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

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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/
Typical dairy cattle social grouping by life stage

- **pre-weaned calf**
- **weaned, growing heifer**
- **adult cow (dry or lactating)**

Housed individually → Housed in groups

Icons from the Noun Project

"The calf hutch was developed out of necessity"

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 Larson and UW Agricultural engineers. Today, Hompel Corporation in Germantown makes/pictures 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.
Individual housing remains the norm in the U.S.

77% of surveyed farms use individual housing only

- Groups of >8 calves: 37 farms (9%)
- Groups of 2-8 calves: 58 farms (14%)
- Individual only – outdoors: 105 farms (25%)
- Individual only – indoors: 39 farms (9%)
- Individual only – indoors/outdoors: 174 farms (42%)

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

- Individual housing only: 318 farms (77.0%)
- Some tactile contact: 91 farms (23.0%)
- Some visual contact: 206 farms (64.8%)
- No visual contact: 21 farms (6.6%)

FARM Animal Care program

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

Social contact is recommended

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 sucking 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 limited rate 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

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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)

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Many producers are interested in social rearing

- 23.0% Some social housing
- 77.0% Individual housing only

36% of those who currently house calves only individually want to learn more from UW-Madison Extension about social rearing of calves

-Mincu, Silva, Van Os et al. (in preparation)
What’s on the horizon?

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

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

- 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

- Play behavior
- Social development

Benefits of social rearing

✓ 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

Positive
approach –
milk reward

Negative
do not approach –
time-out punishment

Phase 1: Initial Discrimination

Correct no-go response

Social Housing

Individual Housing

Discrimination learning

Number of sessions
Cognitive testing

Phase 1: Initial Discrimination

Positive
approach –
milk reward

Negative
do not approach –
time-out punishment

Phase 2: Reversal

Positive
approach –
milk reward

Negative
do not approach –
time-out punishment

Reversal learning

Correct no-go response

Number of sessions

What type of social contact is needed?

Calves paired early or kept in complex social groups did best on the cognitive test.
Benefits of social rearing

- Greater solid feed intake
- Greater weight gains, ADG

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). Icons from the Noun Project

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

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). Icons from the Noun Project
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). 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

<table>
<thead>
<tr>
<th></th>
<th>individual</th>
<th>pair</th>
<th>group</th>
</tr>
</thead>
<tbody>
<tr>
<td>approve</td>
<td>31.5%</td>
<td>66.0%</td>
<td>75.8%</td>
</tr>
<tr>
<td>neutral</td>
<td>21.5%</td>
<td>19.9%</td>
<td>16.8%</td>
</tr>
<tr>
<td>disapprove</td>
<td>47.0%</td>
<td>14.1%</td>
<td>7.4%</td>
</tr>
</tbody>
</table>

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

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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

<table>
<thead>
<tr>
<th>Indicator</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
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<tbody>
<tr>
<td>Treatment incidence</td>
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</tr>
<tr>
<td>Worse clinical scores</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recorded disease</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lung consolidation</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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

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

<table>
<thead>
<tr>
<th>Condition</th>
<th>Pair housed</th>
<th>Individually housed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infected inner ear</td>
<td>1 out of 32</td>
<td>0</td>
</tr>
<tr>
<td>Cryptosporidiosis</td>
<td>0</td>
<td>1 out of 16</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2 out of 32</td>
<td>2 out of 16</td>
</tr>
</tbody>
</table>
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


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)

Silva, Van Os, Winder et al. (in preparation)
What should the age range be within groups?

In our survey, ¾ of farms had age differences of ≤ 2 weeks.

What is the best age to pair or group calves?

In our veterinarian survey, >2/3 prefer pairing calves when they are ≤ 2 weeks old.
What is the best age to pair or group calves?

Age when calves enter pairs or groups

- at least some are >3 weeks old
- 15-21 days old
- 8-14 days old
- ≤7 days old

In our producer survey, ¾ of farms paired calves when they were ≤ 2 weeks old

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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 Sackett, and Sandra Stuttgen
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
*some farms use multiple methods, adds up to >100%; Mincu, Silva, Van Os, et al., in preparation
Manufacturers are offering housing options

- Buddy Hutch Calf-Rearing System
- Group Hutch

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

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.

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
USDA: half of farms feed ≤ 5 quarts (4.7 L) per day, and only 22% feed ≥ 8 quarts (7.6 L)

In our survey, most farms fed ≥ 8 quarts (7.6 L) per day

Percentage of farms

Individual housing
Pair or group housing

quarts/day of milk or milk replacer fed to 4-week old calves
Feeding strategies to reduce cross sucking

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

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

Minnou, Silva, Van Os, et al. (in preparation)
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CCQA: Social contact is recommended

4.4 Social Contact

What is it and Why is it Important?
Calf care is a vital aspect in ensuring the health and well-being of dairy calves. Social contact is recommended as it helps in developing strong bonds between calves and their caretakers. It is essential for the overall health and performance of the herd.

What Can You Do?
To enhance the social contact, calves can be paired with other calves or given opportunities to interact with adults. This can be done by providing access to play pens or group housing areas. Social enrichment activities like providing toys, such as ropes or chewing objects, can also be beneficial.

https://www.calfcareqa.org/
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

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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)

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

### Benchmark #2: transfer of passive immunity

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

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

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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:

<table>
<thead>
<tr>
<th>Square feet per calf</th>
<th>Meters squared per calf</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 30</td>
<td>≥ 2.8</td>
</tr>
<tr>
<td>≥ 35</td>
<td>≥ 3.3</td>
</tr>
<tr>
<td>≥ 40</td>
<td>≥ 3.7</td>
</tr>
</tbody>
</table>

- 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