



THE UNIVERSITY OF BRITISH COLUMBIA

Faculty of Land and Food Systems
Animal Welfare Program

vetmeduni

Automatically monitoring dyadic relationships in dairy cows

Borbala Foris, Sky (Kehan) Sheng,
Daniel M. Weary, Marina A.G. von Keyserlingk

EAAP 2024, 1-5 Sept, Florence, Italy

Cattle are social animals...

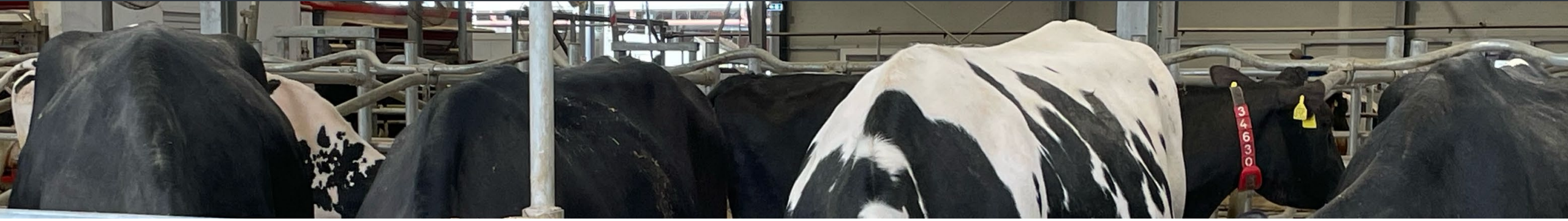


Social
bonds

Dominance

Shein and Fohrman, 1955; Reinhardt and Reinhardt 1981; Val-Laillet et al., 2009; Gutmann et al., 2015; Foris et al., 2019

Cattle are social animals...



Cattle are social animals...

A photograph of several cows in a barn. In the foreground, a black cow is eating from a wooden trough filled with yellow straw. Behind it, a black and white cow is also eating. To the right, a black cow with a red collar and yellow tag is visible. The background shows other cows and barn equipment.

How could we account for social relationships when managing cows?

How can we measure social bonds in dairy cows?



Observation

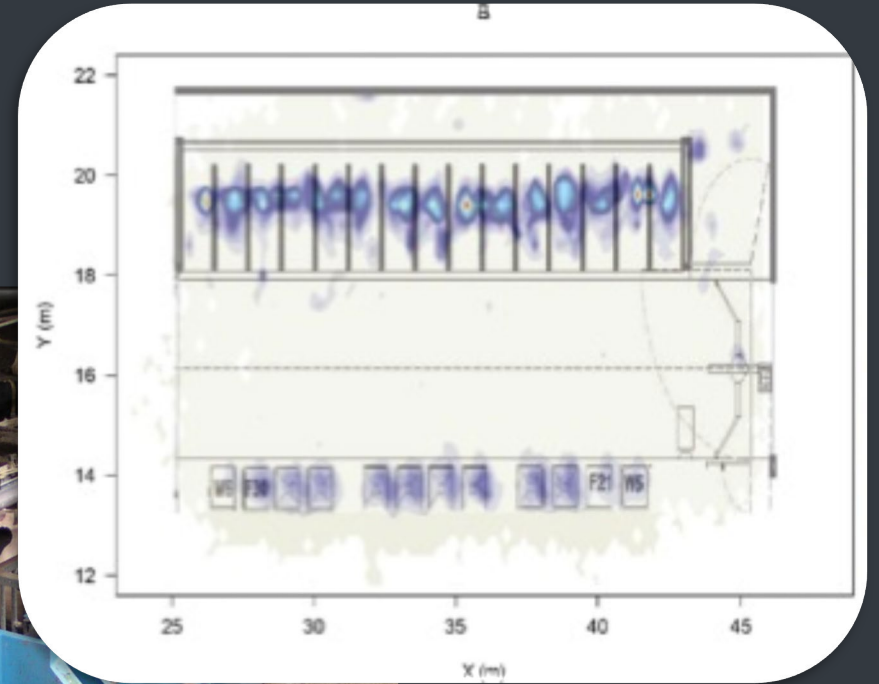
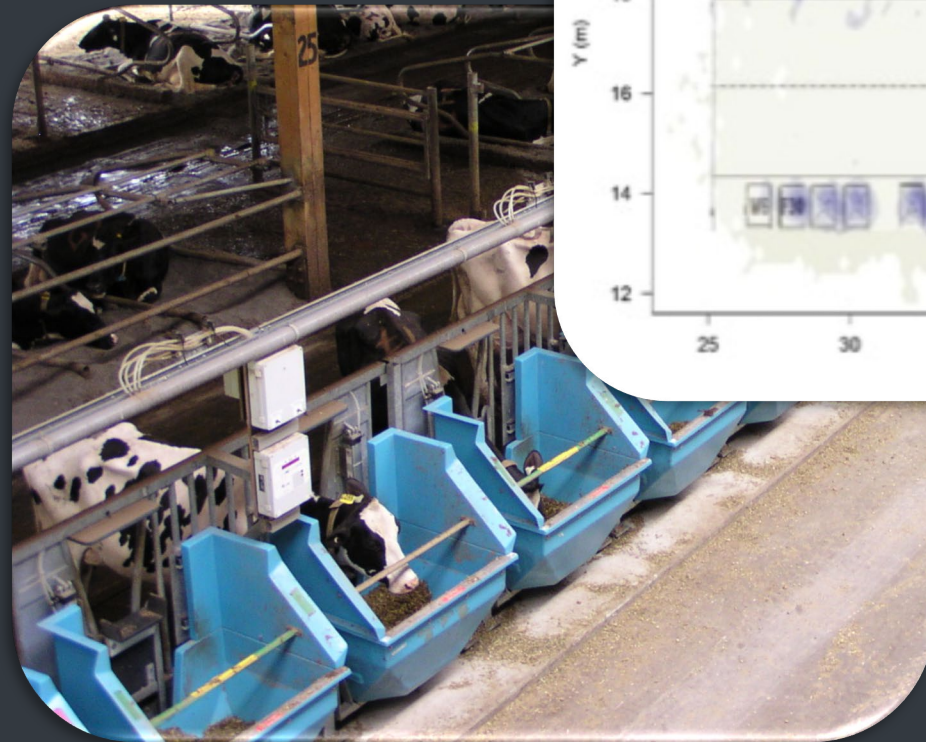
Social
interactions



