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How German dairy farmers perceive advantages and disadvantages of grazing and how it relates to their milk production systems

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ABSTRACT

Dairy farming in Europe and in Germany in particular, is characterized by a growing trend towards all-year-housing. Along with that the proportion of grass products as sources of energy for dairy cows is decreasing. On the other hand, society and politics strongly advocate grazing resulting in the introduction of pasture-milk programs. Little is known of the dairy farmers' perception of grazing and it is not clear what role their attitude towards grazing plays in their decision-making and how this is related to farm structure. To investigate these questions, we conducted a survey with face-to-face interviews on three types of German dairy farms: i.) grazing farms (n = 17), ii) exercise-pasture farms (n = 19), and iii) all-year-housing farms (n = 18). On grazing farms, pasture contributes significantly to the ration of the cows (0.2 ha grassland with 0.1 ha as pasture per cow and year; at least 6 hours of grazing on 120 days per year). Exercise-pasture farms offer their cows a much more restricted access to rather small pastures. All-year-housing farms have no grazing for dairy at all but feed their cows grass silage and hay.

Farmers from grazing farms expressed a high agreement with the positive aspects of grazing (low fodder costs, low labor input, benefits for animal health and fertility), while the all-year-housing farmers were more aware of the challenges and disadvantages of grazing and expressed a high agreement with its potential negative aspects (reduced milk yield, unsuitability for large herds, insufficient access of the herd to the pastures). The exercise-pasture farmers appreciated the advantages of better fertility and better animal health and saw fewer disadvantages of grazing than the all-year-housing farmers. Utilization of grass products also differed among the three groups: grass and grass silage made up 47% of the ration on grazing farms while on exercise-pasture farms and on all-year-housing farms, grass products amounted to only 28% and 23% of the ration, respectively. The grazing farms had fewer cows (n = 69) and smaller milk yields (8,270 kg milk per cow/year) than the exercise-pasture farms (n = 109; 9,524 kg milk per cow/year) and all-year-housing farms (n = 138; 9,404 kg milk per cow/year).

We also discuss the influence of the human tendency to avoid cognitive dissonance on farmers' responses. We conclude that in developing concepts to promote grazing, the differing attitudes and perceptions of dairy farmers and the interaction with differing farm structures need to be considered.

1. Introduction

Grazing dairy used to be the common practice in Germany until the 1990s. Since then, dairy farmers in North-Western Europe have increasingly been converting to all-year-housing systems (Van den Pol-Van Dasselaar et al., 2015; Van Vuuren and Van Den Pol-Van Dasselaar, 2006). Approximately 58% of dairy cows in Germany are kept in all-year-housing systems (Gurrath, 2011), mostly free walk systems (Statistisches Bundesamt 2011). The remaining 42% of dairy cows have access to pasture, but the importance of the pasture for providing energy differs substantially among farms. On some farms, pasture is an important source of energy and roughage in the grazing season, whereas on other farms pasture caters mainly for animal health and animal welfare and contributes almost nothing to the diet of the cows. Between these two extremes there exists a range of varying intermediate stages. Only a few farms rely for the most part on grazing for the diets of their dairy cows (Van Vuuren and Van Den Pol-Van Dasselaar, 2006; Holshof et al., 2016; Washburn and Mullen, 2014). Along with the decline of grazing, the importance of grass, grass silage and hay as the main sources of energy for dairy cows is generally

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decreasing (Peyraud and Peeters, 2016).

This situation might lead to a loss of trust by consumers in dairy products and in dairy farming as is already the case in poultry and pig farming (Weinrich et al., 2014). Despite the trend towards all-year-housing, society and politics hold a positive view of grazing and are in fact promoting this practice. In a number of countries grazing-milk programs have been established to encourage farmers to allow their cows to graze. A recent initiative in Germany to promote milk from grazing under a 'Pasture Milk' label is based on the 'German Pasture Charta'. According to this agreement, requirements for pasture milk include 0.2 ha grassland with 0.1 ha as pasture per cow and year; and cows need to have access to pasture for at least six hours on 120 days per year (Pro Weideland, 2017).

The advantages and disadvantages of grazing are frequently discussed among farmers and by public authorities (Pries, 2004) and are a topic for journals for the practicing farmer (Diersing-Espenhorst, 2016). A survey among Danish farmers found that all-year-housing farmers more often had an unfavorable image of grazing than farmers who used grazing for their dairy. The main concern of the farmers with all-year-housing was that grazing would reduce the performance of the herd (Kristensen et al., 2010). Increasing herd sizes is another concern and grazing of large grazing herds is challenging and can cause damage to the sward and paths, particularly in areas with heavy soils and high rainfall.

Advantages of grazing include better animal health (Washburn et al., 2002), in particular less incidences of mastitis (Hanson et al., 2013), less claw diseases (Armbrecht et al., 2018), and fewer problems with fertility (Palmer et al., 2012); generally, animal welfare is improved which was confirmed by Burow et al. (2013) who applied the welfare quality protocol (Welfare Quality, 2012). In addition, grazing farms have lower labor costs (Dartt et al., 1999; White et al., 2002) and lower feed costs (White et al., 2002; Tozer et al., 2003; Fontaneli et al., 2005).

