

The Welfare of Pair Housed Calves: Is the Best Group a Group of Two?

Whitney Knauer VMD PhD
University of Minnesota
knaue020@umn.edu

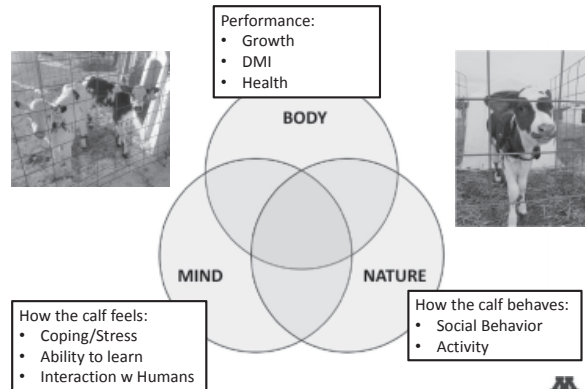
The Welfare of Pair Housed Calves: Is the Best Group a Group of Two?



Whitney Knauer VMD PhD
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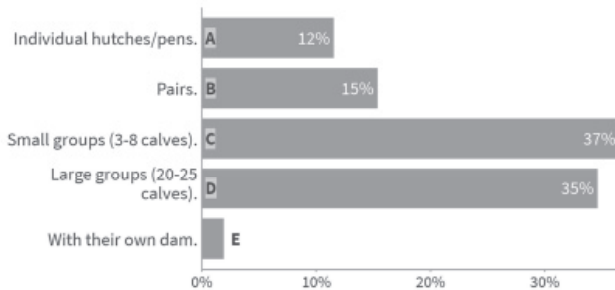
Why pair over individual housing?



From: Understanding Animal Welfare: David Fraser 2008



What will be the most common form of calf housing in the US in 20 years?



(Dairy Cattle Welfare Council Annual Meeting, June 2018)

Performance: ADG and DMI

Table 2. Published research on the effects of social housing on feeding behavior and performance of calves¹

Treatment	Animals	Parameter	Effect of socialization	Reference
Individual: group (3 calves)	Bulls	BW	+	Asanigo et al., 1959
Individual: group (3 calves)	Heifers and bulls	Solid food intake	+	Babu et al., 2001
Individual: group (3 calves)	Heifers and bulls	ADG	+	Babu et al., 2009
Individual: group (3 calves)	Heifers and bulls	Solid food intake	+	Babu et al., 2009
Individual: group (2 or 3 calves) ²	Bulls	DMI	+	Bernal-Riquelme et al., 2012
Individual: group (3 or 4 calves) ³	Bulls	BW	+	Bernal-Riquelme et al., 2012
Individual: pairs	Heifers and bulls	Solid food intake	-	Chan et al., 2002
Individual: pairs	Heifers and bulls	ADG	-	Chan et al., 2002
Individual: pairs	Bulls	Solid food intake	+	Costa et al., 2015a
Individual: pairs	Bulls	ADG	+	Costa et al., 2015a
Individual: pairs	Heifers	Concentrate intake	+	de Paula Vieira et al., 2010
Individual: pairs ⁴	Heifers	ADG	+	Hammann et al., 2005
Individual: group (3 calves) ⁵	Bulls	Solid food intake	+	Hopold et al., 2006
Individual: group (4 calves) ⁶	Bulls	ADG	+	Hopold et al., 2006
Individual: pairs ⁷	Heifers and bulls	Concentrate intake	+	Jensen et al., 2015
Individual: pairs ⁸	Heifers and bulls	BW	+	Jensen et al., 2015
Individual: pairs ⁹	Heifers	Solid food intake	+	Parnick et al., 2013
Individual: pairs ¹⁰	Heifers	ADG	+	Parnick et al., 2013
Individual: group (3 calves)	Heifers	Concentrate intake	+	Phillips, 2004
Individual: group (3 calves)	Heifers	BW gain	+	Phillips, 2004
Individual: group (3 calves)	Heifers and bulls	Final BW	+	Richard et al., 1988
Individual: group (3 calves)	Heifers and bulls	Concentrate intake	+	Richard et al., 1988
Individual: group (3 calves)	Heifers and bulls	Solid food intake	+	Tajiri, 2007
Individual: group (3 calves)	Heifers and bulls	ADG	+	Tajiri, 2007
Individual: group (3 calves)	Bulls	Solid food	+	Toro et al., 2006
Individual: group (3 calves)	Bulls	BW	+	Toro et al., 2006
Individual: group (3 calves)	Heifers and bulls	Solid food intake	+	Warwick et al., 1977
Individual: group (3 calves)	Heifers and bulls	ADG	+	Warwick et al., 1977
Individual: group (3 calves)	Bulls	BW	+	Xiccato et al., 2002
Individual: group (3 calves)	Bulls	ADG	+	Xiccato et al., 2002