How can we measure social bonds in dairy cows?

Sensor-based
monitoring

Spatio-temporal
associations



Boyland et al., 2016; Fielding et al.; 2021, Marina et al., 2024; Foris et al., 2021; Ozella et al., 2023

Disentangling competition and closeness



Disentangling competition and closeness

Applied Animal Behaviour Science 116 (2009) 141–149



Contents lists available at ScienceDirect

Applied Animal Behaviour Science

journal homepage: www.elsevier.com/locate/applanim



Allogrooming in cattle: Relationships between social preferences, feeding displacements and social dominance

David Val-Laillet^{a,*}, Vanessa Guesdon^a, Marina A.G. von Keyserlingk^b, Anne Marie de Passillé^a, Jeffrey Rushen^a

^a Pacific Agri-Food Research Centre, 6947 #7 Highway P.O. Box 1000, Agassiz, BC, Canada V0M 1A0

^b Animal Welfare Program, University of British Columbia, 2357 Main Mall, Vancouver, BC, Canada V6T 1Z4



J. Dairy Sci. 104:3485–3494

<https://doi.org/10.3168/jds.2020-18896>

© 2021, The Authors. Published by Elsevier Inc. and Fass Inc. on behalf of the American Dairy Science Association®.

This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

Familiarity influences social networks in dairy cows after regrouping

B. Foris^{1,2} , H.-G. Haas¹ , J. Langbein³ and N. Melzer^{1*}

¹Institute of Genetics and Biometry, Leibniz Institute for Farm Animal Biology, 18196 Dummerstorf, Mecklenburg-Western Pomerania, Germany

²Animal Welfare Program, Faculty of Land and Food Systems, University of British Columbia, Vancouver, BC, V6T 1Z4, Canada

³Institute of Behavioural Physiology, Leibniz Institute for Farm Animal Biology, 18196 Dummerstorf, Mecklenburg-Western Pomerania, Germany

