Sample size estimates for assessing lameness, leg injuries, and body condition score

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Our question: How do different sampling strategies affect the accuracy with which farms are classified according to animal-based measures?

Specific questions:

How many cows? The number can affect both accuracy and the time and labor required

Which cows? Should the sample size formula be applied to the entire herd, lactating cows, or a single pen of high-producing cows?

Our data set:

To provide a true estimate of prevalence, *all* lactating cows (range = 71–901 cows/farm, total = 12,375 cows) on 38 Brazilian farms were:

Lameness scored (1–5 scale: 3 = moderately, ≥4 = severely lame);

Leg injury scored (**carpal** and **hock** joints; 1–3 scale: 2 = moderate, 3 = severe injury);

Body condition scored (1–5 scale: ≤2.0 = thin)

Sampling strategies assessed:

7 strategies (based on *Dairy Well*, *FARM*, *proAction*, *Validus)* were assessed

6 of these strategies (2 × 3): were derived by varying desired precision (*d*) = 15 , 10 , or 5% and applying this to either *all* lactating cows or to a single pen of high-producing cows (the *high pen*)

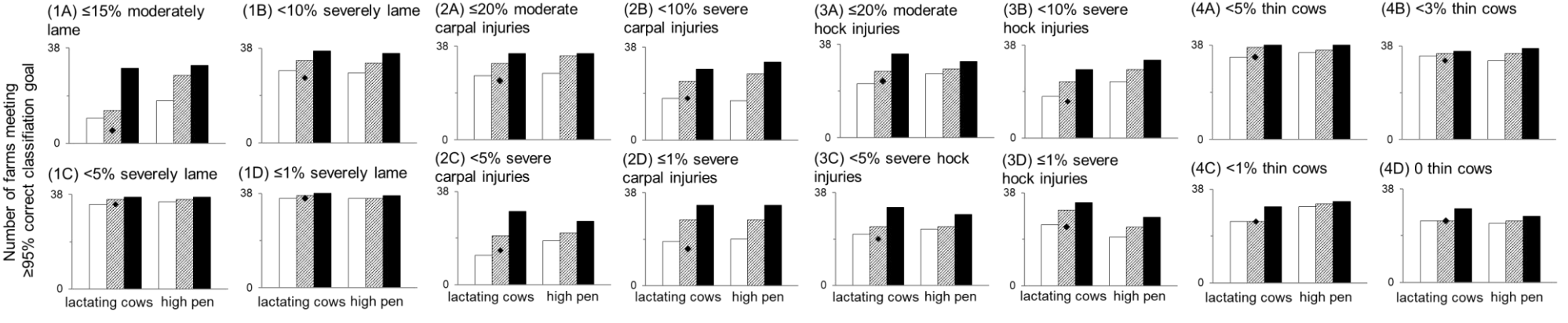
The 7th strategy was based upon using *d* = 10% applied to total herd size, with lactating cows selected in proportion to their representation in herd (similar to the *FARM* program)

10,000 replicate samples were drawn from our dataset using each of the 7 strategies. For each replicate, we estimated prevalence and classified farms as meeting (below) or failing to meet (above) specified thresholds: ≤15% moderately lame cows; ≤20% moderate carpal or hock injuries; <10, <5, or ≤1% severely lame cows or severe carpal or hock injuries; <5, <3, <1%, or 0 thin cows

Our results: The number of farms correctly classified increased with the number of cows assessed; sampling only from a pen of high-producing cows served as a practical proxy for the larger population

d = 15 10 5 %, formula applied to either all **lactating cows** or to a single pen of high-producing cows (**high pen**)

◆ *d* = 10%, formula applied to total herd size, with lactating cows selected in proportion to their representation in the herd (similar to FARM Program)



Goal: ≥95% correctly classified sample replicates (out of 10,000). The number of farms (***n* = 38**) meeting this goal is shown relative to each threshold for: (1) moderately or severely lame cows, moderate or severe injuries on the (2) carpal and (3) hock joints, and (4) thin cows

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The data collection portion of this study was funded by the Science Without Borders Program (CNPq–National Council for Scientific and Technological Development, Brazil, Grant No. 400850/2013-3), which also provided funds to M. A. G. von Keyserlingk for visits to Brazil that enabled this outstanding collaboration. Maria J. Hötzel also received support from CNPq (Grant No. 311509/2015-0), and J. H. C. Costa was supported by a postdoctoral fellowship from CAPES (Ministry of Education, Brazil). J. M. C. Van Os was supported through an NSERC Industrial Research Chair awarded to M. A. G. von Keyserlingk and D. M. Weary with industry contributions from the Dairy Farmers of Canada (Ottawa, ON, Canada), British Columbia Dairy Association (Burnaby, BC, Canada), Westgen Endowment Fund (Milner, BC, Canada), Intervet Canada Corporation (Kirkland, QC, Canada), Novus International Inc. (Oakville, ON, Canada), Zoetis (Kirkland, QC, Canada), BC Cattle Industry Development Fund (Kamloops, BC, Canada), Alberta Milk (Edmonton, AB, Canada), Valacta (St. Anne-de-Bellevue, QC, Canada), and CanWest DHI (Guelph, ON, Canada). We are grateful to Cassandra Tucker (University of California-Davis, USA) for helpful discussions on the topic of this study. We thank the Castrolanda Cooperativa Agroindustrial (Castro, PR, Brazil), Capal Cooperativa Agroindustrial (Arapoti, PR, Brazil), and Cooperativa Agropecuária Witmarsum (Witmarsun, PR, Brazil), especially Hugo Richard Dick, Rodrigo Navarro, Junio Fabiano dos Santos, and Gunther Schartner for their help with identification of farms. Many thanks are extended to Tracy Burnett (Vancouver, BC, Canada), Paulo Henrique Manske Doering, Vanessa Groenwold, Luis Andrés Gonzalez, Gabriela Marquete, and Angélica Roslindo (Florianópolis, SC, Brazil) for their help with data collection.

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Questions?

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