

Review

# Data-Based Variables Used as Indicators of Dairy Cow Welfare at Farm Level: A Review

Barbara Lutz <sup>1,2,\*</sup>, Sibylle Zwygart <sup>2</sup>, Christina Rufener <sup>1</sup>, Joan-Bryce Burla <sup>3</sup>, Beat Thomann <sup>4</sup>  
and Dimitri Stucki <sup>2</sup>

- <sup>1</sup> Centre for Proper Housing of Ruminants and Pigs, Federal Food Safety and Veterinary Office FSVO, Agroscope Tänikon, 8356 Ettenhausen, Switzerland; Christina.Rufener@agroscope.admin.ch
  - <sup>2</sup> Clinic for Ruminants, Vetsuisse Faculty, University of Bern, Bremgartenstrasse 109a, 3012 Bern, Switzerland; sibylle.zwysart@vetsuisse.unibe.ch (S.Z.); dimitri.stucki@vetsuisse.unibe.ch (D.S.)
  - <sup>3</sup> Farm-Animal Welfare Division, Agroscope Tänikon, 8356 Ettenhausen, Switzerland; joan-bryce.burla@agroscope.admin.ch
  - <sup>4</sup> Veterinary Public Health Institute, Vetsuisse Faculty, University of Bern, 3012 Bern, Switzerland; beat.thomann@vetsuisse.unibe.ch
- \* Correspondence: Barbara.Lutz@agroscope.admin.ch

**Simple Summary:** In recent years, the interest in the use of data from routine herd records in the monitoring of dairy welfare at farm level has increased. This review compiles 13 papers to outline the current potential of data-based variables for animal welfare monitoring. All the identified studies showed associations between data-based variables and farm-level dairy cow welfare and therefore provide a first indication of the possible use and suitability of data-based variables for welfare monitoring. However, we found that the definitions of animal welfare, its assessment on the farm, and the data-based variables varied considerably. Consequently, the current state of research does not allow a conclusive assessment of the potential of data-based variables for animal welfare monitoring. Therefore, future research is needed to clarify the potential of data-based variables. Harmonisation of the data-based variables and the use of valid measurements that reflect the multidimensionality of welfare could contribute to increased comparability between the studies.

**Abstract:** During the last years, the interest in data-based variables (DBVs) as easy-to-obtain, cost-effective animal welfare indicators has continued to grow. This interest has led to publications focusing on the relationship between DBVs and animal welfare. This review compiles 13 papers identified through a systematic literature search to provide an overview of the current state of research on the relationship between DBVs and dairy cow welfare at farm level. The selected papers were examined regarding their definition of animal welfare and classified according to this definition into three categories: (a) papers evaluating DBVs as predictors of animal welfare violations, (b) papers investigating the relationship between DBVs and animal-based measurements, and (c) papers investigating the relationship of DBVs to scores of welfare assessments like the Welfare Quality protocol or to overall welfare scores at farm level. In addition, associations between DBVs and indicators of animal welfare were extracted, grouped by the type of DBV, and examined for replications that may confirm the associations. All the identified studies demonstrated associations between DBVs and animal welfare. Overall, the first indications of a possible suitability of DBVs for predicting herds with animal welfare violations as well as good or poor animal welfare status were given. The evaluation of relationships between DBVs and animal-based measurements (ABMs) found mortality-based DBVs to be frequently associated with ABMs. However, owing to varying definitions of animal welfare, the use of different variants of DBVs, and different methods used to assess DBVs, the studies could only be compared to a limited extent. Future research would benefit from a harmonisation of DBVs and the use of valid measurements that reflect the multidimensionality of welfare. Data sources rarely investigated so far may have the potential to provide additional DBVs that can contribute to the monitoring of cow welfare at farm level.



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**Citation:** Lutz, B.; Zwygart, S.; Rufener, C.; Burla, J.-B.; Thomann, B.; Stucki, D. Data-Based Variables Used as Indicators of Dairy Cow Welfare at Farm Level: A Review. *Animals* **2021**, *11*, 3458. <https://doi.org/10.3390/ani11123458>

Academic Editors: Frank J.C.M Van Eerdenburg and Silvana Mattiello

Received: 3 September 2021

Accepted: 2 December 2021

Published: 4 December 2021

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