

THE STATE OF DAIRY CATTLE CLEANLINESS IN THE REGION OF KABYLIE, ALGERIA

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Abstract: The aim of our study was to assess the cleanliness of dairy cows in the Kabylie region: Bouira, Béjaia and Tizi-Ouzou, since these three regions being known for their practice of dairy cattle breeding. Thus, 78 farms were visited and a total number of 705 dairy cows were selected (21 farms in Bouira with 210 dairy cows, 29 farms in Béjaia with 180 dairy cows and 28 farms in Tizi-Ouzou with 315 dairy cows). The cleanliness of the cows was assessed by using four point scale 1 (clean), 2 (slightly dirty), 3 (dirty) and 4 (very dirty) and concerns 3 areas: udder, flank/thigh and hind legs. We also evaluated the rate of farms complying with hygiene standards by calculating the ratio of the number of cows with a score of 3+4 to the total number of dairy cows on the farm. Our results showed that the udder area is the cleanest compared to the flank/thigh and hind leg areas. However, the majority of farms in the Kabylie region do not meet the hygiene standards. As cleanliness affects the health and welfare of animals, dairy farmers in the region must take particular care of hygiene on their dairy farms regardless of the livestock farming system.

Keywords: Cleanliness, Dairy Cattle, Kabylie.

INTRODUCTION

Hygiene affects the health and welfare of animals. There is strong evidence that the prevalence of mammary infections is significantly associated with dairy cows cleanliness (Hughes, 2001; Schreiner and Ruegg, 2003; Munoz et al., 2008; Ward et al., 2002; Rajabi et al., 2017). Also, the animal cleanliness in general, and of the udder in particular, has an effect on the occurrence of subclinical mastitis (Ellis et al., 2006; Vasilev et al., 2007; Khanal et Pandit, 2013; Neja et al., 2016; Lamsal, 2018) and clinical mastitis (Vasilev et al., 2007; Breen et al., 2009; Neja et al., 2016). According to Khanal and Pandit (2013), mastitis causes significant economic losses on dairy farms due to reduced productivity, discarded milk, treatment costs and veterinary charges.

In addition, cow cleanliness, especially leg cleanliness, is a risk factor in the development of hoof diseases associated with lameness problems (Bergsten and Petterson, 1992; Hultgren and Bergsten, 2001; De Rosa et al., 2003; Howell et al., 2003; Ariza et al., 2019).

The state of the cow's cleanliness affects the hygienic quality of the milk (Golton et al., 1982; Schreiner and Ruegg, 2003; Ruud et al., 2010; Hauge et al., 2012). The cleanliness of cows impacts the total number of germs in the milk (Golton et al., 1982), as well as the somatic cell count (Barkema et al., 1998; Schreiner and Ruegg, 2003;

Sant'Anna et al., 2011; Neja et al., 2016). Furthermore, according to Ruegg (2006), good hygiene is essential to preserve consumer health, since it's not uncommon for dairy cows to reject in their excrement to dangerous bacteria such as *Salmonella* spp and *Campylobacter jejuni*, which can contaminate milk that becomes harmful if consumed raw and before pasteurisation.

Cleanliness of the animals also leads to an increase in the workload related to the preparation and udder cleaning before milking (Herlin et al., 1994; Hughes, 2001), as well as a deduction in the payment of farmers holding dirty animals in slaughter houses (Hauge et al., 2012).

However, hygiene is a subjective parameter that differs from one observer to another, and according to Hughes (2001), farmers who are in daily contact with animals do not always notice the increase in dirt. According to Faye and Barnouin (1985), animals cleanliness reflects the hygienic conditions of the environment. Physical, chemical or microbiological measurements to assess the environment are laborious and expensive and only the assessment of the cleanliness of the animal itself as a witness of the environment seems easy to use if it can be objectified. In this context, animal cleanliness rating grids have been proposed by several authors, including Faye and Barnouin (1985), Hughes (2001), Reneau et al. (2005), Bastien et al. (2006) and Lévesque (2006).

To our knowledge, very little work (Kadi, 2007; Belkheir et al., 2015) has focused on this topic in Algeria. Therefore, the objective of this study is to assess the cleanliness of dairy cows in Kabylie, which includes the regions of Bouira, Béjaia and Tizi-Ouzou.

