Journal of Dairy Research

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Housing assessment in farms in the Northwest of Spain: main facility weaknesses and strengths

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Research Article

Cite this article: Verdes S, Yáñez U, Trillo Y, Herradón PG, Peña AI, Becerra JJ and Quintela LA (2022). Housing assessment in farms in the Northwest of Spain: main facility weaknesses and strengths. *Journal of Dairy Research* **89**, 152–155. https://doi.org/10.1017/S0022029922000309

Received: 15 September 2021
Revised: 4 February 2022
Accepted: 7 February 2022
First published online: 7 April 2022

Keywords:
Animal welfare; cow comfort; dairy cattle; herd performance; infrastructure

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Abstract

The aim of this research communication was to examine and report the current situation of dairy farms in the province of Lugo (Galicia, Spain) regarding facility problems. We assessed the facilities of 168 free-stall dairy farms, housing in total 9228 Holstein cows in milk. Housing factors related to the resting area, circulation area, feeding area, ventilation area and milking area, as well as animal-handling features, were evaluated. Distance measurements were performed using a laser metre or a roll metric tape. A survey was conducted to gather information about cleaning and preventive protocols. Our results showed that most farms do not comply with the objective for cubicle measurements, width of the crossovers, type of flooring and presence of a quarantine pen, which may have a negative impact on the health and productivity of the animals. Therefore, to maximise the profits of the farm, the recommendations given in this study may be useful as a guide when building a new farm or remodelling the existing ones.

Dairy cattle welfare has become an important issue, as it is directly correlated with the production of the cows and, consequently, with the profitability of the farms (Verdes *et al.*, 2020). Due to the current situation of high production costs and low price per litre of milk, animal welfare may make the difference between making profits or not. If a cow does not achieve an adequate state of welfare, it will not develop its full productive potential.

In the literature, numerous references can be found regarding how different aspects of dairy farm facilities and their use influence the health, longevity, reproductive performance, and production of the animals (Molina *et al.*, 2019; Verdes *et al.*, 2020; Bugueiro *et al.*, 2021). Therefore, if we want to improve animal welfare in our farms, one important issue to consider is the way our facilities are built and how the herd is handled.

Although it might be expected that old facilities do not comply with the needed standards to achieve proper animal welfare, it is surprising to see how many recently built farms do not do so either. In this context, being aware of the main housing mistakes within a certain region may be an important advantage when designing and building new farms or remodelling the already existing ones.

Given this circumstance, the aim of this research was to examine and report the current situation of dairy farms in the province of Lugo (Galicia, Spain) regarding facility weaknesses and strengths, so this study may be useful as a guide to rectify or avoid mistakes in order to achieve proper animal welfare and, consequently, improve the performance of the herd.

Materials and methods

Farms

From January to December 2015, herd welfare was evaluated in 168 dairy farms located in the Northwest of Spain (province of Lugo, Galicia). This province has the largest population census of dairy cattle in Spain. Out of the 844000 dairy cows that were registered in the census in 2015 in Spain, 360000 (43%) were from Galicia, and 161000 (19%) were from the province of Lugo. Additionally, out of the 6799 thousand tons of milk produced during that year in Spain, 2722 (40%) were produced in Galicia (MAPA, 2015a, 2015b).

Farms were selected within the collaborator veterinarians' client list. These veterinarians were responsible for the reproductive control on dairy farms in the region. We aimed to involve as many farms as possible within the areas where the density of farms was higher. Only free-stall farms were included. Although there still are tie-stall farms, these are usually old, and the tendency is for them to disappear. All animals included in this study were Holstein breed. The total number of cows in milk was 9228, with a mean number of cows in milk per farm of 55 (10–240).

Data collected

All farms were visited once by the same evaluator, and all data were collected always following the same order (see online Supplementary Table 1). The facility-based factors regarding resting area, circulation area, feeding area, ventilation area and milking area, as well as animal-handling features, were evaluated as previously described by Juaristi *et al.* (2004) and Verdes *et al.* (2020) (see online Supplementary Table 2). Distance measurements were performed using a laser metre or a roll metric tape. A survey was conducted to gather information about the milking, the herd, the frequency of cleaning and the performance of hoof trimming.

Statistical analysis

To analyse the data, factors that complied with the welfare objective were scored 0 and those that did not comply were scored 1. The percentage of farms that complied with the objective was calculated for each factor. Then, factors were ordered according to this percentage, and quartiles were calculated. Those factors included between 0% and 25% (1st quartile) were classified as the main weaknesses, whereas those included between 75% and 100% (4th quartile) were characterised as the main strengths of the farms in the region of study. All data were analysed using SPSS version 20.0 for Windows (SPSS Inc, Chicago, IL, USA).

