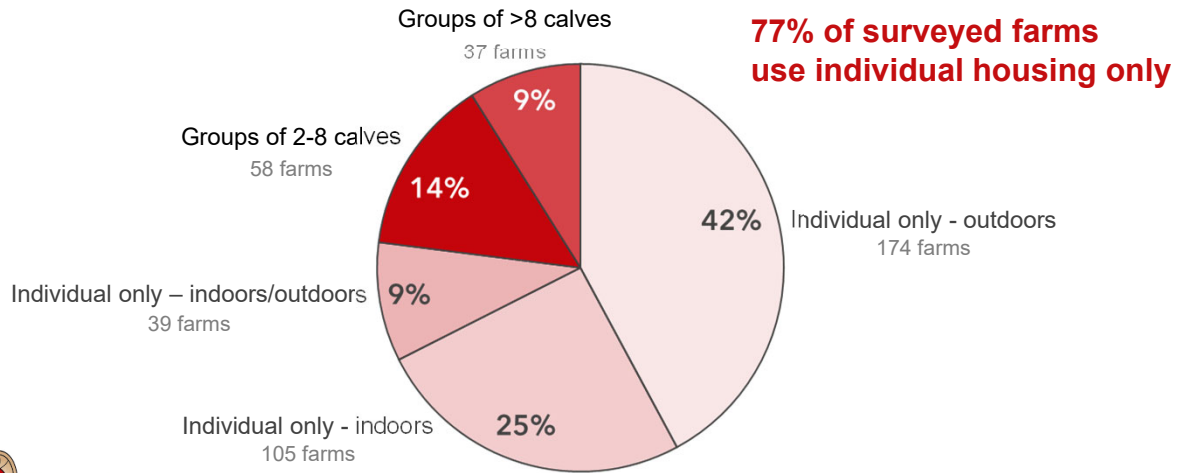
Above: The calf hutch was developed out of necessity by dairy scientist Howard Larsen and UW agricultural engineers. Today, Hampe! Corporation in Germantown manufactures calf hutches and has sold more than 400,000 of them world-wide.

Below: Area farmers learn of new calf housing and dairy feeding strategies developed at the Marshfield station.

**“The calf hutch was developed out of necessity”**

*The History of the Marshfield Agricultural Research Station*

## Individual housing remains the norm in the U.S.

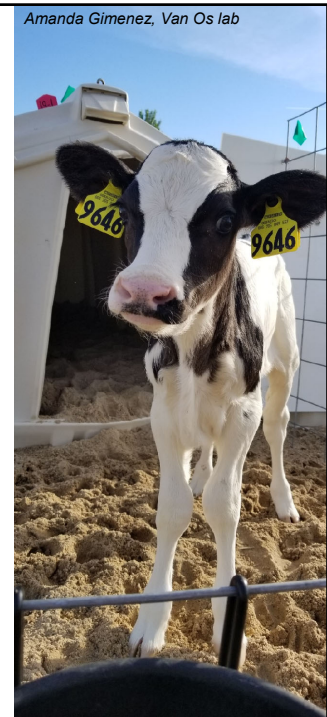


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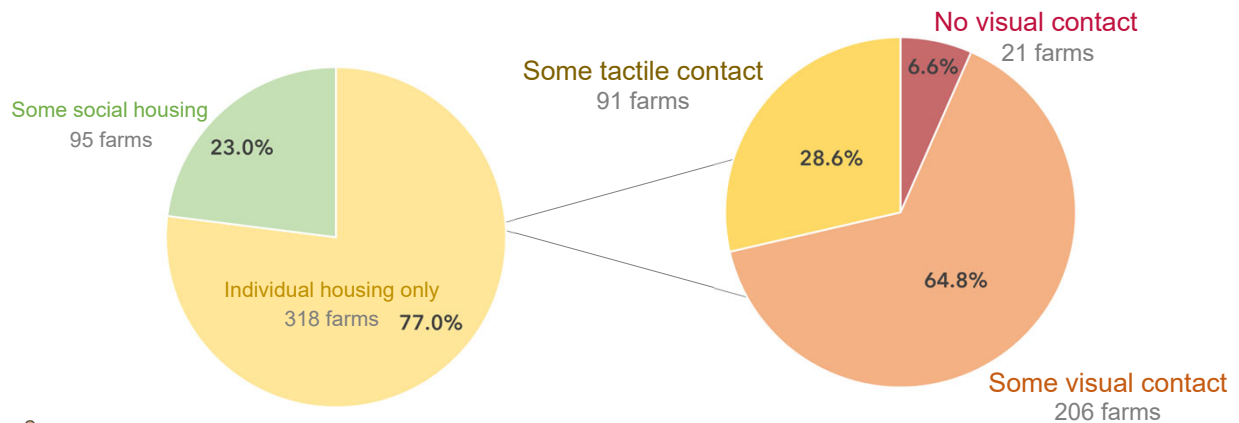
*Mincu, Silva, Van Os et al. (in preparation); USDA (2016)*

## Why is individual housing the norm?

- Allows for controlling & monitoring individual calves (feeding, health issues)
- Physical separation can reduce disease risks:
  - ↓ calf-to-calf contact
  - ↓ shared aerosol
  - ↓ contamination of shared feeding equipment or bedding
- Ease of handling individual calves



## 93% of farms using only individual housing allow at least visual contact among calves



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*Mincu, Silva, Van Os et al. (in preparation)*

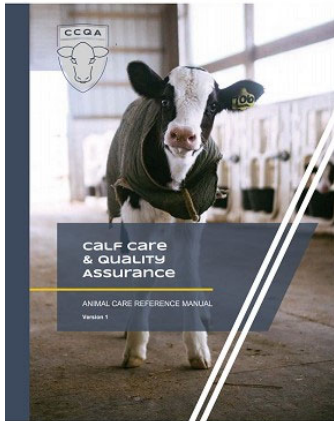
## FARM Animal Care program



Calf housing: expectation is for at least **visual** contact with other calves

<https://nationaldairyfarm.com/dairy-farm-standards/animal-care/>

# Social contact is recommended



<https://www.calfcareqa.org/>

## 4.4 SOCIAL CONTACT

### What is it and Why is it Important?

Cattle are a social species that have a strong urge to live within herds. When calves are separated, there are some detrimental effects that can occur on their development including isolated calves being more fearful and less dominant when mixed into groups later in life. In addition, individually housed calves have a harder time coping with changes in housing and diet and may have cognitive and developmental disadvantages, including poor learning skills and deficient social skills. Collectively this evidence suggests that social contact with peers from an early age is important for the calf.

Beyond these behavioral impacts of social housing, there are some benefits to having socially reared calves including increased body weight gain and increased feed intake. There are some concerns surrounding cross-sucking, aggression, and transmission of disease. However, there are multiple methods to address these challenges, including employing a gradual weaning program, feeding a high plane of milk nutrition, providing appropriate outlets for suckling behavior, using lower stocking density and group sizes, maintaining a stable group of calves, as well as cleaning pens and allowing downtime between subsequent groups.