MATERIALS AND METHODS

Selection of farms

The study was conducted in the Kabylie region of northern Algeria during the months of May to June. The farms were selected from the region's dairy cow farms whose livestock farmers accepted to cooperate, and 78 farms were selected for a total number of 705 dairy cows. The farms are located in 3 regions known for their dairy cattle breeding practices: Bouira (21 farms with 210 dairy cows), Béjaia (29 farms with 180 dairy cows) and Tizi-Ouzou (28 farms with 315 dairy cows). The farms visited use a tie-stall or tie-stall system with access to exercise area.

Cow cleanliness assessment

The cleanliness of the cows was evaluated on site using the scoring grid proposed by Lévesque (2006). The evaluation consists of assigning, visually and individually, a mark on a standing animal and concerned 3 areas: udder, flank/thigh and hind legs. The dirt noted is ancient and dry and when one flank is dirtier than the other, a mark is attributed to the dirtiest flank. According to Lévesque's (2006) recommendations, cow cleanliness is evaluated by using four point scale (Figure 1):

Note 1: "Clean" absence of dirt.

Note 2: "Slightly dirty" dirt in the form of traces.

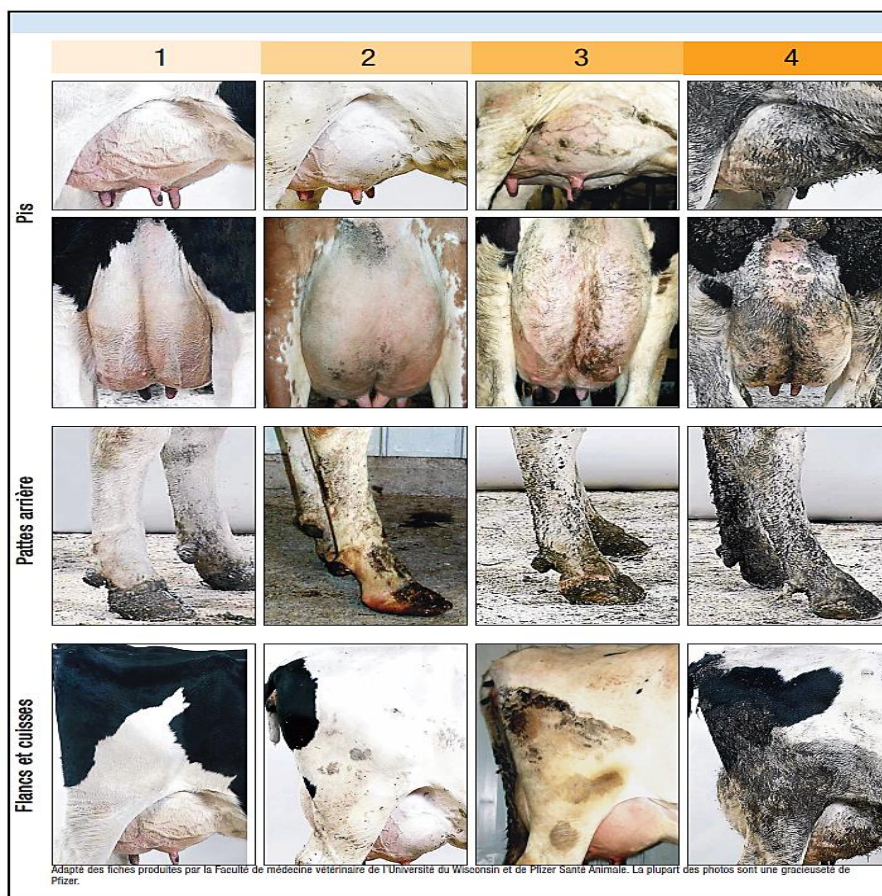
Note 3: "Dirty" means that there are plates of dirt that still allow the hair to be seen.

Note 4: "Very dirty" the dirt covering the hair.

Figure1. Point scale to evaluating the cleanliness of dairy cows according to Lévesque (2006)

The data were collected in an Excel file containing the number of cows with a score of 1, 2, 3 or 4 for each area evaluated, i.e. udder, flank/thigh and hind legs, on each farm in the 3 study regions. We then determined the proportion of dairy cows with a score of 1, 2, 3 or 4 for each zone in each of the three study regions. Finally, following the recommendations of Lévesque (2006), we calculated for each farm the ration between dairy cows with scores 3 and 4 and the total number of dairy cows in the three zones evaluated and for each of the three studied regions.