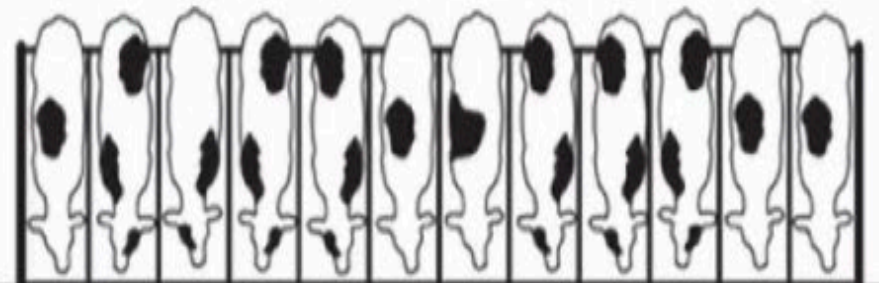
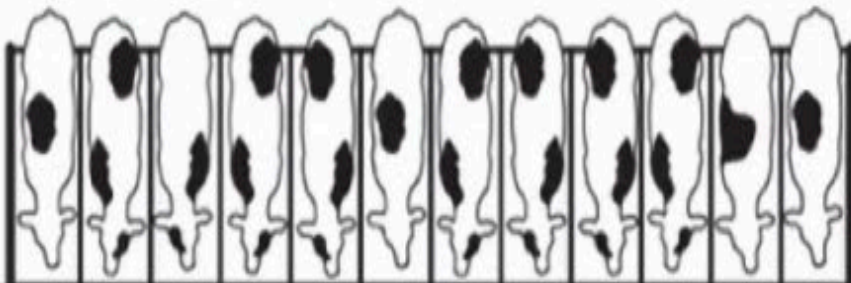
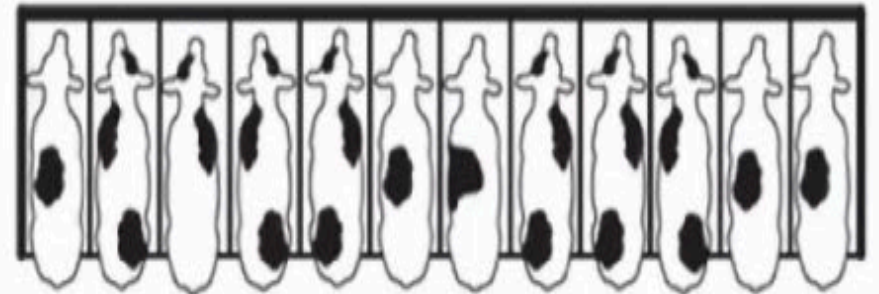
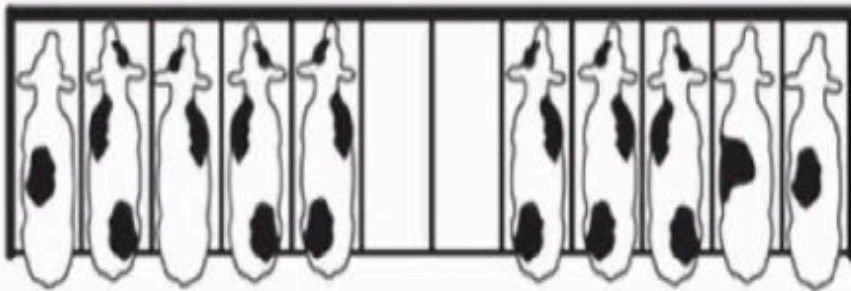


Research questions

1. Are replacements more frequent among cows feeding in proximity?
2. Is feeding in proximity consistent across days?
3. Is proximity at the feed bunk related to proximity during milking?



- 2 groups of 48 cows for 10 days
- 30 feed bins and 5 drinkers (Insentec)
- Milking twice a day, 2x12 parallel parlor





Dyadic synchronicity at the feed bunk

Neighbors: Duration of occupying neighboring bins

Closeness: Weighted duration of synchronous feed bunk presence (weights based on distance between cows)