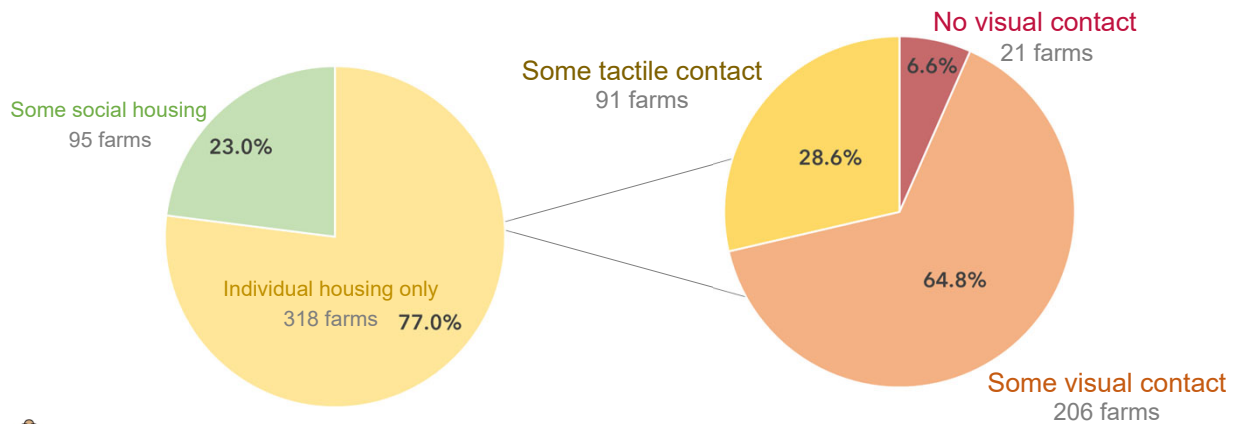
### What Can You Do?

To minimize the effects of social isolation, calves from the same source facilities could be grouped together early in life. Providing visual and/or physical contact with other cattle has been shown to be beneficial to calves.

To see the full benefits of social contact, calves need to be housed where they have physical contact with each other. Pair housing, where calves are grouped with one other calf, may be a good compromise between group housing and individual housing in terms of calf welfare and management. It allows producers to incorporate the benefits of social contact while maintaining the intensive management of animals and limit of disease transmission that occurs with individual housing.

Pair housing... may be a good compromise between group housing and individual housing in terms of calf welfare and farm management.

# 93% of farms using only individual housing allow at least visual contact among calves



Mincu, Silva, Van Os et al. (in preparation)

## Is tactile contact considered social housing?

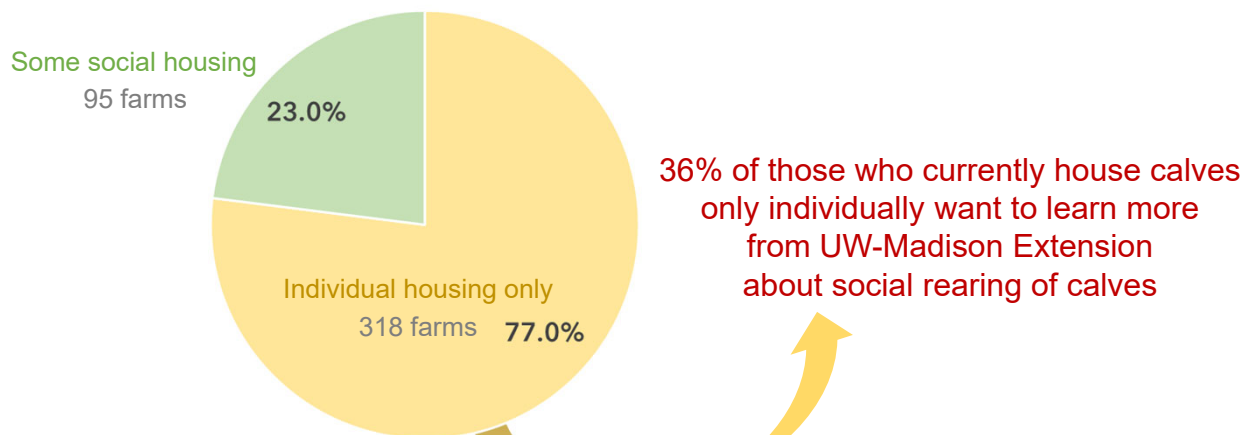
**Common question:** is physical contact through fencing a compromise between individual housing and full contact?

**Answer:** probably not

- Calves are more motivated for full vs. partial social contact
- Lacks purported benefits of individual housing for preventing calf-to-calf transmission, shared aerosol, shared bedding
- To the public, “a cage is a cage” (still individual housing)

*Holm et al. (2002); Jensen & Larsen (2014); Weary et al. (2015)*

## Many producers are interested in social rearing





## What's on the horizon?

There is reason to expect the norm for raising calves will move away from individual housing

<https://www.fwi.co.uk/livestock/youngstock-management/tesco-reveals-reason-for-single-calf-hutch-ban>

**FW** LATEST KNOW HOW MARKETS DISCOVER 12° Sutton

Tesco reveals reason for single-calf hutch ban

Michael Priestley  
13 October 2018

More in  
Dairy Livestock  
Youngstock management

Recommended

Research shows benefits of pair housing calves pre-weaning

Supermarket giant Tesco has cited "latest scientific evidence" in justifying its recent requirement that all dairy calves on supplier farms are reared in pairs or groups.

The decision has met with mixed reviews, with farmers who still use single-calf hutches burdened with extra work in making their systems conform with the supermarket's revised Livestock Code of Practice.

Tesco said the change applied to Tesco Dairy Group members and followed consultation with both farmers and veterinary advisers.

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- Common challenges and potential solutions

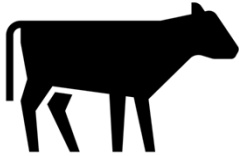


### 2. Interactive examples:

- Are these farms ready to move to pair or group housing?
- Housing and management decisions to support a successful transition to pairs or groups



## Benefits of social rearing



benefits for the calves



Emily Miller-Cushon

- ✓ Addresses calves' motivation and preference for contact
- ✓ Positive emotional state reflected in "optimistic" test responses

*Holm et al. (2002); Faervik et al. (2006, 2007); Ede et al. (2021); Bučková et al. (2019); Lindner et al. (2022). Icon from the Noun Project*

## Benefits of social rearing



benefits for the calves

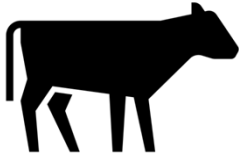
- ✓ Play behavior
- ✓ Social development



Van Os lab

*Broom & Leaver (1978), Jensen et al. (1997, 1998, 2015); Veissier et al. (1994, 1997); Holm et al. (2002). Icon from the Noun Project*

## Benefits of social rearing

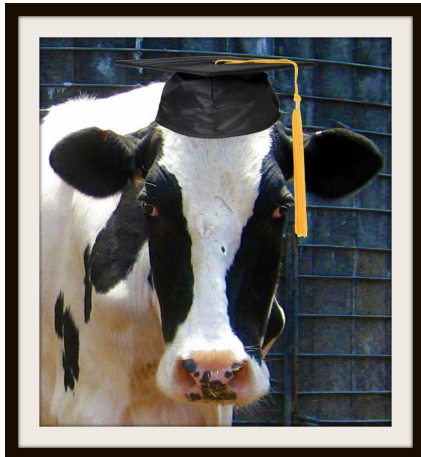


benefits for the calves

- ✓ Resilience to stress (weaning)
- ✓ Cognitive / behavioral flexibility
- ✓ Adaptability to new things

Jensen et al. (1997); Chua et al. (2002); de Paula Vieira et al. (2010); Duve et al. (2012); Costa et al. (2014); Gaillard et al. (2014); Meagher et al. (2015); Bolt et al. (2017); Whalin et al. (2018). Icon from the Noun Project

