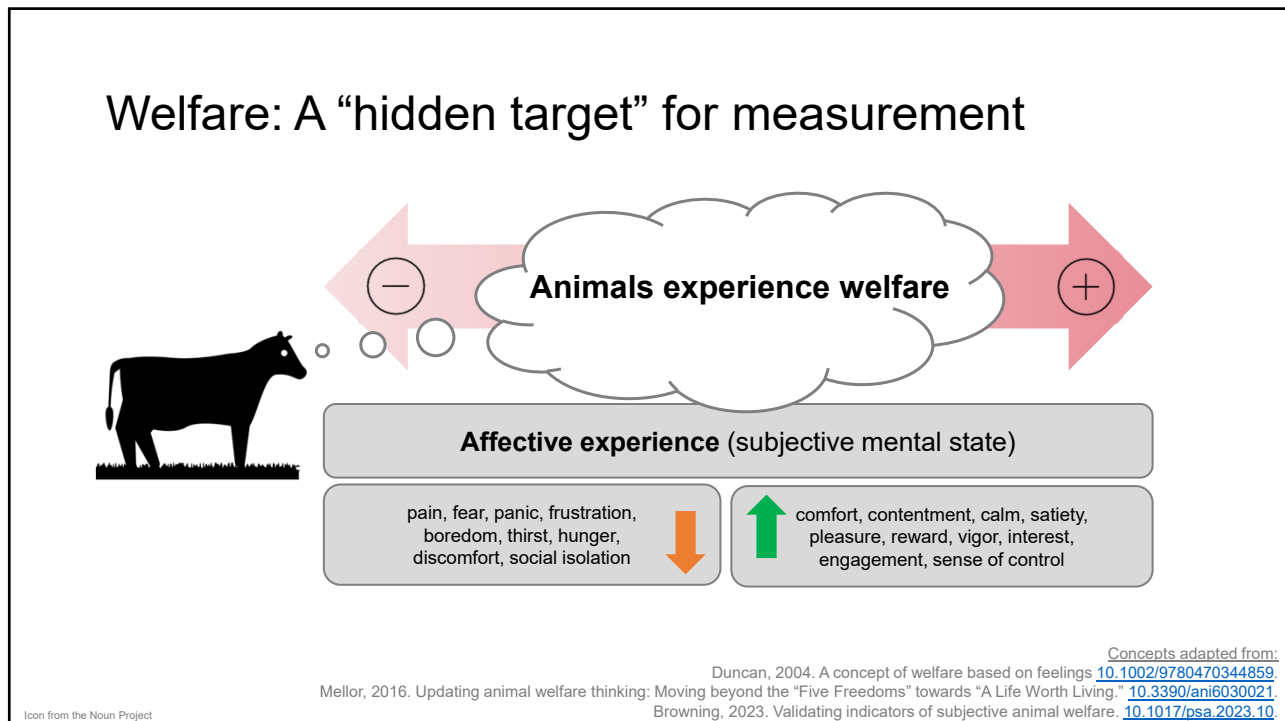
