

# Automated detection of lameness in dairy through measures of weight distribution

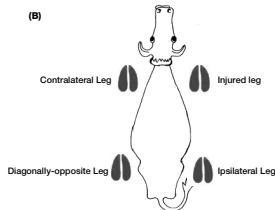
N. Chapinal<sup>1</sup>, A.M. de Passille<sup>2</sup> and J.Rushen<sup>2</sup> • <sup>1</sup>Animal Welfare Program, University of British Columbia, Vancouver, BC; <sup>2</sup>Agriculture and Agri-Food Canada, Agassiz, BC

## Take Home Message

Lame cows take weight off the injured leg and shift weight frequently between contralateral legs. However, cows shift very little weight between front and back legs. Cows carry most of the milk weight on their back legs, putting some extra strain there. Force plate platforms are a promising tool for the automated detection of lame cows.

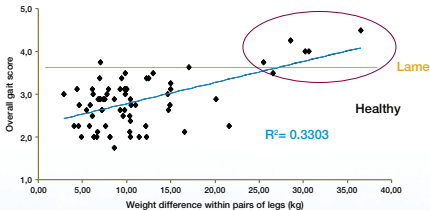
## The question

Lameness is a costly and widespread health and welfare problem in intensive dairy production. The increasing size of dairy farms makes lameness detection difficult, showing the need for automated detection methods. We examined whether measures of how cows distribute their weight between their four legs when standing could detect lameness. In order to better understand how other factors affect weight distribution between legs, we examined how cows distribute their weight before and after milking, before and after calving and when standing with the front hooves higher than the back ones.



**Figure 1.** (A) Cow standing on a force plate platform where the weight placed on each leg is measured independently. (B) Weight placed in a particular leg, e.g. the injured leg, can be compared to the weight placed on the other legs.

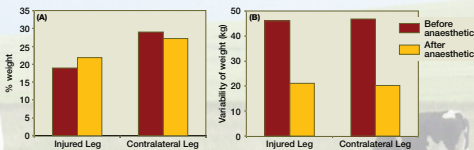
## What we found



**Figure 2.** Of a group of 48 cows, those with high gait scores indicating lameness, showed a greater difference in weight within a pair of contralateral legs.



**Figure 4.** (A) When we compared the weight distribution before and after milking, we found that cows placed more weight on the back before milking: 90% of the weight of the milk was carried on the back legs. (B) However, we found that cows did not change their weight distribution before and after calving: the weight of the calf was distributed between both front and back legs.



**Figure 3.** Lame cows placed less weight on the injured leg than on the contralateral leg (A) and shift weight frequently from one leg to the contralateral (B). An injection of local anaesthetic to the injured hoof increased the weight placed on the injured leg (A) and reduced weight shifting (B).



**Figure 5.** Surprisingly, elevation of front legs had little effect on weight distribution between front and back legs.