## Why does learning ability matter?



We expect cows to learn a lot of new things over their lifetimes:

- ✓ New housing elements  
(e.g., hutch → bedded pack → stalls;  
different feeding and drinking sources)
- ✓ New diets and feed items
- ✓ New social groups
- ✓ Milking in parlors (both sides!) or AMS

Photo: <http://udderside.blogspot.com/2012/05/graduating-to-milking-herd.html>



## Social groups in naturalistic settings (e.g., beef cow-calf operations)

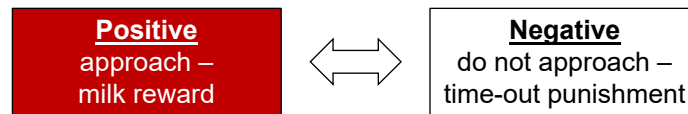


## Cognitive and behavioral flexibility



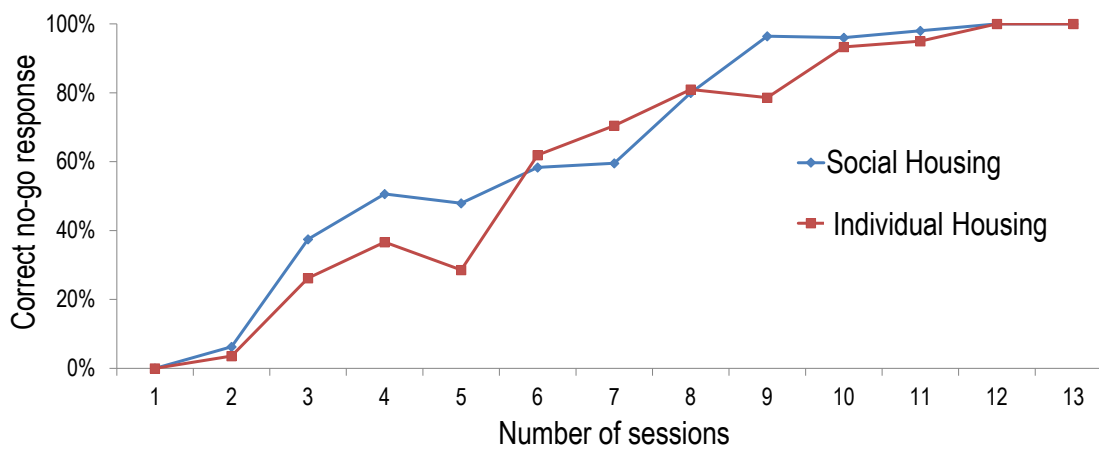
## Cognitive testing

### Phase 1: Initial Discrimination



Meagher et al., 2015 PLoS ONE 10:e0132828 ; Gaillard et al. 2014 PLoS ONE 9: e90205

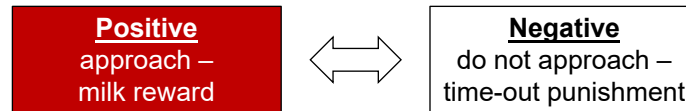
## Discrimination learning



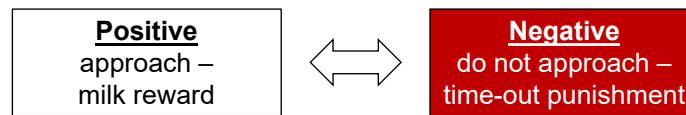
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## Cognitive testing

### Phase 1: Initial Discrimination

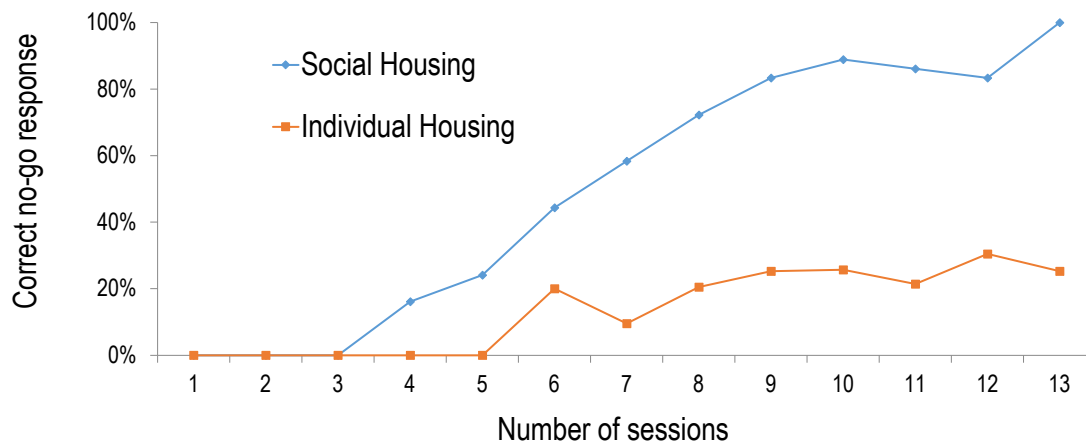


### Phase 2: Reversal



Meagher et al., 2015 PLoS ONE 10:e0132828; Gaillard et al. 2014 PLoS ONE 9: e90205

## Reversal learning



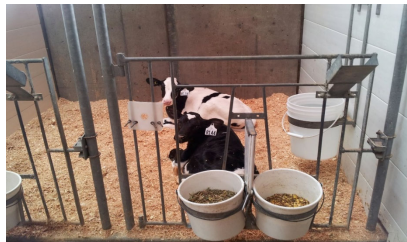
Meagher et al., 2015 PLoS ONE 10:e0132828

## What type of social contact is needed?

individual



multi-age group



early paired (1 wk old)

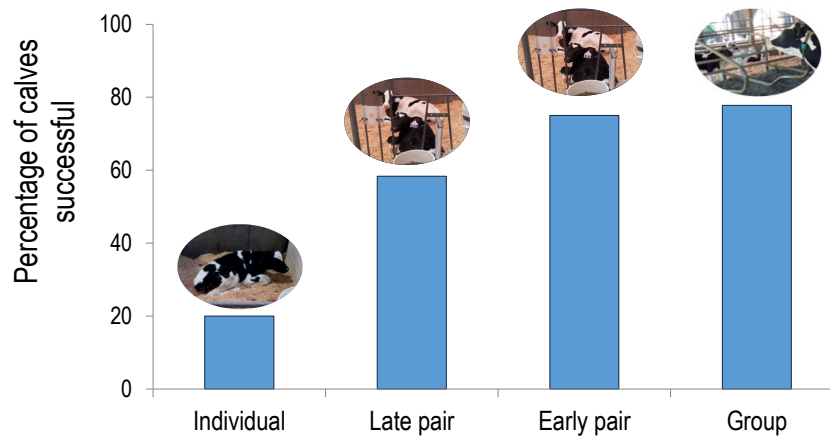


late paired (6 wk old)



Meagher et al., 2015 PLoS ONE 10:e0132828

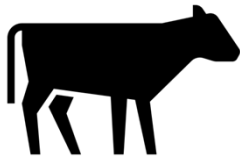
Calves paired early or kept in complex social groups did best on the cognitive test



Meagher et al., 2015 PLoS ONE 10:e0132828

## Benefits of social rearing

- ✓ Greater solid feed intake
- ✓ Greater weight gains, ADG



benefits for the calves



benefits for the farm business

*Pempek et al. (2016); Wormsbecher et al. (2017); Overvest et al. (2018); Whalin et al. (2018); Knauer et al. (2021); Zhang et al. (2021); Lindner et al. (2022). Icons from the Noun Project*