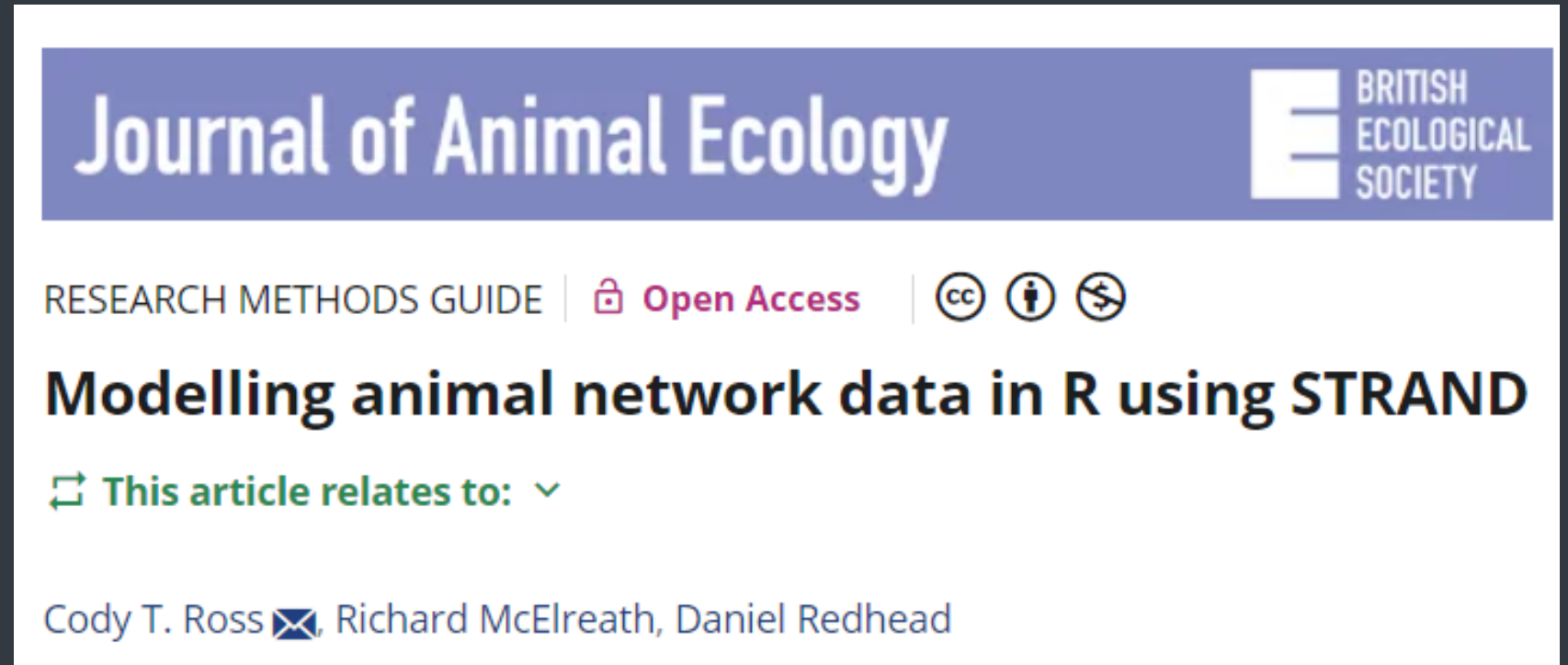
Dyadic synchronicity in the parlor

Neighbors: Frequency of being milked at neighboring stands over 10 days

Same batch: Frequency of being milked in the same batch of 12 cows over 10 days

1. Are replacements more frequent among cows feeding in proximity?

1. Are replacements more frequent among cows feeding in proximity?

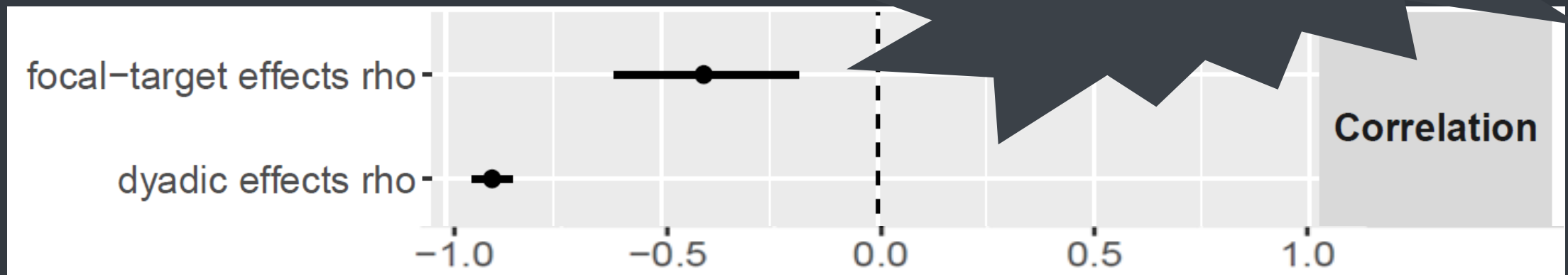


Replacements ~ Feed bunk neighbor + focal cow random + target cow random

1. Are replacements more frequent among cows feeding in proximity?

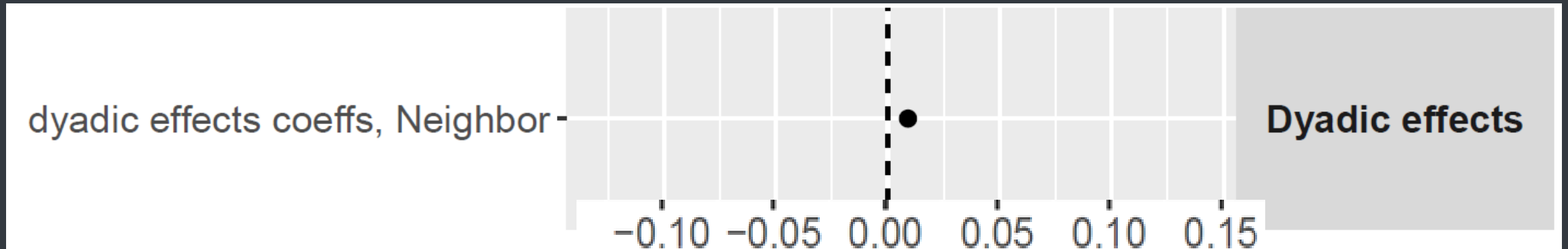
- Cows that replace others are less likely to be replaced
- No evidence of dyadic reciprocity

