



Lameness prevalence and risk factors in organic dairy herds in four European countries

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ABSTRACT

The objectives of this cross-sectional study were to assess the prevalence of lameness in organic dairy herds in France, Germany, Spain and Sweden, and to investigate risk factors for the occurrence of lameness in these herds.

The study sample was derived within the IMPRO project, which aimed to improve animal health and welfare in European organic dairy herds, and contained 8109 cows from 201 herds. Farm visits, during which a systematic random sample of the lactating cows was scored for lameness, were conducted from March to August 2013. During the visits, farm data for elaborating risk factors were collected through an on-farm protocol. The associations between herd variables and lameness were assessed with multivariable, generalized estimating equations with a logit link. The overall prevalence of lame cows was 18%, with large differences between and within the countries. The median (range) herd prevalence was 25% (0–51%), 20% (0–79%), 10% (0–27%) and 5% (0–25%) in France, Germany, Spain and Sweden, respectively. The odds of lameness was five to six times higher in France and Germany, and slightly higher in Spain, than in Sweden. Because the estimates for Spain deviated substantially from the other countries, Spanish data were analysed separately for assessing risk factors. The odds for lameness were significantly higher for the Holstein breed compared to the other breeds; the odds for lameness also increased with herd size in France, Germany and Sweden. In Spain, the effect of herd size was more diverse. Zero-grazing herds, which were only found in Germany, had higher odds of lameness than German grazing herds. The differences in lameness prevalence between the four countries could not be explained by the risk factors studied. Therefore, there is a need for more research to identify the country- and herd-specific factors behind the large variation. The need is reinforced by the fact that there is no unified recording of lameness in European organic dairy herds. The results of this study indicate that there may be a considerable number of European organic farms not reaching the aim of having a low lameness prevalence. This may be particularly true in large herds with cows of the Holstein breed and zero-grazing.

1. Introduction

Lameness is one of the most important animal health and welfare problems in dairy cattle. It is associated with painful conditions for the cows (Rushen et al., 2007; Whay et al., 1998), and affects cow welfare, health and longevity (Alvåsen et al., 2014a, 2014b; Booth et al., 2004; Cha et al., 2010). It also causes significant economic losses to the milk producers (Bruijnjs et al., 2010; Cha et al., 2010; Enting et al., 1997; Ettema and Østergaard, 2006). Herd and management factors such as

breed, herd size, housing conditions, and pasture access are associated with the prevalence of lameness (Barker et al., 2010; Chapinal et al., 2013; Haskell et al., 2006; Sogstad et al., 2005).

Farm conditions, which may impact lameness, vary across countries and it is thus likely that prevalence is also systematically different. Barker et al. (2010) found a mean prevalence of 36.8% (range 0–79.2%) in England, which comes very close to the prevalence of 34% (range 0–81%) reported for herds in Germany and Austria (Dippel et al., 2009). In contrast, prevalence was much lower in Spain, where Pérez-

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Cabal and Alenda (2014) identified an average of 13.8%, and in Sweden where, according to Manske et al. (2002a), the median lameness prevalence was 3.7% (range 0–33%), and slightly lower in Minnesota (USA) with a prevalence of 24.6% (range 3.3–57.3%) (Espejo et al., 2006). The differences between countries and studies are, however, difficult to interpret, because lameness is not necessarily identified and recorded in a comparable way.

Even though the basis of production rules for organic operations in Europe is the same, organic milk production conditions vary greatly throughout Europe, with respect to factors such as topography, climate, culture and national regulations for the farmers, but also in terms of dairy herd management (Ivemeyer et al., 2012; Vaarst et al., 2011). It is, therefore, likely that the prevalence of production diseases, such as lameness, in organic dairy herds varies substantially between countries. Only few studies have, however, specifically studied lameness in European organic herds and none recently. Thus, Huxley et al. (2004) found a 24.2%, Dippel et al. (2009) a median lameness prevalence of 34%, Rutherford et al. (2009) an average prevalence ranging between 8.3% and 18%, depending on housing system and season, and Barker et al. (2010) a mean lameness prevalence of 29.3%.

Animal health and welfare is an important aspect of organic (dairy) production, and the consumers of organic products have expectations regarding animal health and welfare being of a higher level in organic than in conventional systems (Harper and Makatouni, 2002). According to the EU regulation on organic production, good animal husbandry practices should be applied in order to achieve good animal welfare (Council of the European Union, 2007). There are no unified systems for recording disease levels (Sundrum, 2014), and thus no monitoring how that aim is achieved. It is also obvious that recent research into lameness prevalence in organic dairy herds is lacking, especially comparing the prevalence in several countries using a unified approach.