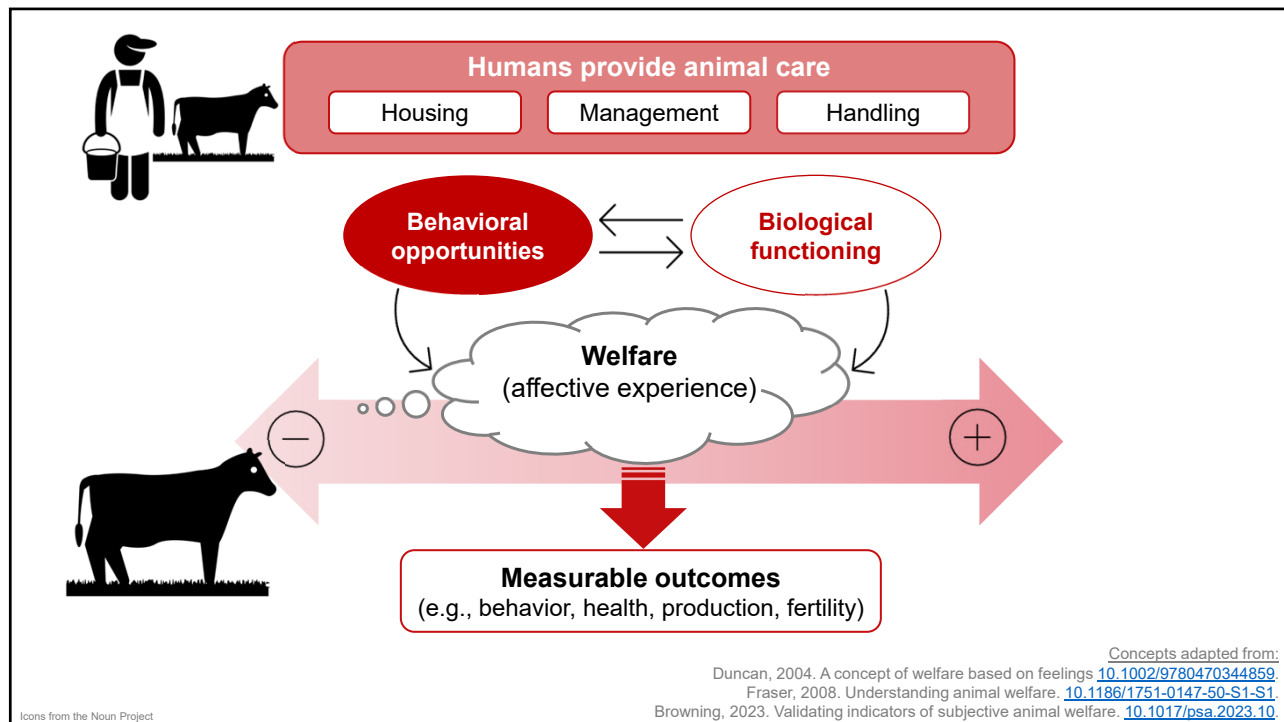