Dominance

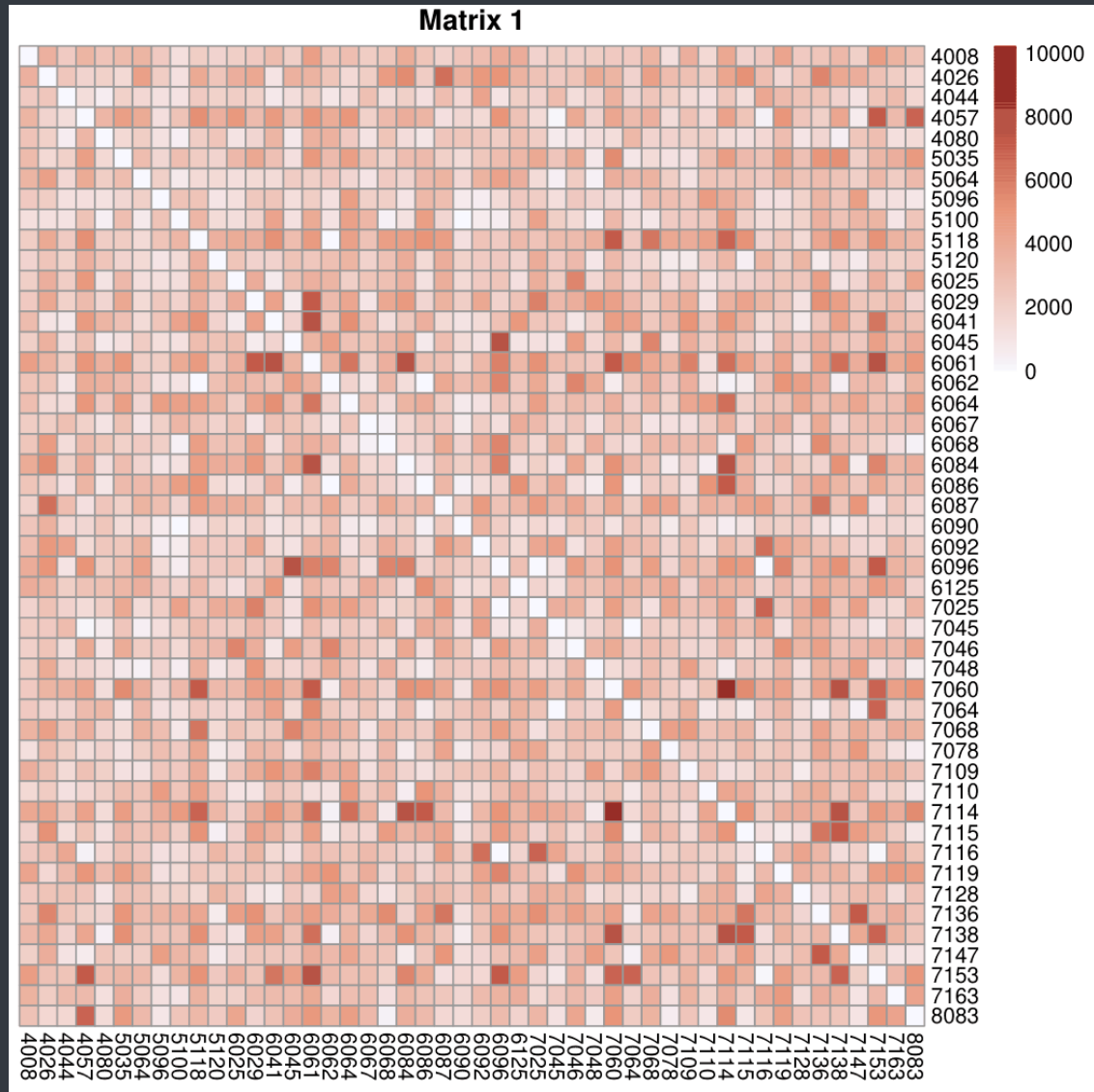


1. Are replacements more frequent among cows feeding in proximity?

Agonistic replacements are NOT more common among cows that are close at the feed bunk