*Costa et al. (2016, invited review in J. Dairy Sci. 99:2453-2467);*

To date, no study has shown individually housed calves to outperform those housed in pairs or small groups

DMI of starter grain	11	8	0
Avg. daily gain	6	7	0
Weaning bodyweight	8	4	0

Dr. Joao Costa



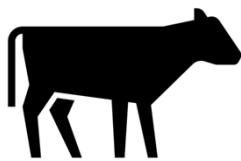
*Adapted from Costa et al. (2016, invited review in J. Dairy Sci. 99:2453-2467); Pempek et al. (2016); Wormsbecher et al. (2017); Overvest et al. (2018); Whalin et al. (2018); Knauer et al. (2021); Zhang et al. (2021); Lindner et al. (2022).*



## Benefits of social rearing

Protection from cold stress

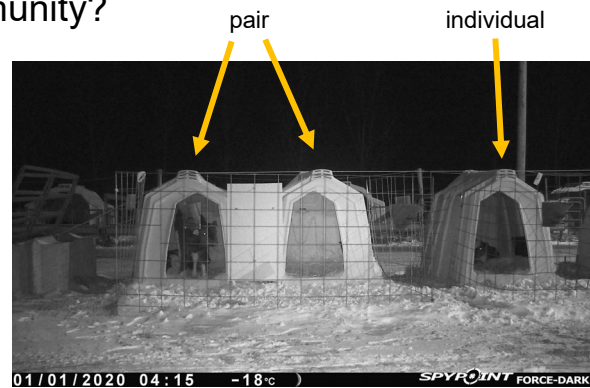
→ more energy for growth and immunity?



benefits for the calves



benefits for the farm business



Reuscher, Van Os, et al. (2024; <https://doi.org/10.3168/jds.2023-23941>). Icons from the Noun Project

## Benefits of social rearing



preferred by the public  
(consumers, voters)



benefits for the farm business

✓ Greater public acceptance

Perttu et al. (2020). Icons from The Noun Project



n = 1,310 adults at the Minnesota State Fair



**individual**

**pair**

**group**



**approve**

31.5%

66.0%

75.8%



**neutral**

21.5%

19.9%

16.8%



**disapprove**

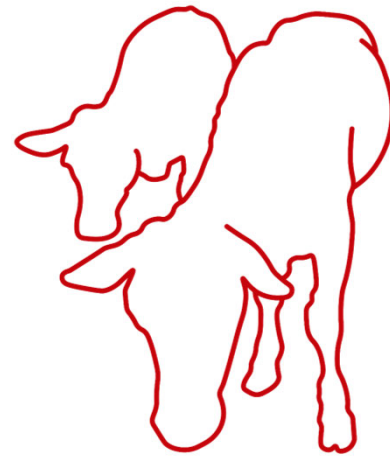
47.0%

14.1%

7.4%

### Benefits of pairing calves:

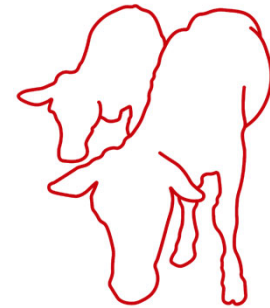
- ✓ Motivated for social contact
- ✓ Play behavior
- ✓ Social development
- ✓ Resilience to stress
- ✓ Cognitive / behavioral flexibility, adaptability to new things
- ✓ Possible protection from cold stress
- ✓ Greater solid feed intake
- ✓ Greater weight gains
- ✓ Greater public acceptance





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## Two heads are better than one: A starter guide to pairing dairy calves



### Topics

1. Why all the fuss about pair housing?
2. Benchmarks for calf health before pair housing
3. Hygiene practices
4. Options for housing pairs or groups
5. Grouping strategies
6. Feeding practices and reducing cross suckling
7. Disbudding and dehorning considerations



[https://animalwelfare.cals.wisc.edu/calf\\_pairing/](https://animalwelfare.cals.wisc.edu/calf_pairing/)

*Created by Jennifer Van Os with contributions from Sarah Adcock, Joao Costa, Courtney Halbach, Tina Kohlman, Emily Miller-Cushon, Theresa Ollivett, Donald Sockett, and Sandra Stuttgart*

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### 1. Lecture:

- Review status of U.S. industry
- Benefits of pair or group housing of calves
- **Common challenges and potential solutions**



### 2. Interactive examples:













- Are these farms ready to move to pair or group housing?
- Housing and management decisions to support a successful transition to pairs or groups

## Potential challenges of pair or group raising

### 1) How to raise healthy calves?

When compared with individual housing, impact of pair or group housing on calf health is unclear...

- When compared with individual housing, group housing sometimes results in worse respiratory health outcomes, whereas other studies detected no differences
- Within group housing, group size is a risk factor

Treatment incidence	 0	 1	 2
Worse clinical scores	 0	 1	 1
Recorded disease	 0	 1	 2
Lung consolidation	 0	 0	 1



*Adapted from Ollivett, 2020. Vet. Clin. Food Anim. 36:385-398*

## Potential challenges of pair or group raising

### 1) How to raise healthy calves?

- Many farms successfully raise healthy calves in social groups
- We surveyed producers using pair or group housing:  
72% were satisfied with calf health

*Mincu, Silva, Van Os, et al. (in preparation)*

## Pair-housed calves can stay healthy

- n = 48 calves (16 individuals, 16 pairs)
- Housed from 0-60 d of age in outdoor plastic hutches
- Winter (December-March) in Wisconsin



Condition	Pair housed	Individually housed
Infected inner ear	1 out of 32	0
Cryptosporidiosis	0	1 out of 16
Pneumonia	1	1
<b>TOTAL</b>	<b>2 out of 32</b>	<b>2 out of 16</b>

*Reuscher, Van Os, et al. (2024; <https://doi.org/10.3168/jds.2023-23941>).*

## Multiple factors contribute to calf morbidity

The same principles for good health apply whether housing calves individually or in groups:

- ✓ preventive care and monitoring
- ✓ colostrum protocol
- ✓ nutrition
- ✓ hygiene, sanitation, biosecurity
- ✓ ventilation
- ✓ space allowance, bedding
- ✓ all-in / all-out moves

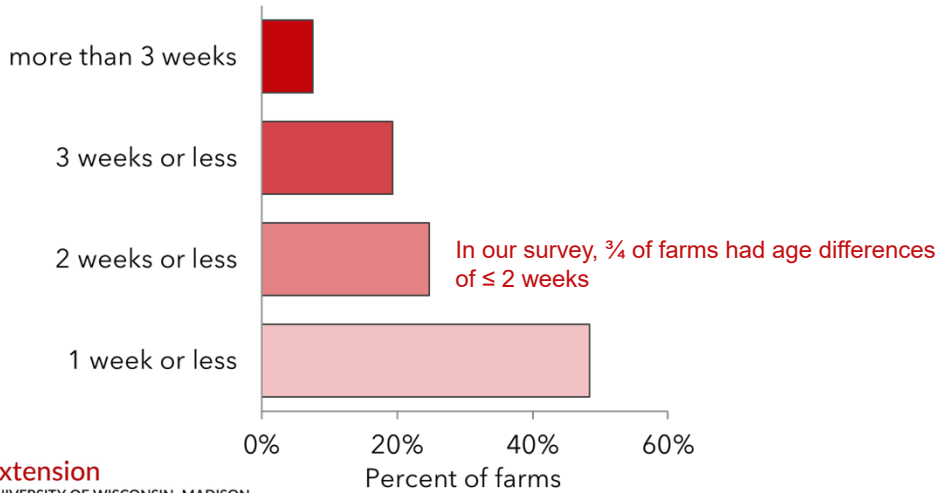
Ollivett (2020) *Vet. Clin. Food Anim.* 36:385-398;  
Costa et al. (2016) *J. Dairy Sci.* 99:2453-2467