Results

Factors included in the 1st and 4th quartile are shown in Table 1. The factors with the least percentage of farms that comply with the objective were cubicle measurements, including total length (5.7%), brisket broad distance from curb (24.9%), neck rail distance from curb (5.7%), and curb height (15.5%); the width of the crossovers (16.6%) and the placing of rubber flooring (4.1%). Also included in this weakness category were the stripped surface or placing of rubber flooring over the waiting area of the milking parlour (7.9%), and the presence of a quarantine pen (13.5%).

On the contrary, among the main strengths we found: the bedding, focusing on dry bedding (76.6%), level bed surface (80.3%) and the frequency of bedding maintenance ≥2 times per day (80.8%); the alley maintenance, regarding slippery floor (76.6%), accumulation of manure in the alley (87.6%), and presence of slurry pit under the barn (89.1%); the animal handling, referring to cow crowding (77.2%), footbaths (80.3%), stress for a scarce commodity (82.9%), presence of cows with tail (87.6%), flight zone (89.6%), and presence of biting flies (95.3%). Also in this strength category were several factors related to the feeding area, including width of headlocks (82.9%), water analysis (86%), cleaning feeding fence (98.4%), continuous feeding availability (99%) and covered feeding table (99%), as well as the maintenance of an accurate environment, concerning spiderwebs (80.8%), lateral opening (81.3%), sidewall height (82.4%), height to ridge (86%), condensation (87.6%), air movement on the face of the cow (89.6%) and excessive humidity (93.8%).

Table 1. Proportions of the main housing weaknesses and strengths (expressed as percentages) observed in farms in the Northwest of Spain

Variable	% of farms that comply
Main weaknesses	
Rubber floor[a]	4.1
Total stall length[b]	5.7
Neck rail distance from curb[b]	5.7
Stripped/rubber flooring over waiting area[c]	7.9
Ceiling insulation[d]	10.4
Quarantine pen[b]	13.5
Curb height[b]	15.5
Width crossovers[a]	16.6
Brisket broad distance from curb[b]	24.9
Main strengths	
Slippery floor[a]	76.2
Dry bedding[b]	76.7
Cow crowding[e]	77.2
Level bed surface[b]	80.3
Footbaths[e]	80.3
Bedding maintenance[b]	80.8
Spiderwebs[d]	80.8
Lateral opening[d]	81.3
Sidewall height[d]	82.4
Stress for a scarce commodity[e]	82.9
Width of headlocks[f]	82.9
Water analysis[f]	86
Height to ridge[d]	86
Accumulation of manure in the alley[a]	87.6
Presence of cows with tail[e]	87.6
Condensation[d]	87.6
Slurry pit under barn[a]	89.1
Flight zone[e]	89.6
Air movement on the face of the cow[d]	89.6
Humidity[d]	93.8
Presence of biting flies[e]	95.3
Cleaning feeding fence[f]	98.4
Continuous feed availability[f]	99
Feeding fence covered[f]	99

[a]Circulation area.
[b]Resting area.
[c]Milking area.
[d]Ventilation area.
[e]Cow area.
[f]Feeding area.

Discussion

Overall, the results of this study showed that, although most farms in Lugo province have an accurate performance regarding the maintenance of facilities and animal handling, there still are several aspects to improve concerning housing measurements and materials, even in recently built farms.

Among the main weaknesses observed, it should be noted that cubicles were small, which can affect the resting time of the

https://doi.org/10.1017/S0022029922000309 Published online by Cambridge University Press

animals. Consequently, cows may lay less frequently, or may do so in other places besides the cubicles, including crossovers and alleys (Cook and Nordlund, 2004). This has a negative impact on cattle hygiene. The presence of dirt over the udder and hindquarters due to laying out of the cubicle is a risk factor that favours the appearance of mastitis (de Pinho *et al.*, 2012) and affects hygienic milk production and thermoregulation (Bugueiro *et al.*, 2018). Moreover, Molina *et al.* (2019) reported a correlation between less clean animals and lower milk production. Additionally, according to Grant (2004), cows need to lie down for about 12–14 h a day; during this period, not only are the dry-matter intake and blood flow to the mammary gland favoured, but it also gives time for the hooves to rest (Calamari *et al.*, 2009). A substandard laying period would diminish feed intake, milk production and would promote the occurrence of lameness and hoof lesions (Tucker *et al.*, 2021).