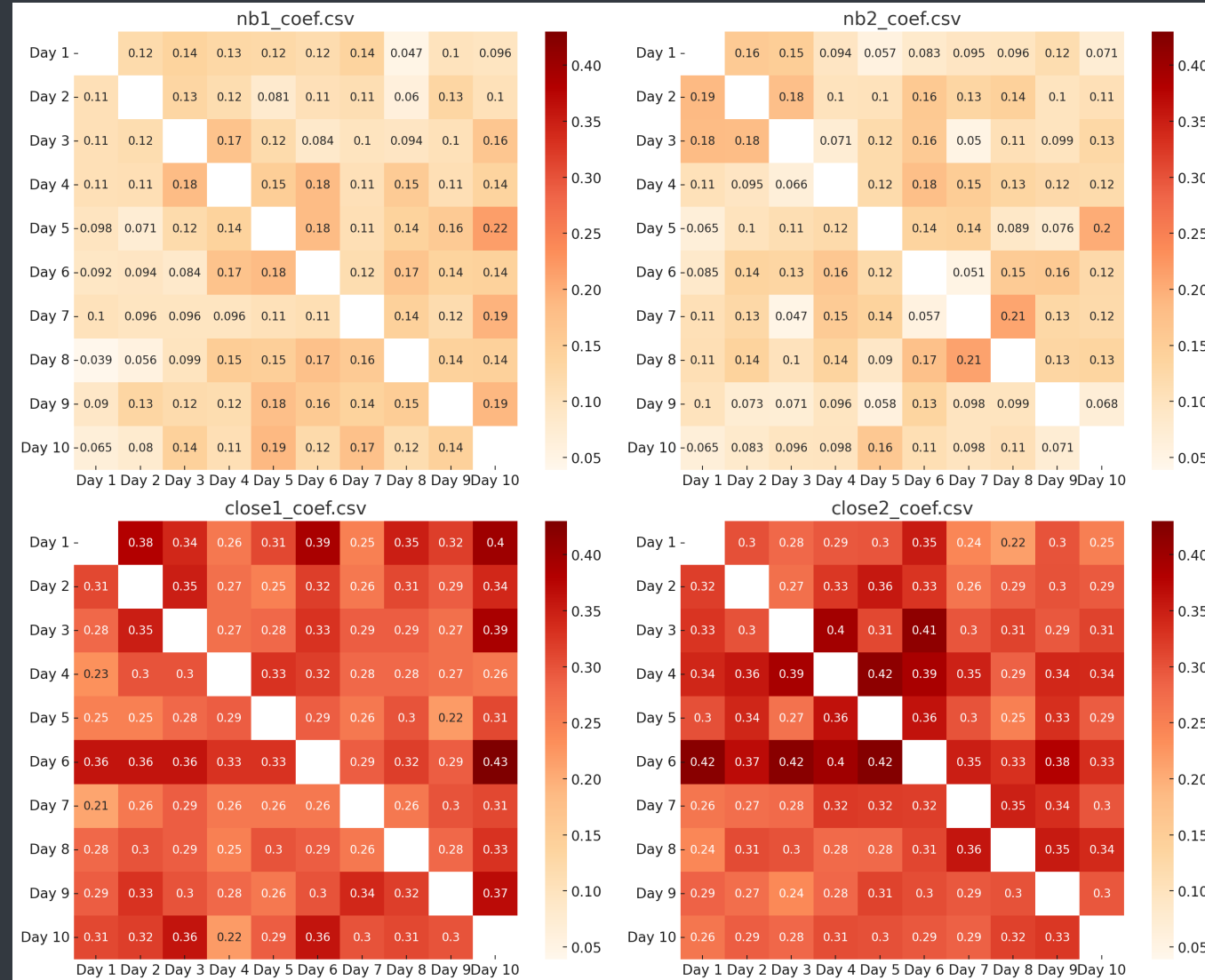
2. Is feeding in proximity consistent across days?



Correlation between the
10 daily networks in both
groups for **Neighbors** and
Closeness
(Mantel test)

2. Is feeding in proximity consistent across days?

Neighbors
(0.04 – 0.22)



Group 1

Group 2

3. Is proximity at the feed bunk related to proximity during milking?

1. Identifying affiliated dyads using feed bunk closeness
2. Comparing “same batch” frequency between affiliated and normal dyads