1



2

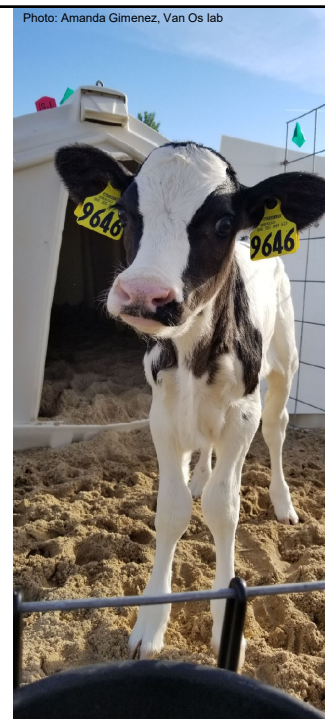


3

Why is individual housing the norm?

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

*Note: individual housing with fence-line contact does not prevent these concerns!



4

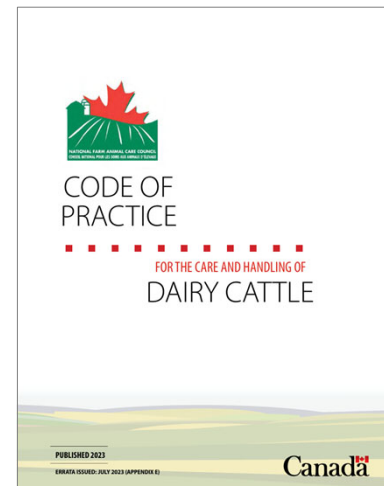
Global trends suggest a shift

The norm for raising calves is moving away from individual housing

UK farms using social housing:¹

- 2010 = 40%
- 2021 = 62%

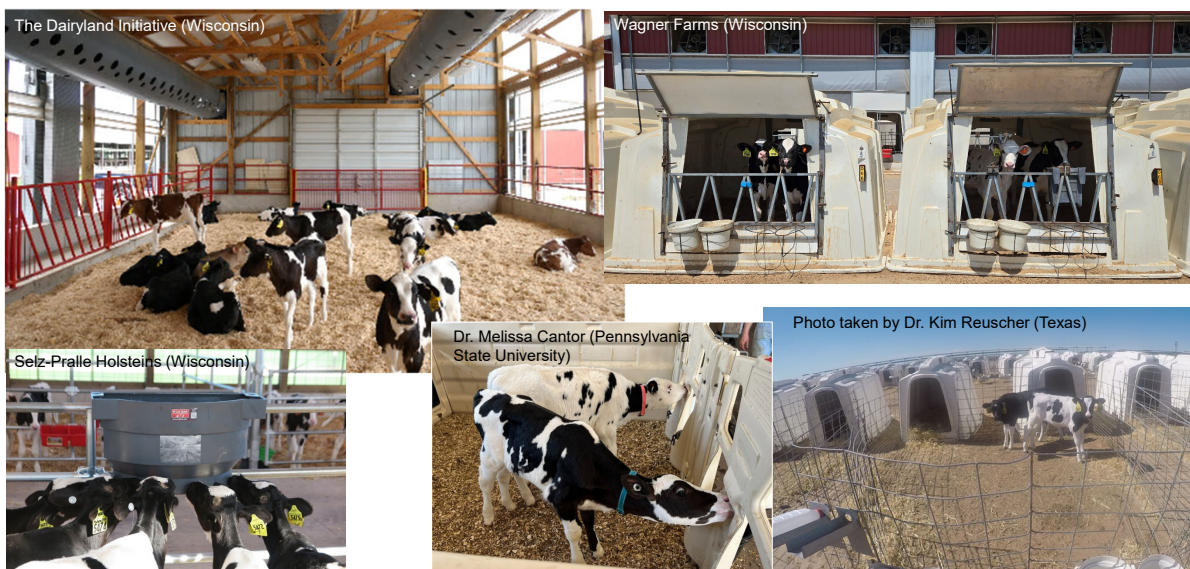
Canada: effective in 2031, indoor-housed calves must be paired or grouped by 4 weeks old ²



¹Mahendran et al., 2022. [10.3168/jds.2021-206338](https://doi.org/10.3168/jds.2021-206338)
²<https://www.nfacc.ca/codes-of-practice/dairy-cattle>

5

What do we mean by social housing?



6

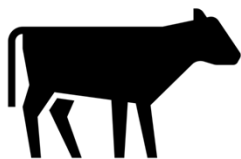
Why should a farmer pair or group house?

Because:

1. There are numerous research-backed benefits.

7

What are the benefits of social housing?



benefits for the calves



Dr. Melissa Cantor, Penn State U



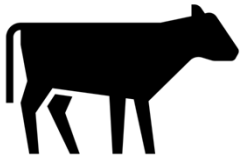
Dr. Emily Miller-Cushon, U FL

- ✓ 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

8

What are the benefits of social housing?



benefits for the calves

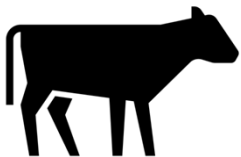
- ✓ Play behavior
- ✓ Social development



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

9

What are the benefits of social housing?



benefits for the calves

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

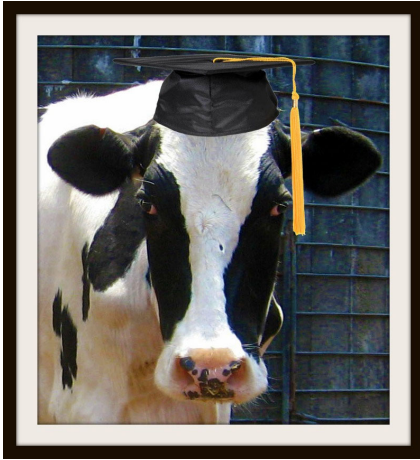


Dr. Melissa Cantor, Penn State

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

10

Why does learning ability matter?



