



Stress in dairy calves suckled or not by their dam assessed from cortisol in hair

➤ Context

- Citizens and consumers are increasingly sensitive to the welfare of farm animals; in dairy farming, the demand is mainly for grazing (*Schuppli et al., 2014*) and for maintaining a prolonged cow-calf contact (*Busch et al., 2017*).
- Consumers are questioning the naturalness of early calf separation, which prevents cow-calf bonding and the expression of the animals' natural behaviour.
- There is a large literature showing that rearing calves with their dam is good for their welfare (from *Krohn, 2001* to *Meagher et al., 2019*).
- On the other hand, late separation of calves seems to induce real stress (*Fröberg et al., 2011; Veissier et al., 2013*).

Schuppli, von Keyserlingk & Weary, 2014, J Anim Sci, 92, 5185-5192

Busch, Weary, Spiller & von Keyserlingk, 2017, Plos One, 12, e0174013

Krohn, 2001, Appl Anim Behav Sci, 72, 271-280

Meagher, Beaver, Weary & von Keyserlingk, 2019, J Dairy Sci, 102, 5765-5783

Fröberg, Lidfors, Svennersten-Sjaunja & Olsson, 2011, Acta Agriculturae Scand, 61, 145-156

Veissier, Caré & Pomiès, 2013, Appl Anim Behav Sci, 147, 11-18

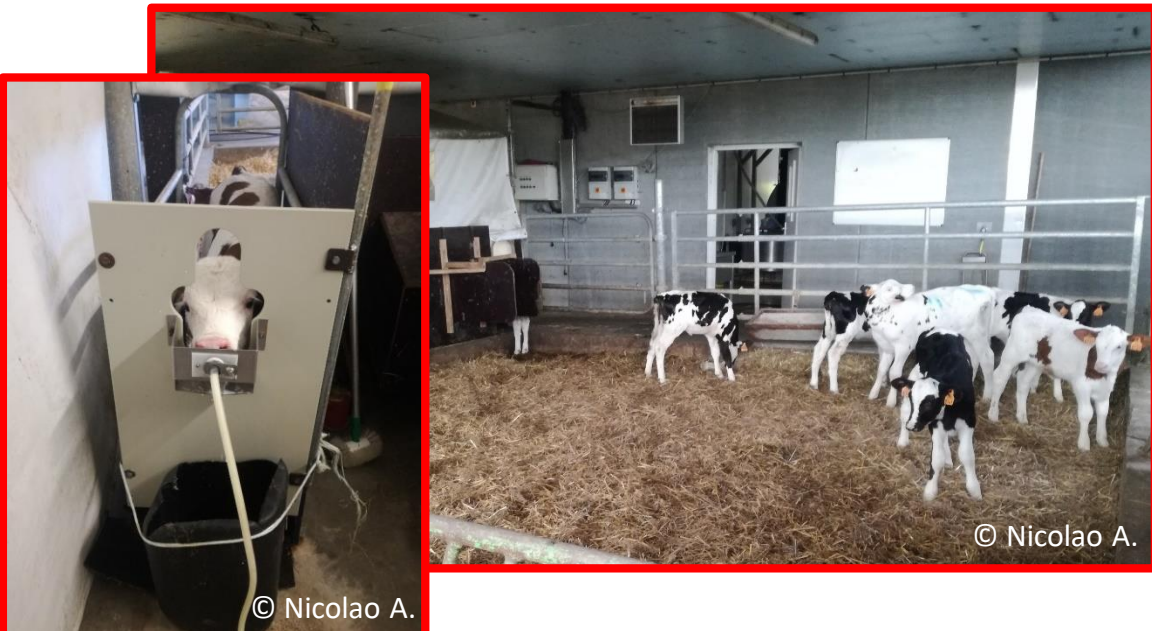
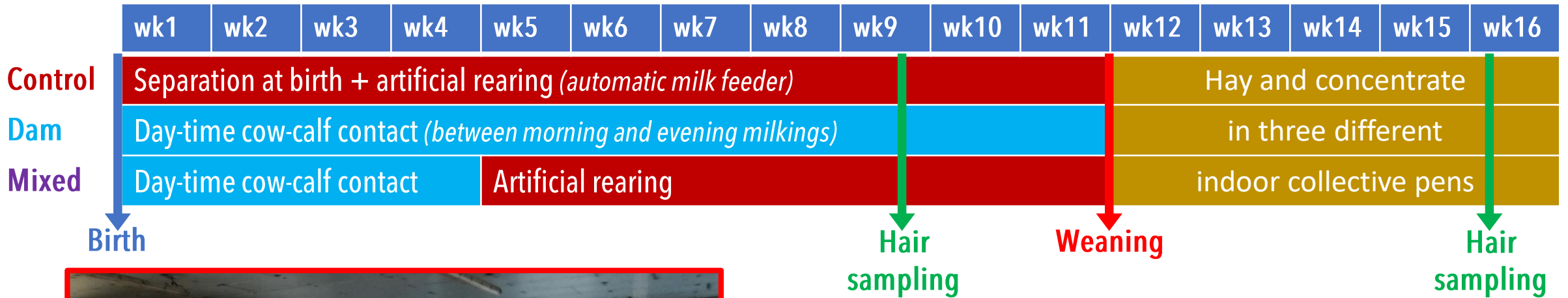