## What should the age range be within groups?

- No more than 14 days age difference between oldest and youngest calf in a pair or group
- Ideally, no more than 7 days age difference
  - (Preferred by 80% of veterinarians)

## What should the age range be within groups?

Maximum age difference within pairs or groups of calves

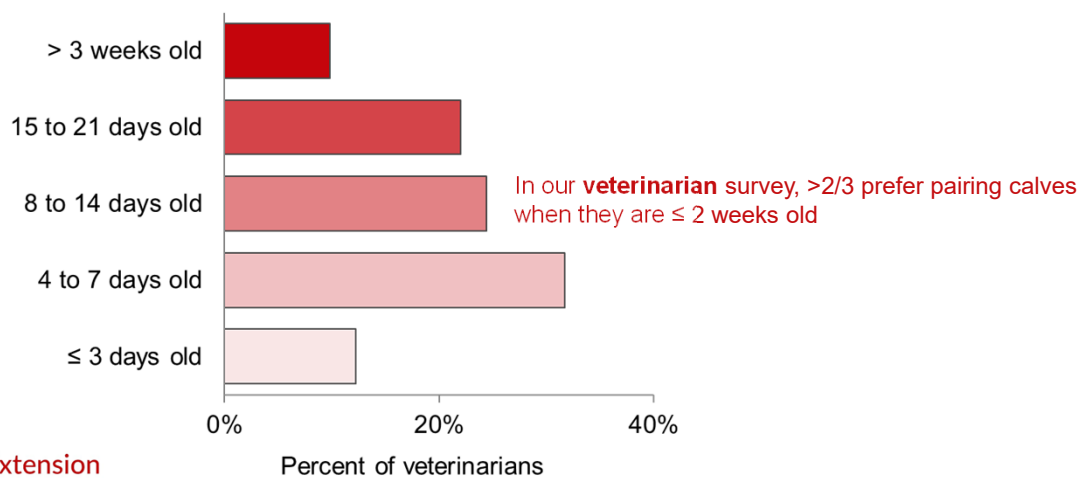


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Mincu, Silva, Van Os, et al. (in preparation)

## What is the best age to pair or group calves?

Age when calves enter pairs or groups



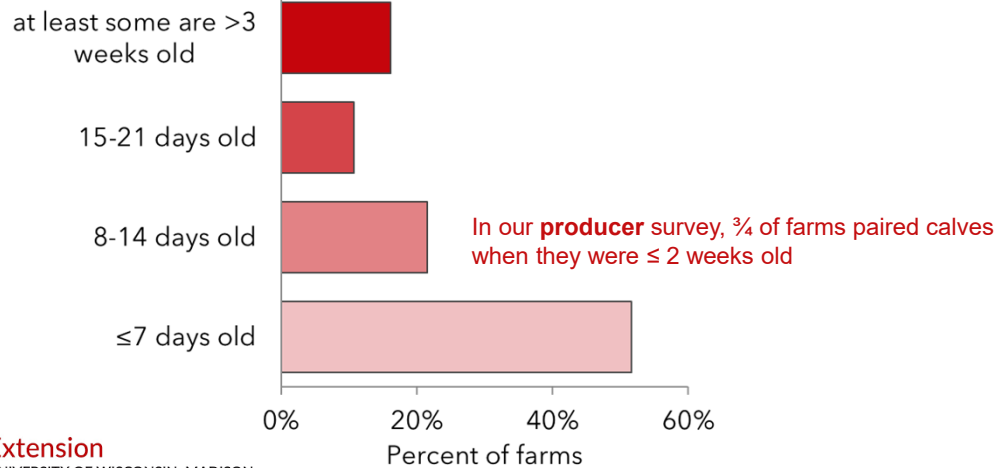
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Silva, Van Os, Winder et al. (in preparation)



## What is the best age to pair or group calves?

### Age when calves enter pairs or groups



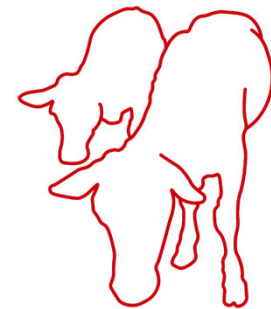
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Mincu, Silva, Van Os, et al. (in preparation)



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## Two heads are better than one: A starter guide to pairing dairy calves



### Topics

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2. **Benchmarks for calf health before pair housing**
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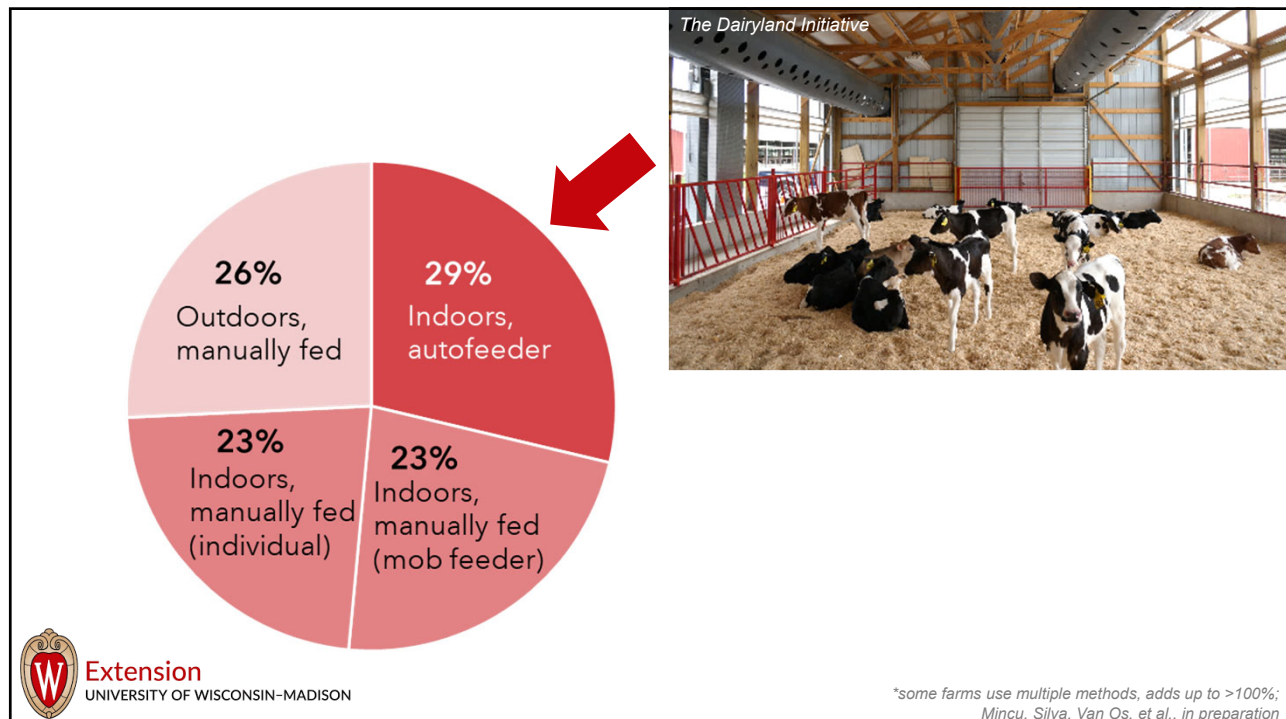
## Potential challenges of pair/group raising