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

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

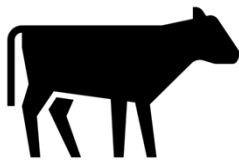
Photo: <http://udderside.blogspot.com/2012/05/graduating-to-milking-herd.html>

11

Icons from the Noun Project

What are the benefits of social housing?

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



benefits for the calves



benefits for the farm business

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).

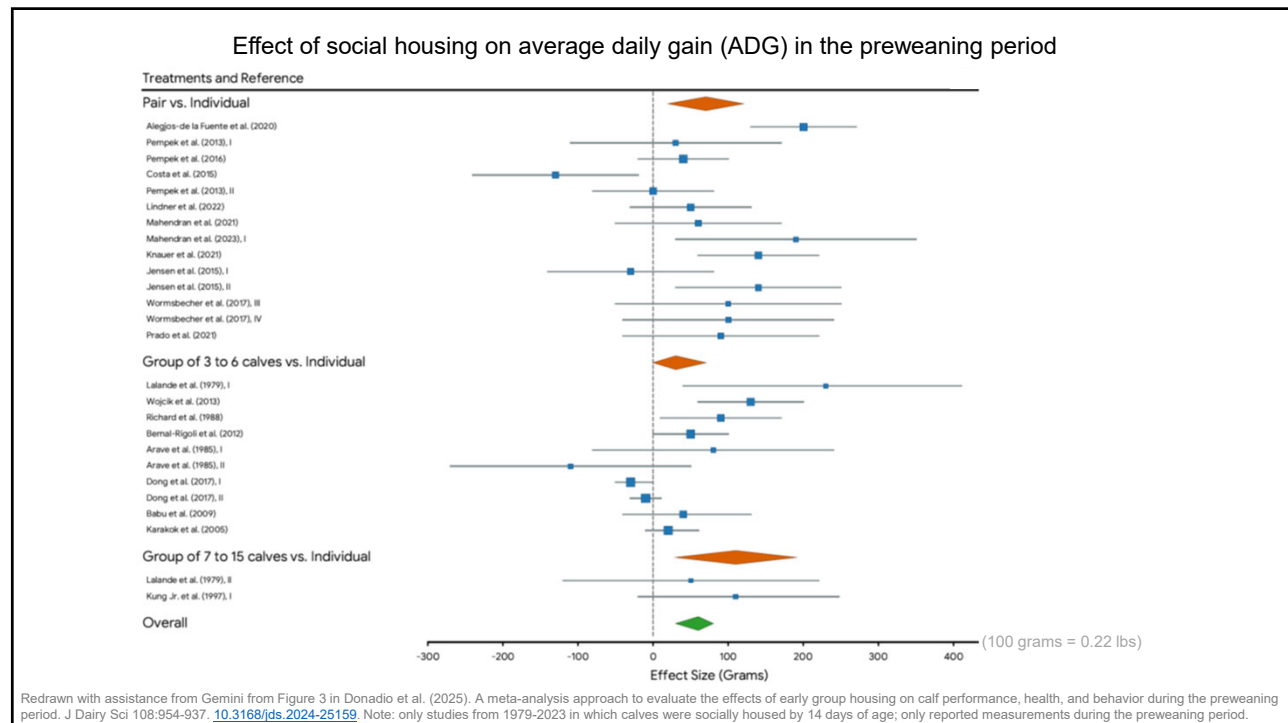
12

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

DMI of solid feed	 14	 7	 0
Avg. daily gain	 7	 17	 0
Bodyweight	 8	 8	 0

Adapted from Table 2 in invited review by Costa et al., 2016. [10.3168/jds.2015-10144](https://doi.org/10.3168/jds.2015-10144) and Table 2 in scoping review by Plaughner & Cantor, 2025. [10.3389/fvets.2025.1568164](https://doi.org/10.3389/fvets.2025.1568164).