➤ Objectives

- We wondered if it was possible to "measure" that dairy calves reared by their dam are less stressed than calves artificially reared.
 - As cortisol concentration in hair is assumed to reflect stress accumulated over weeks or months (*Meyer & Novak, 2012*), we wanted to compare hair cortisol in calves reared or not by their dam, before and after weaning.
 - Hair cortisol is an interesting non-invasive biomarker of chronic stress, and its concentration is not likely to be affected by manipulations during sampling
1. Can it be confirmed by hair cortisol measurements that calves reared by their dam are less stressed than those reared artificially?
 2. Can an abrupt separation from the dam at weaning challenge this practice?

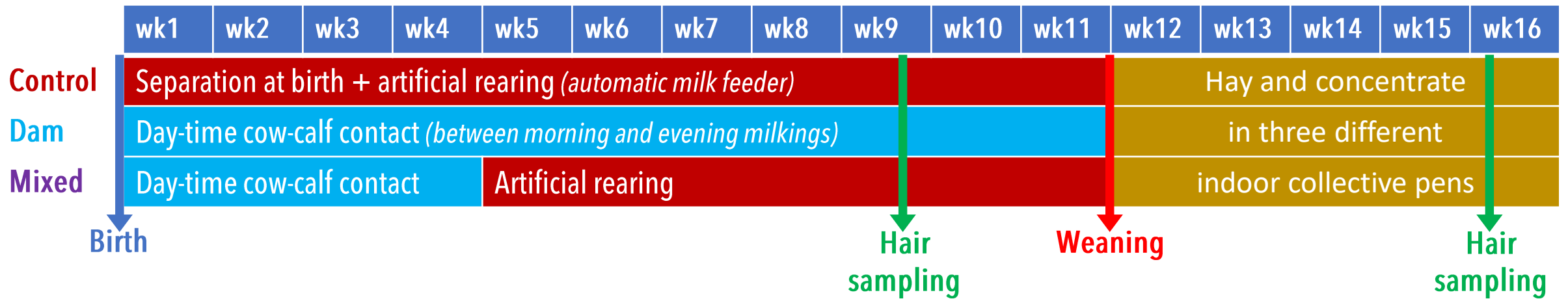
➤ Experimental design

- Three groups of 9 calves at the INRAE Herbipôle experimental farm:



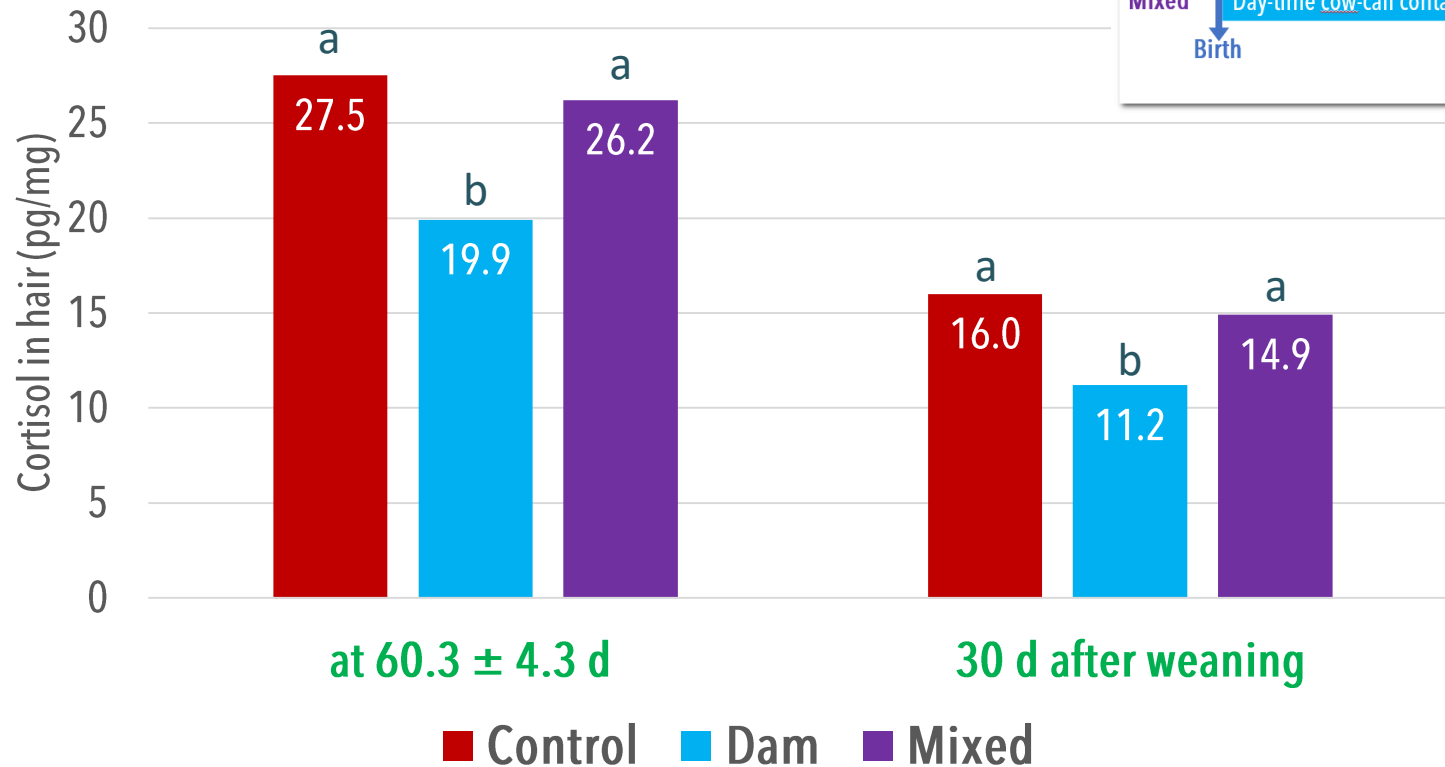
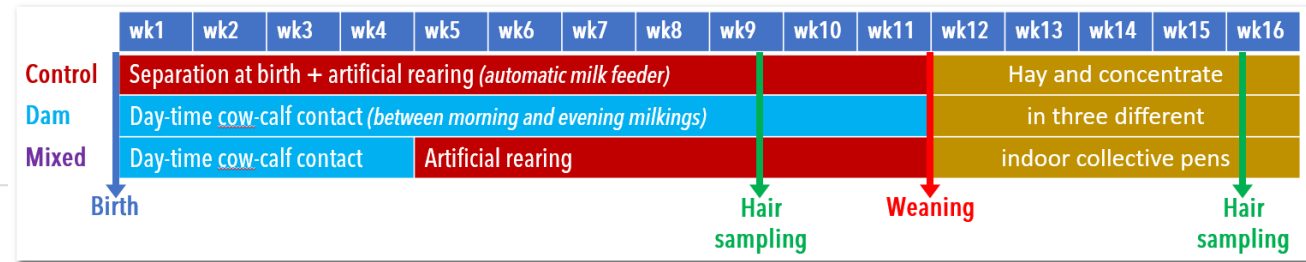
➤ Experimental design