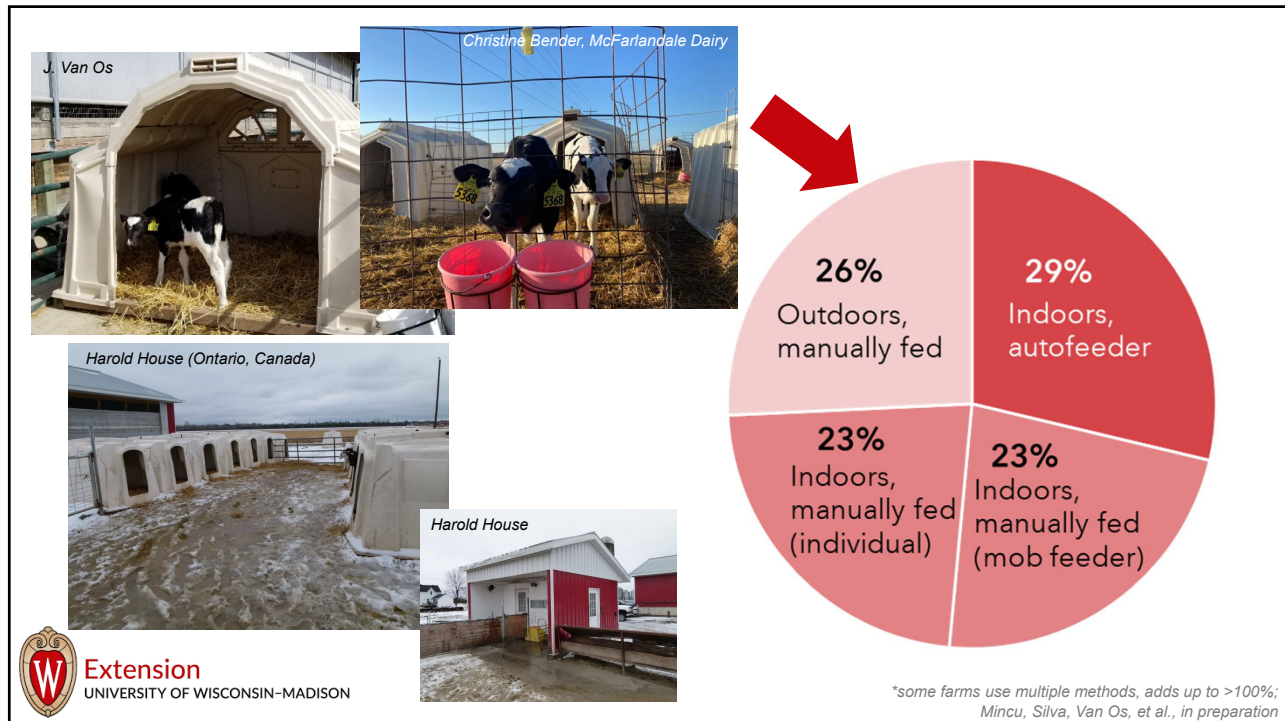
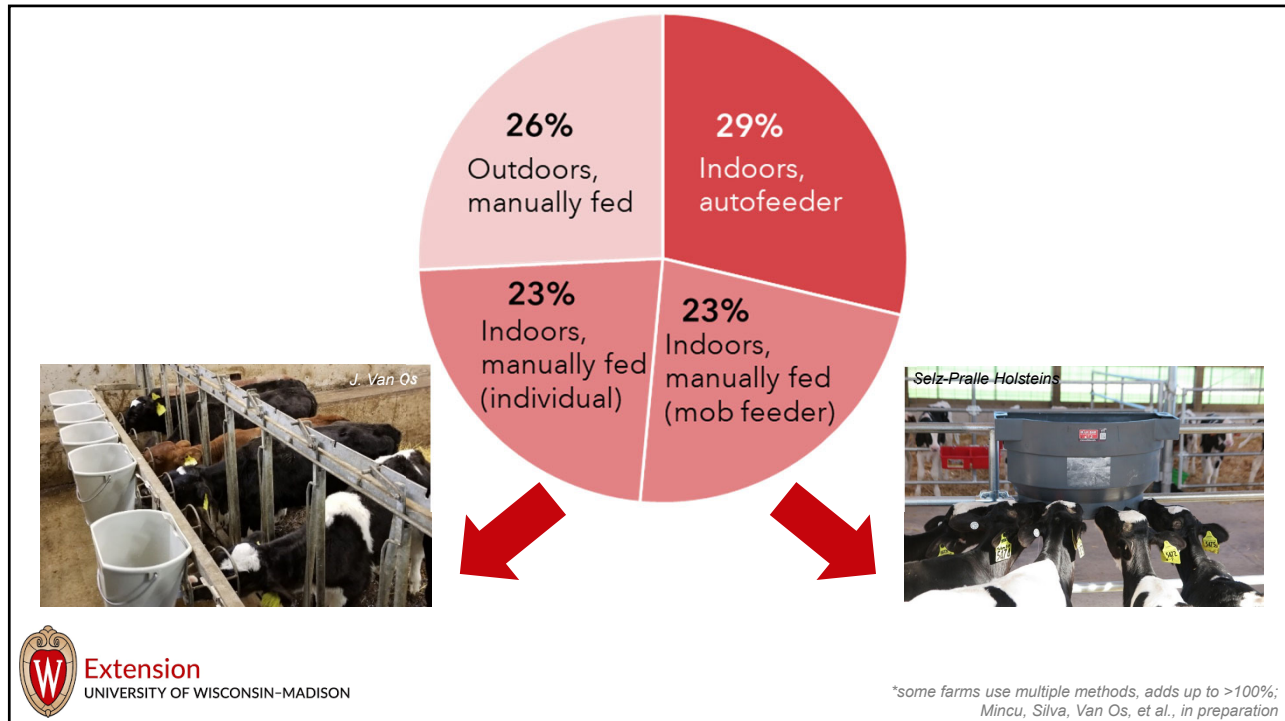
### 2) Proper housing facilities?

One reason given for keeping calves individually is a lack of housing facilities for groups

- Should a farm adapt their existing calf housing?
- Assuming finances allow, is there space for new housing?
- Would a proposed social housing strategy require a radical shift from existing management?

*Medrano-Galarza et al., 2017. J. Dairy Sci. 100:6872-6884*





*Kim Reuscher (Texas)*

*Photo of Arizona calves: Chris Gorder, Strauss Feeds*

Method	Percentage
Indoors, autofeeder	29%
Outdoors, manually fed	26%
Indoors, manually fed (individual)	23%
Indoors, manually fed (mob feeder)	23%

*\*some farms use multiple methods, adds up to >100%; Mincu, Silva, Van Os, et al., in preparation*

**Extension**  
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## Manufacturers are offering housing options

**Buddy Hutch Calf-Rearing System**

The Buddy Hutch Calf Rearing System has a removable center panel and a multi-position weather cover for added protection.

**Group Hutch**

Group Hutches are designed to ease the transition from individual to group housing, and to make it easier for the farm crew to provide the best care.