13



14

Recent evidence that performance advantages persist for previously pair-housed calves:

↑ BW at 12 months ¹ and 18-20 months old ²

↑ 1st lactation milk yield ^{3, 4}, either explained by ⁴
or enhanced by ↓ culling ³

¹ Lindner et al., 2025. [10.3168/jds.2024-25946](https://doi.org/10.3168/jds.2024-25946)

² Riesgraf, Van Os et al., 2024. [10.3390/ani14050716](https://doi.org/10.3390/ani14050716)

³ Lindner et al., 2026. [10.3168/jds.2026-28491](https://doi.org/10.3168/jds.2026-28491)

⁴ Tendencies reported in Mahendran et al., 2024. [10.3390/ani14010125](https://doi.org/10.3390/ani14010125)

+ Numerically (not statistically significant) ↑ BW at 16 wk old: Knauer et al., 2021. [10.3168/jds.2020-18928](https://doi.org/10.3168/jds.2020-18928)

15

What are the benefits of social housing?

Protection from cold stress

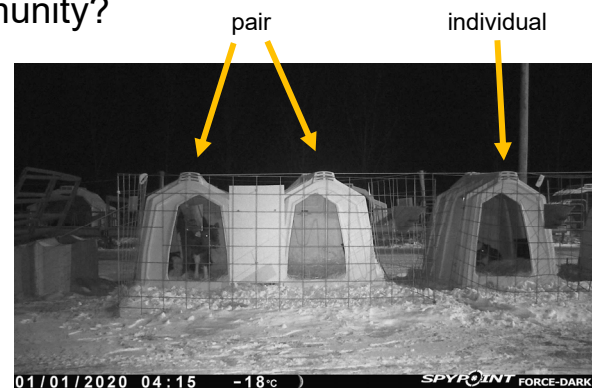
→ more energy for growth and immunity?



benefits for the calves



benefits for the farm business



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

16

What are the benefits of social housing?



preferred by the public
(consumers, voters)



benefits for the farm business

✓ Greater public acceptance

Perttu et al. (2020); but not Sirovica et al. (2022).

17

Adapted from: Perttu et al., 2020. J. Dairy Sci. 103:8507-8517.



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%

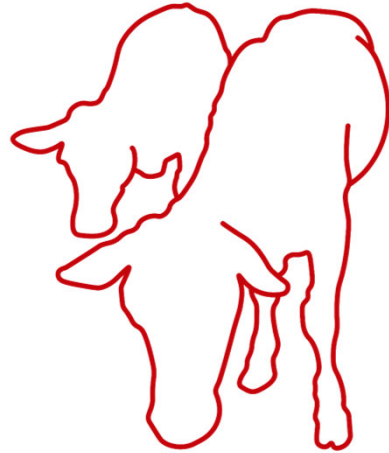
14.1%

7.4%

18

Research-based benefits of pairing / grouping calves:

- ↑ solid feed intake
- ↑ weight gains
- ↑ resilience to weaning stress
- ↑ protection from cold stress
- ↑ play behavior
- ↑ social development
- ↑ flexibility and adaptability
- ↑ public acceptance



19

Why should a farmer pair or group house?

Because:

1. There are numerous research-backed benefits.
2. Their farm is ready (benchmarks, infrastructure, logistics, management).

20

Potential challenges of social housing

1) How to raise healthy calves?

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

Lindner, Van Os et al. (in preparation)

21

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.

22

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.

23

Multiple factors contribute to calf morbidity

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

- ✓ maternity pen management
- ✓ colostrum management
- ✓ Nutrition
- ✓ preventive care and monitoring
- ✓ hygiene, sanitation, biosecurity
- ✓ ventilation
- ✓ space allowance, bedding
- ✓ all-in / all-out moves

Other, more recent innovations are available!



24

When comparing pairs or triples vs. individual housing, health outcomes are similar

BRD	 0	 5	 1
Diarrhea	 1	 6	 1

Adapted from Table 1 in scoping review of studies since 2016 by Plaughner & Cantor, 2025. [10.3389/fvets.2025.1568164](https://doi.org/10.3389/fvets.2025.1568164).

25

Larger group housing is more complex

When compared with individual housing, impact of group housing on calf health is mixed. **Larger group size (15+) is a risk factor.**

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

Adapted from Ollivett, 2020. Vet. Clin. Food Anim. 36:385-398.
See also review by Miller-Cushon & Jensen (2025; [10.3168/jds.2024-25468](https://doi.org/10.3168/jds.2024-25468)).