- Three groups of 9 calves at the INRAE Herbipôle experimental farm:



- Hair samples were taken from each calf's shoulder.
- Samples were washed and dried before cortisol extraction and determination using Salimetrics ELISA kit at the Swedish University of Agricultural Sciences.
- Statistical analysis: GLM model including Group, Sex and Breed (*on \log_{10} cortisol values*).

➤ Results



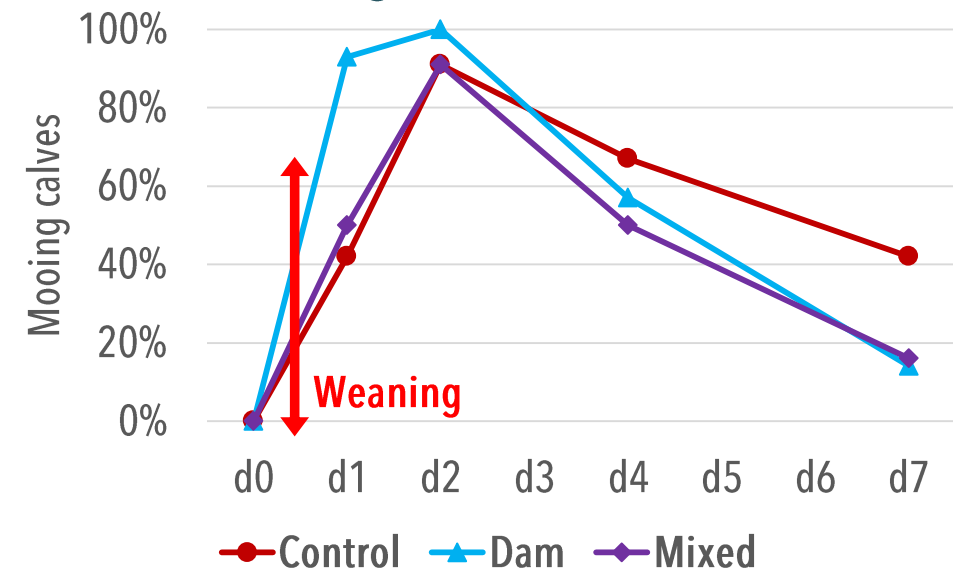
- Hair cortisol concentration was lower in Dam-calves than in other groups of calves both before weaning (-26%; $P = 0.02$) and after weaning (-28%; $P = 0.08$)

➤ Discussion

- Before weaning, the Dam-calves grazed with the dams during the day whereas other calves remained in indoor pens; as cortisol increases with activity (*Bonen, 1976*), it should therefore be higher in Dam-calves if they were as stressed as other calves.
➡ This reinforces the conclusion that calves with their dam are less stressed.
- The difference found in hair cortisol during the pre-weaning period between groups tended to persist, even though Dam-calves had a stressful weaning.

➔ *Dam-calves tended to moo more than other calves in the first two days of the post-weaning week*

➔ *Higher levels of blood cortisol at weaning in suckling calves compared to artificially reared ones (*Veissier et al., 2013*)*



➤ Conclusion

- Despite stress at weaning, rearing dairy calves with their dam seems thus to result in less stress than rearing them without the dam.
- The measurement of hair cortisol is a reliable and non-invasive method to compare the level of chronic stress between groups of animals; it could also be used to compare the stress level of dams that are suckling or not their calves.





Thank you for your attention