**COMFY CALF Suites**

Comfort for You and Your Calves

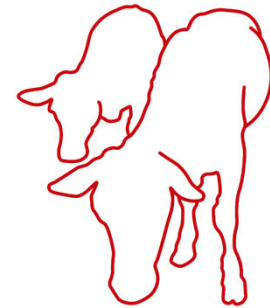
**Social Calf Housing**





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## Potential challenges of pair/group raising

### 3) How to manage unwanted behaviors (e.g., cross sucking)

In our survey, at least “occasional”  
cross sucking reported by:

- 85% of producers using pair or group housing
- 70% of producers using individual housing with fence-line contact



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*Mincu, Silva, Van Os et al. (in preparation)*

## How much of a problem is cross sucking?

- Cross sucking in pre-weaned groups not consistently associated with navel infections
- Cross sucking persisting after weaning not consistently associated with mastitis or higher SCC in the first lactation

However, producers express concern and want to minimize the occurrence of this behavior

Vaughan et al., 2016; Größbacher et al., 2018

## Feeding strategies to reduce cross sucking

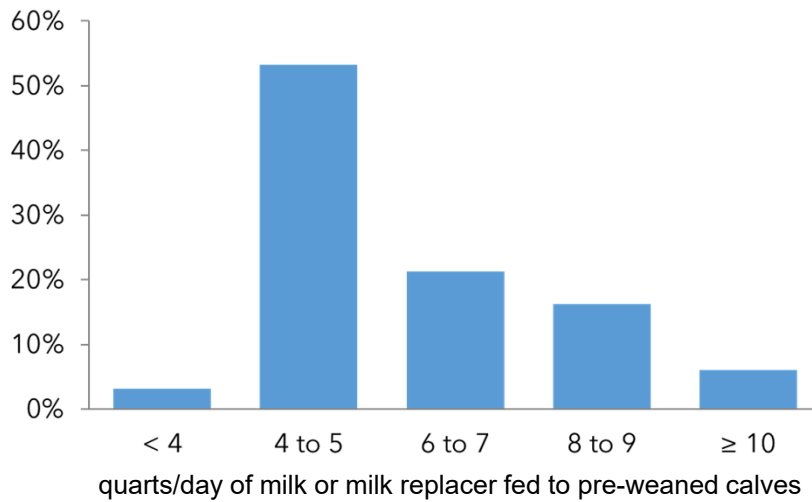
### 1. Reduce hunger:

- ✓ Feed a generous milk volume (i.e., 8 to 10 quarts/day, 7.6 to 9.5 liters/day, *or more*)
- ✓ Step-down weaning, ideally based on starter intake

### 2. Provide enough opportunity to suckle appropriately

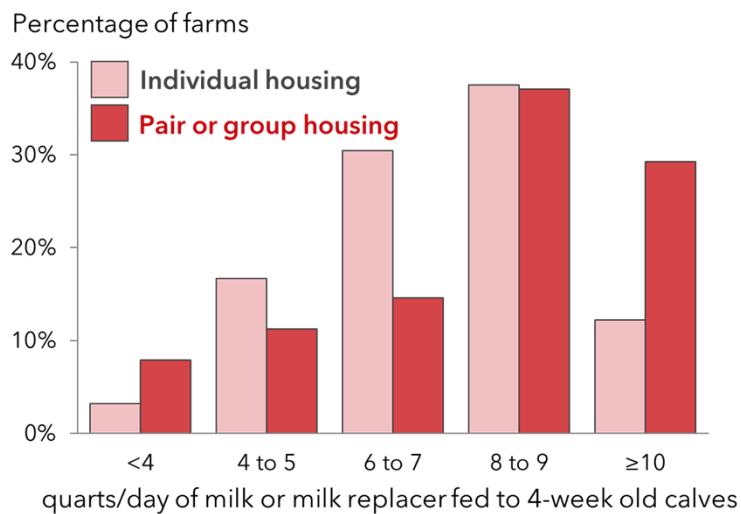
Hammel et al. (1998); de Passillé (2001, 2010); Jung & Lidfors (2001); Keil & Langhans (2001); Loberg & Lidfors (2001); Lidfors & Isberg (2003); Veissier et al. (2002); Jensen & Budde (2006)

USDA: half of farms feed  $\leq 5$  quarts (4.7 L) per day, and only 22% feed  $\geq 8$  quarts (7.6 L)



United States Department of Agriculture, 2016

In our survey, most farms fed  $\geq 8$  quarts (7.6 L) per day



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Mincu, Silva, Van Os, et al. (in preparation)



# Feeding strategies to reduce cross sucking

1. Reduce hunger
2. Provide enough opportunity to suckle appropriately

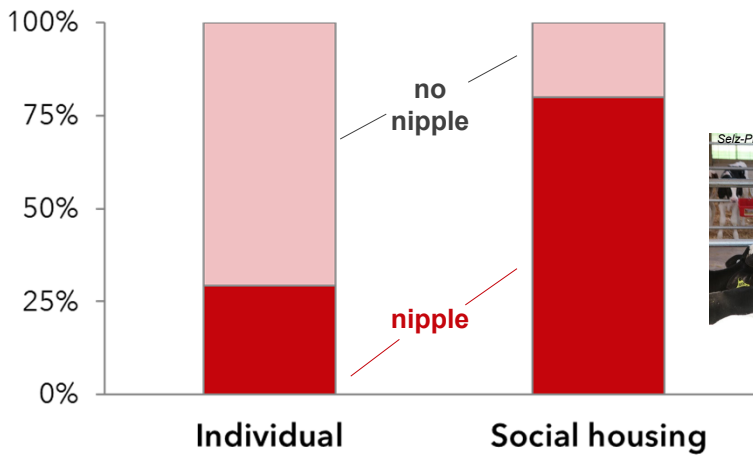
Braden® bottle



Slow-flow teat bucket (Milk Bar®)

Hammel et al. (1998); de Passillé (2001, 2010); Jung & Lidfors (2001); Keil & Langhans (2001); Loberg & Lidfors (2001); Lidfors & Isberg (2003); Veissier et al. (2002); Jensen & Budde (2006); Salter, Reuscher, Van Os (2021); <https://doi.org/10.3168/jds.2020-19380>

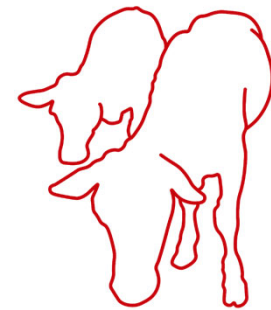
In our survey, 80% of farms using social housing fed milk through a nipple instead of a bucket or trough





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## Two heads are better than one: A starter guide to pairing dairy calves



### Topics

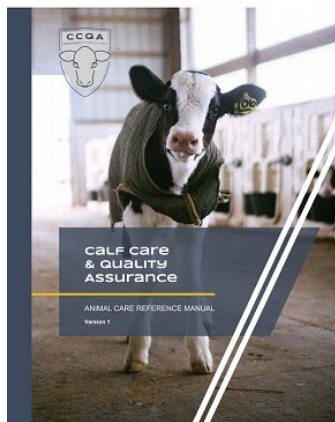
1. Why all the fuss about pair housing?
2. Benchmarks for calf health before pair housing
3. Hygiene practices
4. Options for housing pairs or groups
5. Grouping strategies
- 6. Feeding practices and reducing cross sucking**
7. Disbudding and dehorning considerations



[https://animalwelfare.cals.wisc.edu/calf\\_pairing/](https://animalwelfare.cals.wisc.edu/calf_pairing/)

*Created by Jennifer Van Os with contributions from Sarah Adcock, Joao Costa, Courtney Halbach, Tina Kohlman, Emily Miller-Cushon, Theresa Ollivett, Donald Sockett, and Sandra Stuttgart*

## CCQA: Social contact is recommended



<https://www.calfcareqa.org/>

### 4.4 SOCIAL CONTACT

#### What is it and Why is it Important?

Cattle are a social species that have a strong urge to live within herds. When calves are separated, there are some detrimental effects that can occur on their development including isolated calves being more fearful and less dominant when mixed into groups later in life. In addition, individually housed calves have a harder time coping with changes in housing and diet and may have cognitive and developmental disadvantages, including poor learning skills and deficient social skills. Collectively this evidence suggests that social contact with peers from an early age is important for the calf.