RESULTS AND DISCUSSION



The Lévesque (2006) dairy cow cleanliness evaluation grid, used in our work, takes in to account the scoring of 3 zones: udder, hind legs and flank/thigh.

Cleanliness of the udder

Individual observation of the dairy cows showed that on all the farms investigated, the first position in udder scoring was the score 2 (Figure 2).

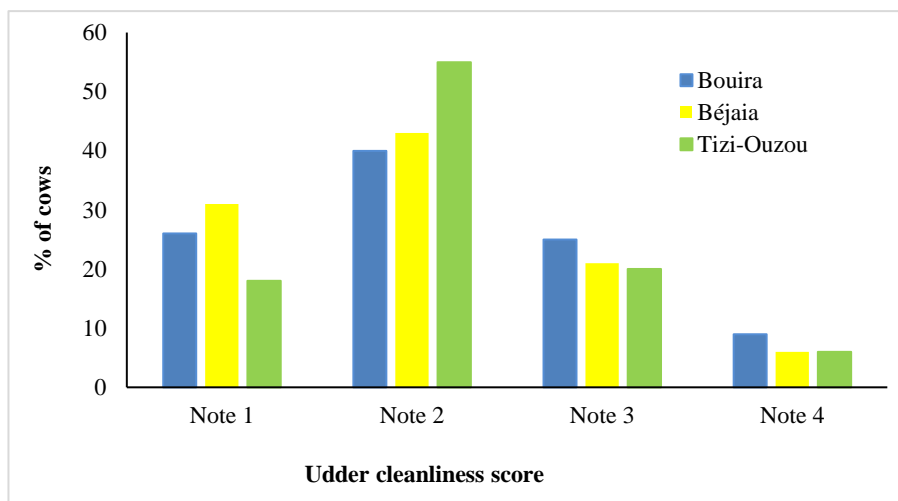


Figure 2. Proportion of dairy cows according to udder cleanliness score in the three study regions

The udder cleanliness affected the welfare and health of the dairy cows. Udder infection by exogenous way is by far the most common and most often of bacterial origin. Cows are often in contact with environmental pathogens that cause mastitis; when teats and udders are dirty and soiled, many of these bacteria have the opportunity to infect the udder (Schreiner and Ruegg, 2002). Thus, several studies report correlation between the udder cleanliness score and the occurrence of subclinical mastitis (Schreiner and Ruegg, 2003; Ellis et al., 2006; Neja et al., 2016; Lamsal, 2018) or clinical mastitis (Vasilev et al., 2007; Breen et al., 2009; Neja et al., 2016). Also, cows with an udder cleanliness score ≥ 3 are 1.5 times more likely to develop udder inflammation (Vasilev et al. 2007). In the present study (Figure 2), more than a quarter of the cows (28% so over 200 cows) obtained an udder cleanliness score ≥ 3 , which is not reassuring and should incite to better observation and detection of cows with mastitis.

Furthermore, the udder cleanliness affects the quality of the milk. According to Schreiner and Ruegg (2003), Reneau et al. (2003) and Neja et al. (2016), the somatic cell count of milk increases with increasing udder cleanliness score. In addition, udder cleanliness can affect the microbiological quality of the milk as measured by the total germs in the milk (Galton et al., 1982; Konputtar et al. 2015), presenting a serious health risk for consumers. According to Schreiner and Ruegg (2003), cows with an udder hygiene score of 3 and 4 are 1.5 times more likely to produce milk containing major pathogens than cows with a hygiene score of 1 or 2. Although the prevalence of udder cleanliness scores 1 and 2 is highest (Figure 2), the proportion of dairy cows with udder cleanliness scores 3 and 4 is important and close to 30%, which can negatively affect the microbiological quality of raw milk produced in these areas. Indeed, work carried out in the north-central region of Algeria (Adjlane et al., 2014), in the region of Tizi-Ouzou (Titouche et al., 2016), in the medio-seventh region (Kaouche-Adjlane and Mati, 2017) and in the central region of Algeria (Baazize-Ammi et al., 2019) confirms that the cow's milk produced in these regions is of bad microbiological quality. According to Titouche et al. (2016), the consumption of raw cow's milk can pose health risks and given that it is marketed through the informal circuit that escapes any health control, it can present a

risk to the health of consumers (Baazize-Amami et al., 2019). In these different studies, these authors agree on the fact that the contamination of milk is attributed to poor hygiene practices, particularly milking.