Within a European research project aiming at improving animal health in organic dairy herds (the IMPRO-project, www.impro-dairy.eu), an in-depth study of lameness was conducted in a structured and standardized way. The objectives of this study were to assess the prevalence of lameness in organic dairy herds in France, Germany, Spain and Sweden and to investigate associations between risk factors and lameness.

2. Materials and methods

2.1. Study design

This cross-sectional study was carried out in organic dairy herds in France, Germany, Spain and Sweden. The inclusion criteria for herds were: participation in (official) milk-recording schemes as of January 2012, certification as organic for at least one year before the start of the study, expected to be in operation for the coming year, and herd sizes representative of the country (average range and mean). Farms were recruited by phone or mail in Spain and Sweden. In Germany and France local advisors or veterinarians assisted in the process. Out of the willing participants a sample was drawn. The aim was to include 200 herds equally distributed among the four countries. However, only a few organic dairy herds fulfilled all the inclusion criteria in Spain, which is why additional herds were recruited in the other countries. A total of 73, 60, 28 and 57 herds were selected in France, Germany, Spain and Sweden, respectively. The distribution of farms followed the geographical distribution and organic share of dairy farms and captured the variation found in organic dairy production within Europe (Eurostat, 2017). Further details of the source population and selection process can be found in van Soest et al. (2015).

The sample consisted of very few herds with tie-stalls (11 herds with 294 observations) or herds without housing where the animals were permanently kept outside (6 herds with 198 observations). There was almost complete confounding between these farms and country, and these farms were therefore excluded from the statistical analyses. In

total, 8109 observations from 201 herds were thus included in the final analysis, with 2449 observations in 70 herds in France, 2450 observations in 60 herds in Germany, 807 observations in 20 herds in Spain, and 2403 observations in 51 herds in Sweden. All animals in this study were handled according to the common ethical standards of the participating countries, and ethical approval for the study was obtained from the local ethics committees, where necessary. Participation in the study was voluntary, and the farmers were informed about the purpose and methods of the study. They were assured that all information would be treated anonymously, and that they could withdraw from the study at any time. For the data retrieval, it was necessary to obtain consent from all participating farmers.

2.2. Collection of lameness data

Lameness scoring was performed according to the guidelines of the Welfare Quality® Assessment protocol for dairy cattle (Welfare Quality® Consortium, 2009). In total, six assessors from the countries carried out the scoring. Prior to the study, training sessions on lameness scoring were conducted in order to standardize the assessments. The sessions included hands-on group training with dairy cows and a final, individual validation of video recordings (11 videos) of lame cows. A weighted kappa value was used to measure the agreement between the scorers by analysing the results of these individually scored videos (Gwet, 2010). The overall kappa value was 0.49 (inter-quartile range = 0.18–0.81), indicating moderate agreement between the scorers (Dohoo et al., 2009). The number of individual cows assessed in each herd was determined according to the guidelines of the Welfare Quality® Assessment protocol. The animals to be scored were chosen by systematic random sampling—every *n*th cow to come across in the herd were scored until all necessary cows were scored, also as described in the Welfare Quality® Assessment protocol. The assessments were performed while cows were indoors. Selected cows lying down at the time of scoring were gently persuaded to raise and walk. Cows were scored whilst walking along the straight pathways inside the stable at their own pace or, if needed, with gentle encouragement. Observers viewed the cows from the side and from behind, and recorded the cow identity and lameness score. The following locomotion attributes were taken into account according to the guidelines of the Welfare Quality® Assessment protocol: timing of steps, temporal rhythm, and weight-bearing on feet.

Scoring criteria were as follows:

- 0–Not lame: timing of steps and weight-bearing equal on all four feet
- 1–Lame: imperfect temporal rhythm, creating a limp in the stride
- 2–Severely lame: strong reluctance to bear weight on one limb, or more than one limb affected

2.3. Collection of data on potential risk factors

The herds were visited once between March and August 2013; each visit took from 3 to 5 h. Information on potential risk factors was collected through a specifically designed on-farm questionnaire administered during the visit. The initial questionnaire was developed in an interdisciplinary process involving agricultural scientists, animal scientists, economists, sociologists, and veterinarians from the participating countries. The questionnaire covered the following areas: general information about farm and respondent, education and involvement in farmers' associations, reproduction, milking management, housing, feeding management, pasture and outdoor run, health status, health management strategies, and quality control. The information on farm characteristics and risk factors pertained to the year 2012. The questionnaire was developed in English and translated into French, German, Spanish and Swedish, and thereafter back-translated into English by a person not involved in the development of the questionnaire in order to detect anomalies. Finally, the questionnaires were

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