In order to estimate the potential of the different farm types to increase or begin with grazing, it is important to know how much grassland the farms provide for their cows and how significant the grassland is to the farms.

Given that north-western Germany is one of the most important dairy regions in Germany (Bundesanstalt für Landwirtschaft und Ernährung (BLE), 2018), we set up an on-farm survey with a focus on this region with the aim of investigating German dairy farmers' perception of the main advantages and disadvantages of grazing.

We used the average milk yield, the herd size, grassland management, and the ration for the cows to assess the significance of grassland and grazing for the farm. We hypothesize that grazing farmers have a higher agreement with positive statements about grazing and that all-year-housing farmers agree more with negative statements.

2. Materials and methods

2.1. Farms

We visited 60 dairy farmers on their farms for face-to-face interviews. The farmers were all full-time farmers, but milk production was not necessarily the only source of farm income. On all the farms milk production was based on high-yielding dairy cows, whose rations were supplemented with concentrates. The grassland was managed intensively with at least three defoliations per vegetation period. We conducted interviews on three types of dairy farms that differed in terms of the role of grazing in providing feed for milk production. Before the visits, farms were approximately categorized according to the duration of grazing per day. After the farm visits, information from the questionnaires about grazing time and the actual amount of pasture available per cow was used to adjust the categorization. (Table 2).

The first group consists of grazing farms (n = 17) on which grazing contributed substantially to the diet. These farms matched the requirements of the German Pasture Charta (Pro Weideland, 2017): at least 0.2 ha grassland with 0.1 ha as pasture per cow and year; cows had access to pasture for at least six hours on 120 days per year. This is rather low but is intended also as an incentive to interest more farmers in grazing. Grazing cows with 8500 l milk per year and a dry matter intake of 20 kg would then take up more than 10% of the ration from grass on pasture (Holshof et al., 2016; Kuratorium für Technik und Bauwesen in der Landwirtschaft (KTBL), 2009). The second group is referred to as exercise-pasture farms (n = 19; Salomon et al. 2010) where cows had access to pasture for less than 6 hours per day and where the contribution of grazing to the total energy supply of the cows was negligible: less than 0.1 ha of pasture per cow. The third group consists of all-year-housing farms (n = 18) where cows did not graze and had no access to pasture at all. In the context of our survey grassland refers to all grassland, grazed and cut, that is used for the production of fresh grass and forage for the dairy herd. This includes dry cows and the heifers needed for replacement as well. Marginal land and set-aside land was not taken into account. 'Pasture per cow' refers to grassland which is only grazed by dairy cows. On some farms part of the total pasture is at times cut once or twice before it is solely used for grazing. The farms were mostly situated in the north-western part of Germany - one of the most important regions for dairy in Germany - (Bundesanstalt für Landwirtschaft und Ernährung (BLE), 2018) and were randomly spread over the area.

2.2. The survey

The face-to-face interviews with farmers followed a strictly structured questionnaire. In the first part, data on farm structure and dairy production system were requested for. This comprised questions on the farm size, the number of cows, the annual milk-yield, and the ration of the cows including the amount of maize silage and concentrates per cow. In the second part on the farmers' perception of grazing, farmers were presented with positive and negative statements about grazing. The positive statements about grazing were concerned with lower fodder costs, lower labor input, benefits for animal health and fertility in grazing systems. Negative statements involved lack of knowledge about grazing, inaccessible pastures, potentially reduced milk yield and risks of an insufficient supply with energy, supplemental feeds and water. Furthermore, the farmers were confronted with statements about the difficulties to monitor cow health and fertility in grazing cows and the challenge to combine grazing with large herds (Table 1). They were asked whether these aspects would motivate them to continue and increase grazing or whether they would discourage them from using grazing. Answers were rated on a balanced 5-point Likert scale (Likert, 1932) with both sides of a neutral option (3) ranging from 1 (no agreement) to 5 (full agreement) (c.f. Figs. 1, 2 and 3).

Before data analysis the validity of the information given in the answer sheets on the most important parameters was tested. Basic parameters were the milk yield per cow, the intake of concentrates and maize per cow per day and the energy content of roughage. These basic parameters had to fall within defined confidence limits and were then combined in a formula to calculate final parameters that had to match previously defined confidence limits as well, e.g. the amount of grass (grass + grass-silage + hay) in the feed ration and the dry matter intake per cow per day. For example: limits for concentrates and maize in a daily ration were set at 0 and 13 kg DM; for energy content of the forage and dry matter intake the possible range was defined at 4–7 MJ NEL kg^{-1} DM and 15–24 kg respectively. Detailed information about all parameters of the calculation can be found in a paper about the validity testing of the data (Becker et al., 2015).

Six farms had reported figures for milk yield and intake of concentrates and maize that fell outside the defined confidence limits and were subsequently removed from the survey. Finally, we used data from 19 all-year-housing farms, 18 exercise-pasture farms, and 17 grazing farms for analysis.