Also, udder hygiene scores are significantly associated with hind leg hygiene scores (Schreiner and Ruegg, 2003; Zurbrigg et al., 2005).

Cleanliness of the hind legs

Concerning the cleanliness of the hind legs, the observations made on dairy cows showed a difference between the 3 study regions (Figure 3).

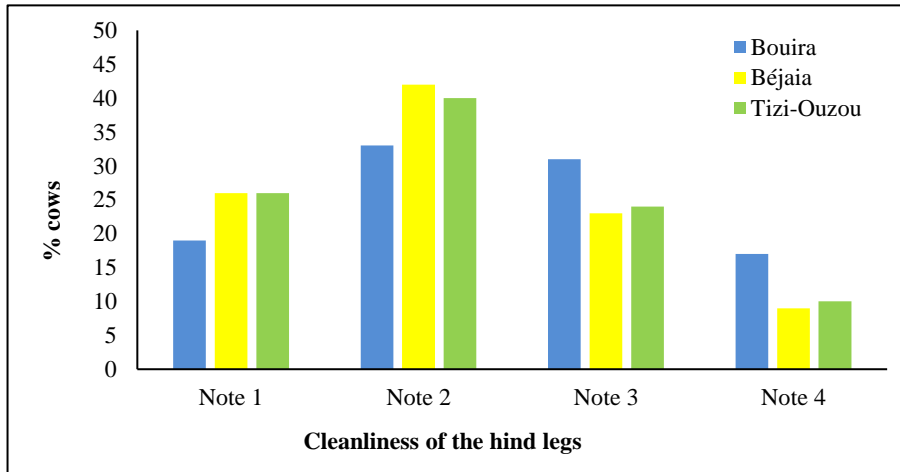


Figure 3. Proportion of dairy cows according to the hind legs cleanliness score in the three study regions

According to Ruud et al. (2010), the legs are generally the dirtiest part of the body as cows walk in the manure covering the alleys. Thus, it seems that better stall hygiene improves hind leg cleanliness and leads to improved hoof health (Bergsten and Petterson, 1992). Bowellet et al. (2003), also report that locomotion score is negatively correlated with leg cleanliness score in dairy cows. This is because leg cleanliness is a risk factor for diseases that induce lameness and affect farm profitability (Ariza et al., 2019). Faye and Barnouin (1988) report a strong positive correlation between milk production and legs disorders in highly dairy cows. Also, these diseases often cause lameness, which is considerably high when hygiene rules are neglected.

Our results show that 48, 32 and 34% of the cows in the region of Bouira, Béjaia and Tizi-Ouzou respectively obtained the cleanless score of hind legs ≥ 3 . Therefore, this can lead to locomotion problems that affect the health, comfort and welfare of the cows as well as the profitability of dairy farms.

In addition, they are the hind leg and udder cleanliness scores that are significantly associated with somatic cell count in milk and increase with increasing hygiene score (Reneau et al., 2005; Vasilev et al., 2007). According to Reneau et al. (2005), in herds with a prevalence of environmental mastitis and a milk somatic cell count ≥ 400000 cells/ml, each one-unit change in the composite udder-hind legs hygiene score will be associated with a decrease in milk somatic cell count.

Cleanliness of the flank/thigh

For this parameter, the Bouira region is distinguished by cows that appear to be less clean, with only 28% of the cows scoring 2 in this region, compared to the other two regions where the proportions for this parameter are above 40% (Figure 4). This is confirmed by the proportion (20%) of cows obtaining a score of 4 (dirty) in this region, as opposed to 12% on average for Béjaïa and Tizi-Ouzou.