26

What is the optimal group size?

Goal when selecting group size: minimize disease & competition.

↑ age gap → ↑ competition ¹⁻²

- No more than 2 weeks age difference between oldest and youngest calf in a pair or group
- Ideally, no more than 1 week age difference
 - (Preferred by 80% of veterinarians) ³

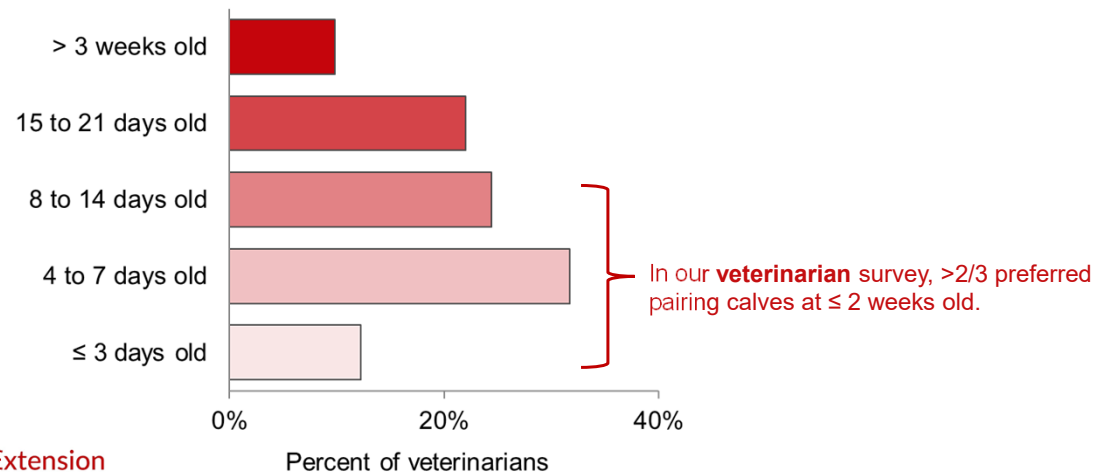
Consider achievable age range based on calving rate

^{1,2}Jensen et al. (2013, 2015).
³ Lindner, Van Os et al. (in preparation).
 See review by Miller-Cushon & Jensen (2025; [10.3168/jds.2024-25468](https://doi.org/10.3168/jds.2024-25468)).

27

What is the best age to pair or group calves?

Age when calves enter pairs or groups



Data from Lindner, Van Os et al. (in preparation).
 Earlier pairing → more homogeneous weaning BW: Moroz et al. (2025; [10.3168/jds.2024-25686](https://doi.org/10.3168/jds.2024-25686)).

28

Potential challenges of social housing

2) How to manage unwanted behaviors (e.g., cross sucking / inter-sucking)

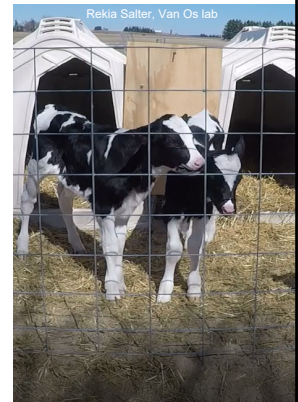
In our survey, at least “occasional”
cross sucking reported by:

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



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Lindner, Van Os et al. (in preparation)



29

Feeding strategies to reduce cross sucking

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



30

Feeding strategies to reduce cross sucking

1. Reduce hunger:

- ✓ Feed a generous milk volume
(~8 to 10 quarts or liters per day, *or more*)
- ✓ Step-down weaning, ideally based on starter intake

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). Scoping review by Plaughner & Cantor (2025) suggests feeding at least 7 L/day.

31

Feeding strategies to reduce cross sucking

1. Reduce hunger
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); Salter, Reuscher, Van Os (2021; <https://doi.org/10.3168/jds.2020-19380>). See also scoping review by Plaughner & Cantor (2025).