(Costa et al., 2016)



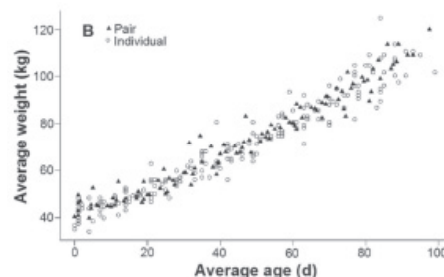
Why pair over group housing?

Individual -> Pair vs. Individual -> Group

- Easier transition for producers
 - No change in milk delivery system
 - Both hutches and pens in barns can be adapted
 - No need for a new building
 - Fewer changes in calf management
 - More acceptable change for producers (?)
- Advantages of social housing without detrimental effects of large groups
 - Health challenges
 - Weaning challenges



Equivocal growth



- Holstein heifer calves
- Paired at 5d in modified hutches
- Fed 10L milk replacer per day via bottle
- Weaned at 60d

(Whalin et al., 2018)



Improved Pre-weaning Growth



- Pair established at birth (n=6 pairs; n=12 individual)
- Pro-Cross and Holstein Heifer calves
- Fed 4L milk replacer twice per day
- Weaned at 50d, followed until 4 months

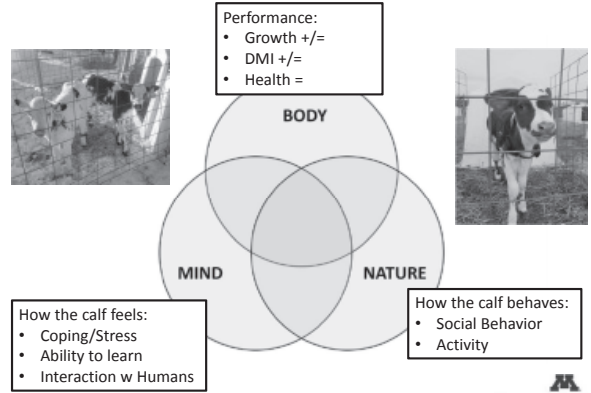
Measure	Individual	Pair	P-Value
Weaning weight (kg)	82.4 (1.5)	89.4 (1.5)	0.04
16w weight (kg)	154.5 (3.4)	162.1 (3.4)	0.12
ADG ¹ (kg/d)	0.81 (0.03)	0.95 (0.03)	0.04
ADG ² (kg/d)	1.16 (0.05)	1.15 (0.05)	0.89
ADG ³ (kg/d)	1.03 (0.03)	1.09 (0.03)	0.22

ADG¹: Birth to weaning
 ADG²: Weaning to 16 weeks
 ADG³: Overall

(Knauer, unpublished data)



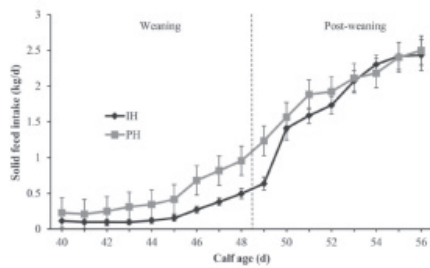
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Increased Starter Intake around Weaning



- Bull calves
- 10 calves per group
- Ad lib MR
- Weaned at 50d at which point all were pair housed

(Overvest et al, 2018)



Social Behavior: how do pair housed calves interact with other calves?