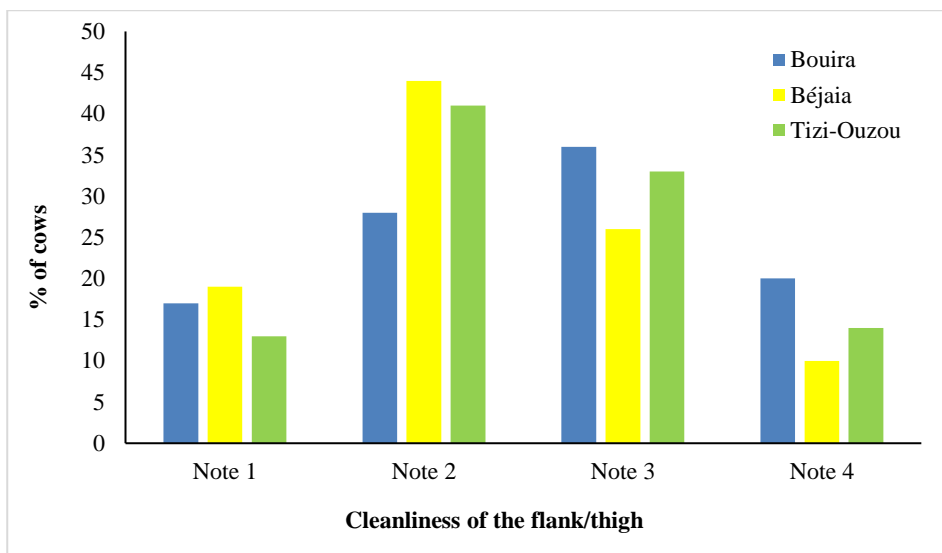


Figure 4. Proportion of dairy cows according to the hind legs cleanliness score in the three study regions

The cleanliness of the flank/thigh region depends on the presence and quality of the bedding used (Hughes, 2001; Ruud et al., 2010). However, according to Ruegg (2006), organic bedding is a favourable environment for microbial development. So, to keeping animals clean, bedding material must be abundant, dry and frequently renewed (Hughes, 2001; Ruegg, 2006).

Globally, our results show that the udder region is cleaner than the hind legs and the flank/thigh region and are in agreement with the scientific literature (Vasilev et al., 2007; Ruund et al., 2010; Neja et al., 2016; Erbez et al., 2018; Lamsal, 2018), probably due to less udder contact with the ground when the animal is lying down compared to the thighs and hind legs. In addition, the prevalence of scores 1 and 2 indicates good udder cleanliness due to the cleaning and drying of udders by farmers before each milking in order to have milk with an acceptable germ account in order to avoid milk being rejected the dairies.

According to Lévesque (2006), in farms that conform to hygiene standards, the ratio between the number of cows with a score of 3 and 4 and the total number of cows must not exceed 10% for the udder, 20% for the flank/thigh and 15% for the hind legs in tie-stall conditions.

Our results showed that the majority of farms do not respect the hygiene standards, since 57, 66 and 61% of the farms in the regions of Bouira, Béjaïa and Tizi-Ouzou respectively, present a proportion of cows with scores of 3 and 4 exceeding 10% and varying between 11 and 100%. Concerning the cleanliness of the hind legs, 76, 55 and

39% of the farms exceed the norm by 15% in the three regions and ranging from 11 to 100%. Similarly, the 20% standard for the cleanliness of the flank/thigh is not complied in 81% of farms in Bouira, 69% of farms in Béjaia and 79% of farms in Tizi-Ouzou, and ranging from 14% to 100%. Thus, hygiene conditions are bad in the majority of farms in Kabylie. Ours observations are similar to those reported by Kadi (2007) and Belkheir et al. (2015) which concluded that there is a poor level of hygiene in dairy farms in the Tizi-Ouzou region.

Indeed, several factors have an effect on the cleanliness of dairy cows, such as management factors: scraping routines, the use of bedding material, washing and brushing, ... (Hauge et al., 2012), housing design: trying system, size and presence of stall dividers (Erbez et al., 2018; Kimeli et al., 2019), location of drinking troughs (Lapointe et al., 2010). Also, the size of the herd (Ruud et al., 2010), the season and climatic conditions (De Rosa et al., 2003; Sant'Anna et al., 2011), the type of stall (Sant'Anna et al., 2011), the feed that conditions the consistency of the faeces (Hughes, 2001, Ward et al., 2002) are as many other factors that must also be considered to ensure the cleanliness of the dairy cows.

CONCLUSION

Our results showed that, in the study region, udder is the cleanest area compared to the hind legs and the flank/thigh area of the dairy cows. However, the majority of farms in the Kabylie region do not conform to hygiene standards. Dairy farmers in the region must therefore, take particular care of hygiene on their dairy farms regardless of the livestock farming system.

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