32



educ
to suck

Rekia Salter

Photo: Sky Sheng

Bottles

Seiz-Pralle Holsteins

Mob feeders (slow-flow)

Nipple buckets (slow-flow)

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>). See also scoping review by Plaughter & Cantor (2025).

33



educ
to suck

Rekia Salter

Photo: Sky Sheng

Bottles

Seiz-Pralle Holsteins

Mob feeders (slow-flow)

Nipple buckets (slow-flow)

Calves still need access to nipples for 20 minutes after finishing milk

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>). See also scoping review by Plaughter & Cantor (2025).

34

How much of a problem is cross-sucking?

- 1 study did not find any association between cross-sucking in pre-weaned groups and navel infections.¹
- 1 study did not find any association between cross-sucking persisting after weaning and mastitis or higher SCC in the first lactation.²
- 1 study found greater odds of udder health issues in first lactation after pair housing, while 1 study found no differences; neither quantified the amount of cross-sucking / inter-sucking behavior.^{3, 4}
 - No significant difference in blind quarters: individual vs. pair = 4.1% vs. 6.6%³; individual vs. pair vs. group = 2.1% vs. 9.6% vs. 6.0%⁴.

Farmers want to stop this behavior and its potential negative consequences. Some express concern, affecting willingness to consider social housing.

¹ Größbacher et al., 2018. [10.1016/j.applanim.2018.05.030](https://doi.org/10.1016/j.applanim.2018.05.030).

² Vaughan et al., 2016. [10.3168/jds.2015-9504](https://doi.org/10.3168/jds.2015-9504).

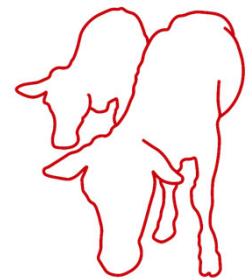
³ Mahendran et al., 2024. [10.3390/ani14010125](https://doi.org/10.3390/ani14010125).

⁴ Lindner et al., 2026. [10.3168/jds.2026-28491](https://doi.org/10.3168/jds.2026-28491).

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Better together: Social housing can work

- ✓ Social housing of calves can result in numerous benefits.
- ✓ There can be challenges, but there are also strategies to address them.
- ✓ There are many examples of farms doing social housing successfully.



36

Why should a farmer pair or group house?

Because:

1. There are numerous research-backed benefits.
2. Their farm is ready (benchmarks, infrastructure, logistics, management).
3. **They want to.**

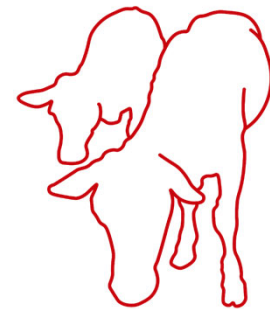
Koralesky et al., 2025. Social housing for dairy calves: Farmer acceptance of Canadian industry-led requirements. [10.3168/jds.2025-26881](https://doi.org/10.3168/jds.2025-26881)

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



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

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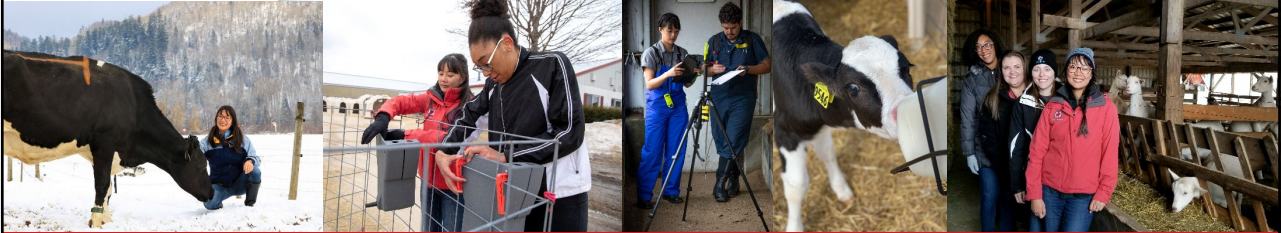
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