Beyond these behavioral impacts of social housing, there are some benefits to having socially reared calves including increased body weight gain and increased feed intake. There are some concerns surrounding cross-sucking, aggression, and transmission of disease. However, there are multiple methods to address these challenges, including employing a gradual weaning program, feeding a high plane of milk nutrition, providing appropriate outlets for suckling behavior, using lower stocking density and group sizes, maintaining a stable group of calves, as well as cleaning pens and allowing downtime between subsequent groups.

#### What Can You Do?

To minimize the effects of social isolation, calves from the same source facilities could be grouped together early in life. Providing visual and/or physical contact with other cattle has been shown to be beneficial to calves. To see the full benefits of social contact, calves need to be housed where they have physical contact with each other. Pair housing, where calves are grouped with one other calf, may be a good compromise between group housing and individual housing in terms of calf welfare and management. It allows producers to incorporate the benefits of social contact while maintaining the intensive management of animals and limit of disease transmission that occurs with individual housing.

Pair housing... may be a good compromise between group housing and individual housing in terms of calf welfare and farm management.

## FARM Animal Care program



- Pair/group housing will not become an expectation in version 5.0 (effective July 2024)
- Manual will discuss recommended best practice, as in CCQA

<https://nationaldairyfarm.com/dairy-farm-standards/animal-care/>

## Outline

### 1. Lecture:

- Review status of U.S. industry
- Benefits of pair or group housing of calves
- Common challenges and potential solutions



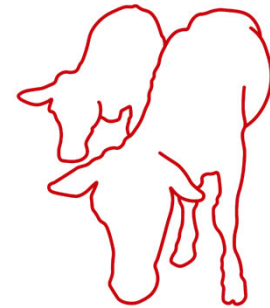
### 2. Interactive examples:

- **Are these farms ready to move to pair or group housing?**
- Housing and management decisions to support a successful transition to pairs or groups



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## Two heads are better than one: A starter guide to pairing dairy calves



### Topics

1. Why all the fuss about pair housing?
2. **Benchmarks for calf health before pair housing**
3. Hygiene practices
4. Options for housing pairs or groups
5. Grouping strategies
6. Feeding practices and reducing cross sucking
7. Disbudding and dehorning considerations



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## Benchmark #1: pre-weaned calf mortality rate

- DCHA Gold Standards: < 3% mortality
- Exclude still births (between birth to 24 hours after birth)

$$\frac{\text{calves dying between 24 hours to 60 days of age}}{\text{calves born per year} - \text{still births}}$$

Dairy Calf and Heifer Association, 2016; Urie et al., 2018. J. Dairy Sci. 101:9229-9244.

## Benchmark #2: transfer of passive immunity

Category	IgG (g/L)	STP (g/dL)	Serum Brix (%)	Calves (%)
Excellent	≥25.0	≥6.2	≥9.4	>40
Good	18.0-24.9	5.8-6.1	8.9-9.3	~30
Fair	10.0-17.9	5.1-5.7	8.1-8.8	~20
Poor	<10.0	<5.1	<8.1	<10

*Godden et al., 2019. Vet. Clin. Food Anim. 35:535-556; Lombard et al., 2020. J. Dairy Sci. 103:7611-7624.*

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Poor	<10.0	<5.1	<8.1	<10

Ideally, < 5% of calves should be considered to have “poor” transfer

*Godden et al., 2019. Vet. Clin. Food Anim. 35:535-556; Lombard et al., 2020. J. Dairy Sci. 103:7611-7624.*

## Outline

### 1. Lecture:

- Benefits of pair or group housing of calves
- Common challenges and potential solutions



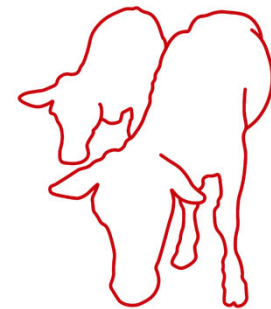
### 2. Interactive examples:

- Are these farms ready to move to pair or group housing?
- **Housing and management decisions to support a successful transition to pairs or groups**



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## Two heads are better than one: A starter guide to pairing dairy calves



### Topics

- |   |   |
|---|---|
| 1. Why all the fuss about pair housing?           | <b>5. Grouping strategies</b>                   |
| 2. Benchmarks for calf health before pair housing | 6. Feeding practices and reducing cross sucking |
| 3. Hygiene practices                              | 7. Disbudding and dehorning considerations      |
| <b>4. Options for housing pairs or groups</b>     |   |



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## What is the optimal group size?

**Goal when selecting group size:** minimize disease, competition

- Consider achievable age range based on calving rate

**Reminder – targets for age range within groups:**

- No more than 14 days age difference between oldest and youngest calf in a pair or group
- *Ideally*, no more than 7 days age difference

## How much space does each calf need?

- Expert recommendations vary for usable dry, bedded resting space:

Square feet per calf	Meters squared per calf
≥ 30	≥ 2.8
≥ 35	≥ 3.3
≥ 40	≥ 3.7

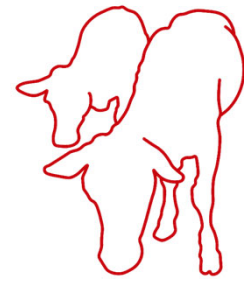
- With outdoor housing, consider rain, snow, or hot sun exposure





## Conclusions

- Social housing of calves can result in numerous benefits
- Many farms successfully raise healthy calves in pairs or groups
- Some farms may need to adjust housing and management to successfully transition to social housing



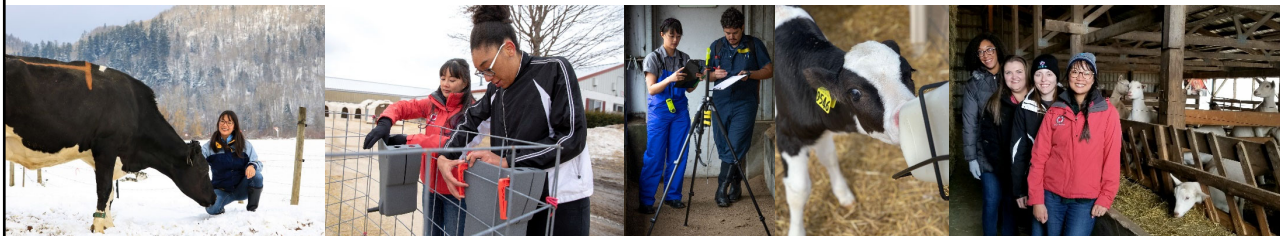
**Jennifer Van Os**

[jvanos@wisc.edu](mailto:jvanos@wisc.edu)

[www.DairyAnimalWelfare.org](http://www.DairyAnimalWelfare.org)



**Department of  
Animal & Dairy Sciences**  
UNIVERSITY OF WISCONSIN-MADISON



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