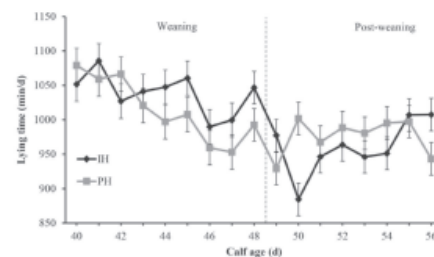
- Lower heart rate when placed in a pen with unfamiliar calves (Jensen et al, 1997)
- More willing to interact with unfamiliar calf (Jensen et al, 2014)
- Less fearful and more willing to approach unfamiliar calves when mixed after weaning (de Paula Vieira et al, 2012)

No difference in pre-weaning calf health

- No difference has been found in calf health outcomes (treatment or health scoring) between calves raised individually vs. in a pair during the pre-weaning period (Jensen and Larsen 2014; Pempek et al, 2016)
- No study has had sufficient sample size to evaluate this appropriately
 - Example: To find a reduction in morbidity from 35% to 28% (20% reduction) would need 700 calves per treatment group
 - Largest study to evaluate health had 22 per group



Activity: Lying behavior around weaning

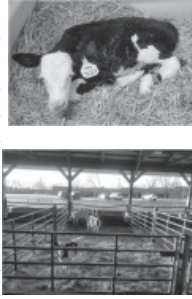
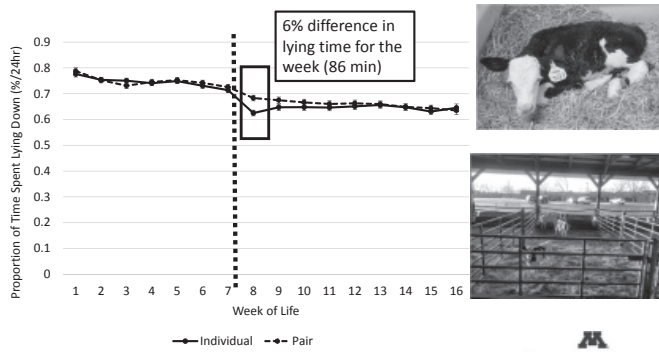


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(Overvest et al, 2018)

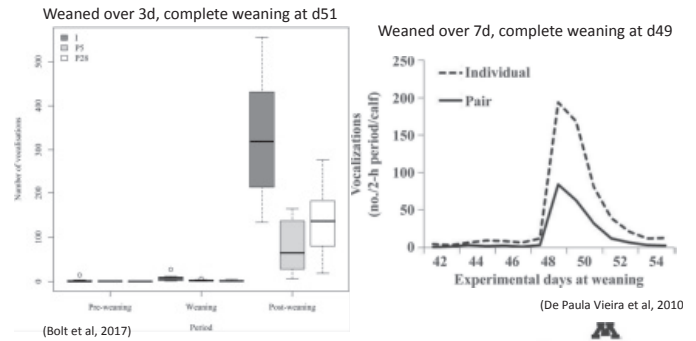


Activity: Lying behavior around weaning

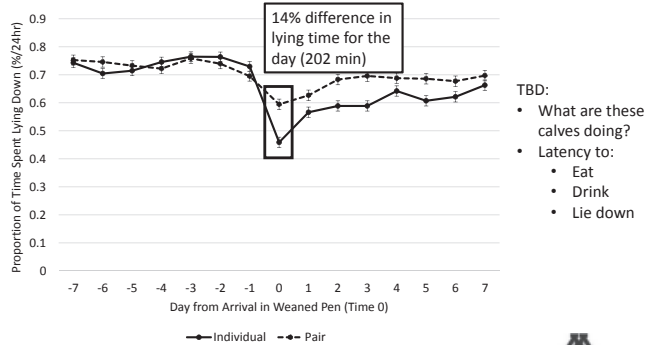


(Knauer, unpublished data)