3. Is proximity at the feed bunk related to proximity during milking?

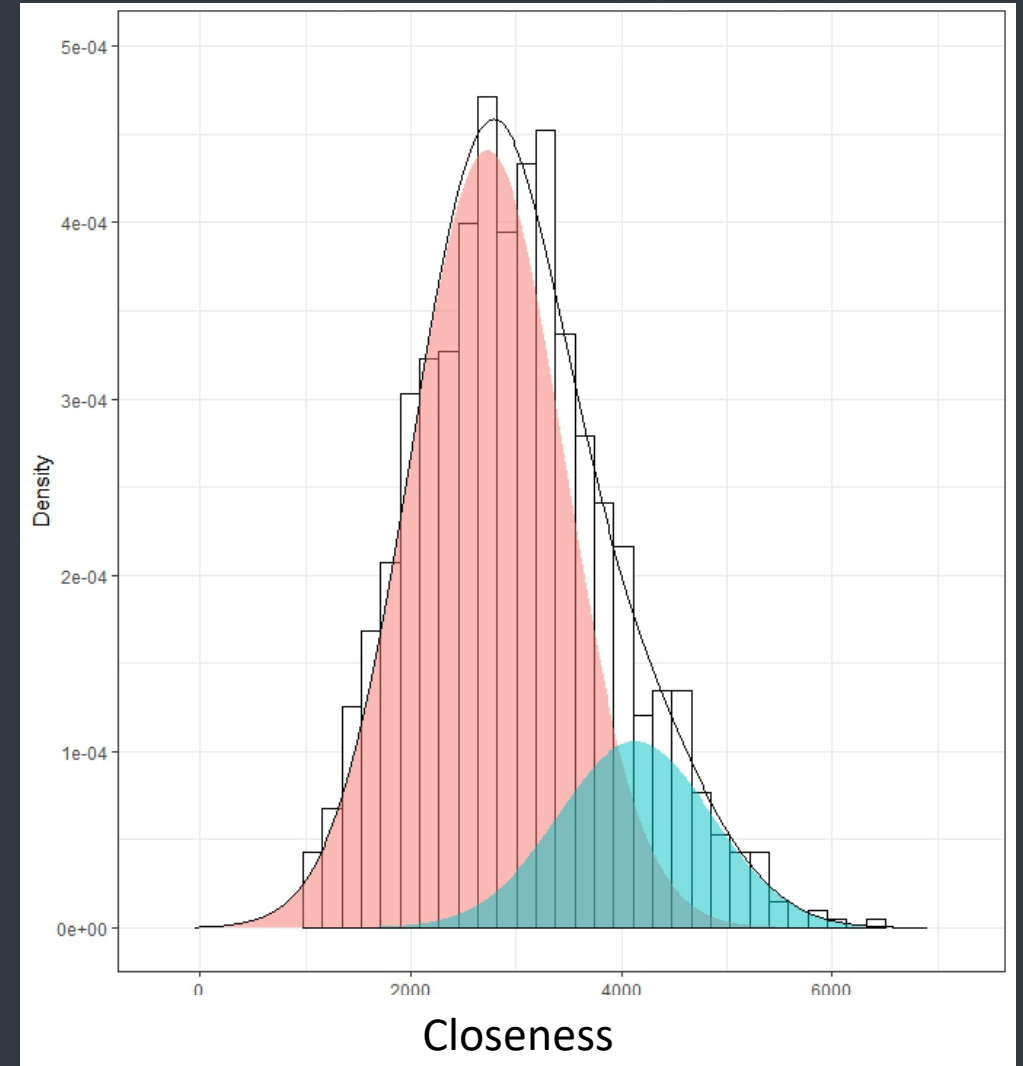
1. Identifying affiliated dyads using feed bunk closeness

Group 1:

78 dyads (7%), 34 cows

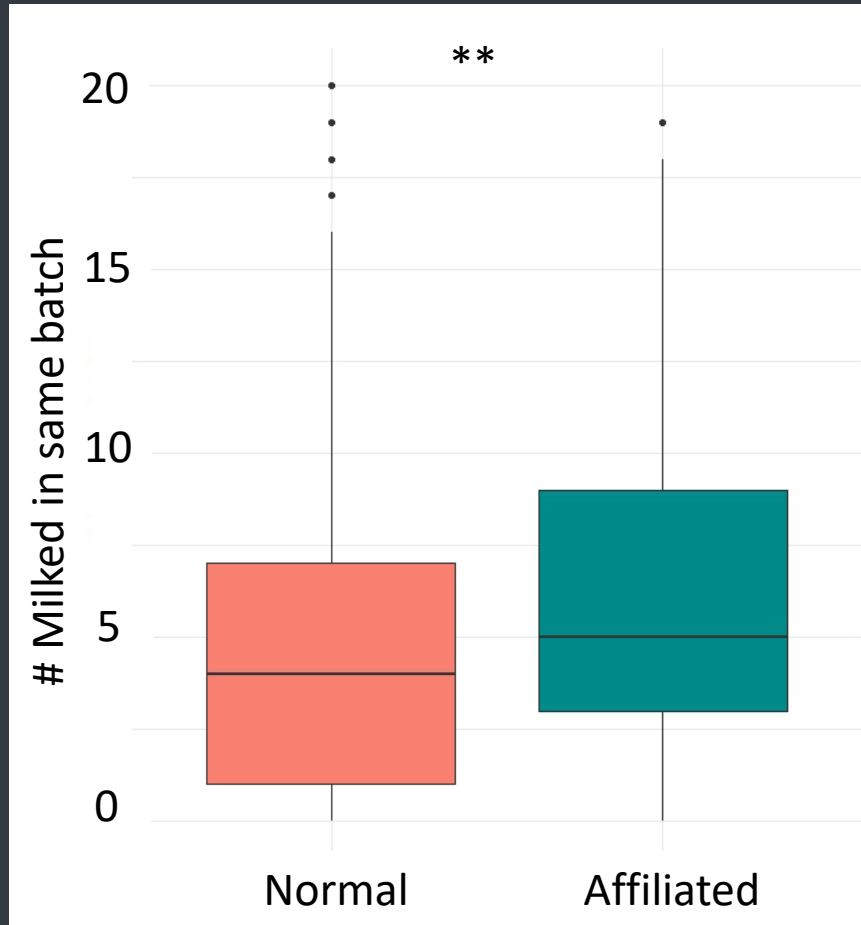
Group 2:

164 dyads (14.5%), 37 cows

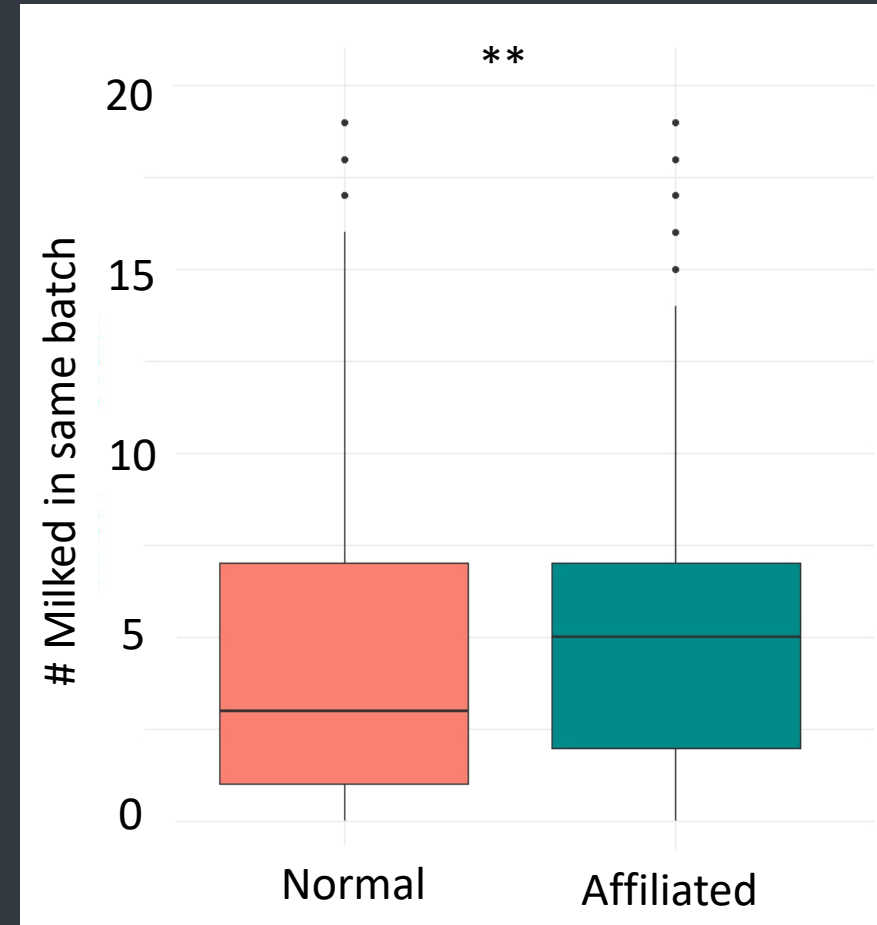


Pairs which were close at the feed bunk were also milked together more often

Group 1



Group 2



Conclusions

- Consistent closeness at the feed bunk may represent social bonds rather than competition
- Feeding time variation influences measures
- On-farm data sources may be useful for detecting affiliated dyads

Robust and reliable tools to detect social bonds are needed!



Where do we go from here?

- Validation with observed social interactions and life history knowledge
- Assessing competition and proximity using other data (RTLS, AMS, CV)
- Monitoring calves and heifers



Where do we go from here?

Adapting grouping practices using data on dyadic bonds!



Thank you!



borbala.foris@vetmeduni.ac.at