Most crossovers did not allow the simultaneous passage of two animals. In this regard, it is important to remark that there is a dominance relationship between animals in a herd, and some aggressive interactions increase when space constraints are imposed (Fregonesi *et al.*, 2007). As a consequence, subordinate cows may be bullied and inhibited from accessing a certain resource (such as the feeding fence, cubicles, or mechanical brush), acquiring a submissive or avoidance behaviour, and getting their movements blocked by dominant cows in their paths (Cook and Nordlund, 2004).

Another facility drawback in most farms was the absence of rubber flooring or stripped surface over the waiting area of the milking parlour and the alleys and crossovers. The use of rubber flooring has been extensively documented in the literature. In this regard, Boyle *et al.*, (2007) suggested that cows prefer to stand on comfortable surfaces, but they did not find a beneficial effect of rubber flooring on either hoof health or oestrus expression and reproductive performance. However, other researchers stated that cows on rubber flooring show an earlier onset of regular oestrus behaviour, resulting in an earlier pregnancy and a shorter calving interval, but it has no effect on milk yield (Kremer *et al.*, 2012). Concerning hoof health, Oehme *et al.* (2019) reported a reduction in mechanical load while standing and walking on rubber flooring in comparison with concrete, which might reduce mechanically induced hoof lesions. Moreover, Telezhenko *et al.* (2017) assessed the slip resistance of different types of solid flooring in cattle facilities; they concluded that the risk of slipping is reduced when the cow walked on a surface with better compressibility, such as rubber mats, where the claws could sink deep enough, providing significantly better gait.

In order to achieve proper biosecurity, farms need a biosecurity plan that considers all the risks and includes strategies to manage disease (Dargatz *et al.*, 2002). Among these strategies, the introduction of new animals should be carefully considered, as they might carry diseases either from the farm of origin or acquired at the market or during transit (Laurence, 2014). Consequently, not only a separation of time, but also a physical separation is needed to prevent spread of pathogens. Therefore, a period of quarantine and a quarantine pen are highly recommended to allow the number of pathogens to decline (Laurence, 2014). Nevertheless, few farms in the province of Lugo have a quarantine pen, which may negatively influence the welfare of the cows already in the herd regarding their health status. It has been reported by Bugueiro *et al.* (2018) that management of diseases is a warning aspect to take into consideration in farms from Galicia, encouraging farmers to include new health-control plans to provide better prevention of pathologies.

Our results are different from those obtained by Molina *et al.* (2019), who reported 'excellent' and 'enhance' scores (according to Welfare Quality® protocol) regarding housing assessment in farms in southern Spain. This may be explained by the different protocols used to evaluate housing factors, as they did not consider cubicle measurements or type of flooring. On the contrary, Bertocchi *et al.* (2018) claimed that the presence of cubicles with wrong dimensions or design was one of the main housing hazards in Italian farms, as well as the type of floor in walking areas.

In most farms, appropriate maintenance of facilities was observed. More than 75% of the farms in this study kept the bed surface dry and levelled, and cleaned the cubicles with sufficient frequency. In addition, food and water supply were proper in almost all farms regarding water analysis, cleaning and cover of the feeding store as well as feed availability. Moreover, an accurate environment was noticed in most farms as far as infrastructure, alley maintenance, presence of biting flies and location of the slurry pit are concerned. As discussed above, hygiene is a key aspect of successful herds, as it affects the health of the cows and their milk yield (de Pinho *et al.*, 2012; Bugueiro *et al.*, 2018; Molina *et al.*, 2019). Furthermore, not only are their productive capacity and health affected by hygiene, but also by an adequate supply of basic needs such as feeding and drinking (Bugueiro *et al.*, 2021). Finally, it should be noted that most farms complied with proper animal handling, including cow crowding, foot baths, stress, flight zone, and presence of cows with a tail. On this subject, Bova *et al.* (2014) claimed that certain management practices such as handling and housing conditions may act as major stressors, as they can severely affect the health and production of the cows.

In conclusion, cubicle and crossovers measurements, flooring materials and the absence of a quarantine pen are the main facility weaknesses observed in dairy farms in the province of Lugo. The design of the facilities should be carefully considered, as it is directly associated with the health and productivity of the cows. Therefore, to maximise both these factors and, consequently, the profits of the farm, the recommendations given in this study may be useful as a guide when building a new farm or remodelling the already existing ones.

Supplementary material. The supplementary material for this article can be found at https://doi.org/10.1017/S0022029922000309

Acknowledgements. This study was partially supported by Diputación Provincial de Lugo (Convenio 2015-CP011). Uxía Yáñez Ramil holds a predoctoral contract (Ref. 2020/122) from the Xunta de Galicia. The authors wish to thank the veterinarians and farmers for their uninterested collaboration.

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https://doi.org/10.1017/S0022029922000309 Published online by Cambridge University Press