Pair calves vocalize less at weaning

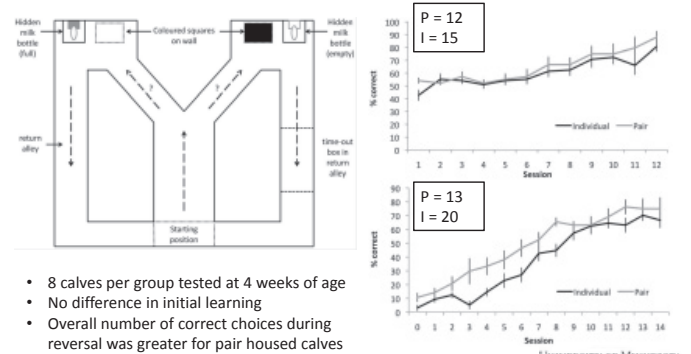


Activity: Lying behavior around weaning



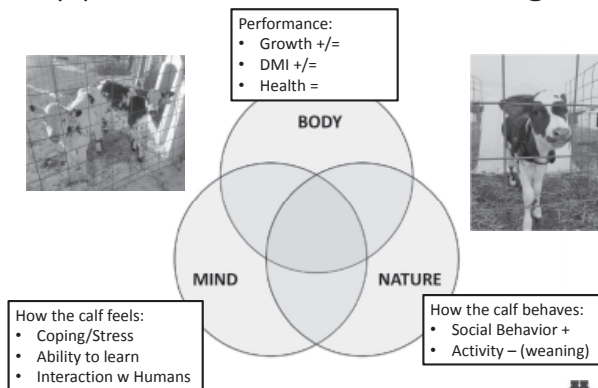
(Knauer, unpublished data)

Pair housed calves learn more easily



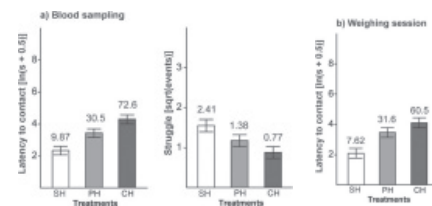
(Galliard et al, 2014)

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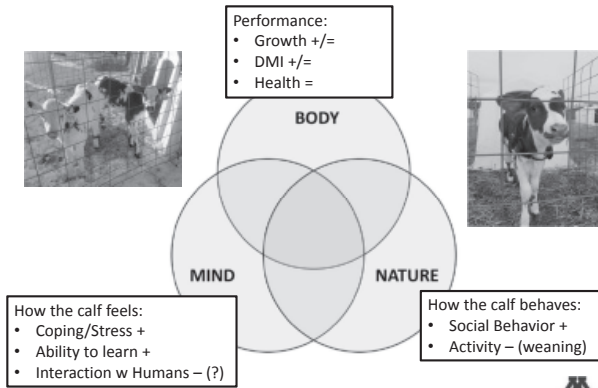
Interaction with humans



- 8 calves per group; 9L of whole milk per day via teat bucket 2X
- Blood sampling took place weekly
- Weighing took place every other week
- Pair housed (and dam housed) calves struggled less during blood sampling and took longer to contact the human handler during both blood sampling and weighing activities

(Duve et al, 2012)

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Pair Housing: Best Practices

- Pair at birth or shortly thereafter
- Age difference of no more than 5-7d between calves in a pair
- Double the amount of space for 1 calf (35 -> 70ft²)
- Feed milk from bottles and provide barrier to prevent milk switching/stealing, and to help reduce the risk of cross suckling



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Challenges of Pair Housing

- One study in Jersey calves reported a cross suckling rate of 13.5%



- Separating calves at feeding time added ~ 2.5min per pair per day

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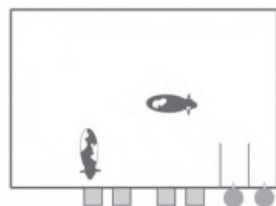
Still need to investigate:

- Economics
 - vs. individual
 - vs. group
 - Implementation
- Health
 - Pre-weaning and post-weaning
- Producer attitudes
- Producer experiences with implementation



Solutions to Cross-suckling

- Increased milk allowance
 - Hungry calves are more likely to cross suckle
- Separating at milk feeding
- Feeding with a bottle vs bucket
- Barriers between calves (100cm (1m); Jensen et al, 2008)



(Duve et al, 2014)

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Thank you!
knaue020@umn.edu

