



Developments in Gait

A WELL-E Research Report

Summary

Lameness is as a serious concern for dairy producers, and one of the primary reasons why cows are removed from their herds. At WELL-E, we are working towards earlier and more accurate prediction of changes in cow gaits, before the onset of symptoms requiring treatment, which can be expensive and, at times, unsuccessful. Over the past ten years, members of our team have tested a variety of technologies and developed cutting-edge tools while studying cow hoof and leg health in exercise conditions.

Key Results

Provision of outdoor access for 1-2 hours per day, 5 days/week vs. 1 day/week yielded positive effects on gait and hoof health of cows.

- 1** One point (in 5-point scoring system) reduction in gait score of cows with 1 hour/day of outdoor access for 5 days/week showed no negative effect on hoof lesion incidences on different surfaces.



- 2** Up to 50% increase in daily steps



Diverse technologies used to analyze bovine gait enabled the early detection of abnormalities.

- 1** Subclinical effects of outdoor access previously undetectable with traditional methods are now identifiable. They have potential to notice changes before making significant problems and reduce the need for treatment.



- 2** Our predictive models using kinematics data performed as well as existing models with provision of more details meaning that our tools were successful in predicting gait score with 0.5 interval (same detailed level as visual gait scoring) with 40% success rate. This is an exciting development while additional work is needed.

As our project continue to evolve and incorporate new technologies, AI and machine learning have the potential to grow this domain exponentially.

Trade Publications

- [Using technology to improve locomotion assessments in dairy cows](#)
- [Beyond the stall: How partial outdoor access affects gait and hoof health of movement-restricted cows](#)



Podcast

- [Movement and Exercise for Dairy Cows | Lactalis Canada](#)
- [L'IA pour améliorer le bien-être des vaches: Faire entrer l'intelligence artificielle dans l'étable](#)
- [L'IA pour améliorer le bien-être des vaches : Les détails avec C. Srivastava](#)
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Videos

- [Industrial Research Chair in Sustainable Life of Dairy Cattle](#)
- [Technologies at CowslifMcGill](#)



Journal Publications

- Bradtmueller A., Nejati A., Shepley E., Vasseur E. [Applications of Technology to Record Locomotion Measurements in Dairy Cows: A Systematic Review](#). *Animals (Basel)*. 2023 Mar 22;13(6):1121. doi: 10.3390/ani13061121
- Charlton GL., Bouffard V., Gibbons J., Vasseur E., Haley DB., Pellerin D., Ruchen J., de Passillé AM. [Can automated measure of lying time help assess lameness and leg lesions on tie-stall dairy farms?](#). *Applied Animal Behaviour Science*. 2016 Feb;175:14-22. doi: 10.1016/j.applanim.2015.02.011.
- Gibbons J., Haley DB., Higginson Cutler J., Nash C., Zaffino Heyerhoff J., Pellerin D., Adam S., Fournier A., de Passillé AM., Rushen J., Vasseur, E. Technical note: [A comparison of 2 methods of assessing lameness prevalence in tiestall herds](#). *Journal of Dairy Science*. 2014 January;97(1):350-353. doi: 10.3168/jds.2013-6783
- Nejati A., Bradtmueller A., Shepley E., Vasseur E. [Technology applications in bovine gait analysis: A scoping review](#). *PLoS One*. 2023 Jan 25;18(1):e0266287. doi: 10.1371/journal.pone.0266287.
- Nejati A., Shepley E., Dallago GM., Vasseur E. [Investigating the impact of 1h daily outdoor access on the gait and hoof health of non-clinically lame cows housed in a movement restricted environment](#). *JDS Communications*. 2023 Mar 7; doi: 10.3168/jdsc.2023-0498
- Palacio S., Peignier L., Pachoud C., Nash C., Adam S., Bergeron R., Pellerin D., de Pasillé AM., Rushen J., Haley D, DeVries TJ., Vasseur E. [Technical note: Assessing lameness in tie-stalls using live stall lameness scoring](#). *Journal of Dairy Science*. 2017 Jun 7;100(8):6577-6582. doi: 10.3168/jds.2016-12171
- Shepley E., Berthelot M., Vasseur E. [Validation of the Ability of a 3D Pedometer to Accurately Determine the Number of Steps Taken by Dairy Cows When Housed in Tie-Stalls](#). *Agriculture*. 2017; 7(7):53. doi: 10.3390/agriculture7070053
- Shepley E., Lensink J., Vasseur E. [Cow in Motion: A review of the impact of housing systems on movement opportunity of dairy cows and implications on locomotor activity](#). *Applied Animal Behaviour Science*. 2020 September 8;230:105026. doi: 10.1016/j.applanim.2020.105026



- Shepley E., Vasseur E. The effect of housing tiestall dairy cows in deep-bedded pens during an 8-week dry period on gait and step activity. JDS Commun. 2021 Jul 22;2(5):266-270. doi: 10.3168/jdsc.2021-0091.
- Shepley E., Vasseur E. Graduate Student Literature Review: The effect of housing systems on movement opportunity of dairy cows and the implications on cow health and comfort. Journal of Dairy Science. 2021 April;104. doi: 10.3168/jds.2020-19525
- Solano L., Barkema HW., Pajor EA., Mason S., LeBlanc SJ., Zaffino Heyerhoff JC., Nash CG., Haley DB., Vasseur E., Pellerin D., Rushen J., de Passillé AM., Orsel K. Prevalence of lameness and associated risk factors in Canadian Holstein-Friesian cows housed in freestall barns. J Dairy Sci. 2015 Oct;98(10):6978-91. doi: 10.3168/jds.2015-9652
- Warner D., Vasseur E., Lefebvre DM., Lacroix R. A machine learning based decision aid for lameness in dairy herds using farm-based records. Computers and Electronics in Agriculture. 2020 January 17;169:105193. doi: 10.1016/j.compag.2019.105193
- Westin R., Vaughan A., de Passillé AM., DeVries TJ., Pajor EA., Pellerin D., Siegford JM., Witaifi A., Vasseur E., Rushen J. Cow-and farm-level risk factors for lameness on dairy farms with automated milking systems. Journal of Dairy Science. 2016 May 1;99(5): 3732-3743. doi: 10.3168/jds.2015-10414