



Health of the Locomotor System Indicator of Welfare of Algerian Dairy Cows[†]

Imene Djaalab^{1,*} , Samia Haffaf², Hadria Mansour-Djaalab¹, Foulla Riachi¹, Loutfi Ghoribi^{1,*} and Abdel Fattah Beghrich¹

¹ Institute of Veterinary Sciences, University Constantine 1 Frères Mentouri, Constantine 25000, Algeria

² Department of Veterinary Sciences, University Mouhamed Boudief-M'sila, University Pole, M'sila 28000, Algeria

* Correspondence: imendjaalab@gmail.com (I.D.); loutfiveto@yahoo.fr (L.G.)

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Abstract

Animal Welfare has a significant impact on the dairy cow's health, behaviour, productivity and milk quality. By implementing husbandry practices that respect the physical, behavioural and emotional needs of dairy cows, the dairy industry can improve the sustainability of its operations and meet rising expectations. The aim of this study is to evaluate the impact of housing systems (free vs. tied) on dairy cow health through musculoskeletal health indicators and lameness scores. The hypothesis that dairy cows reared in free housing have a better quality of health than cows reared in restrained housing is tested. Thus, 300 dairy cows of the Holstein and Montbeliarde breeds were selected from dairy farms in five municipalities of Constantine province (eastern Algeria). The results showed that the frequency of severe lameness did not exceed 12% in stalls with restraints and more than 42% of light lameness are in free-stall housing ($p < 0.001$). These results reflect a lack of comfort in restricted housing, with an impact on dairy performances. Moreover, the monitoring of lame cows and the functional trimming of their hooves should be frequent. It is also important to implement a cull policy for unproductive cows. Finally, it is very important to provide adequate training to farmers in order to improve the well-being of dairy cows.

Keywords: welfare; dairy cows; locomotor system; Algeria



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1. Introduction

Livestock are considered an important asset on the African continent. In most countries in North Africa, animal welfare is rarely the subject of specific legislation or regulations [1]. Concern about how animals are treated exists in many different cultures but has become particularly important in western countries over the past twenty years. Animal welfare is, however, one of the critical competencies considered by the World Organisation for Animal Health (OIE), which has already been consulted by most researchers in African countries [2]. Hence, animal welfare assessment involves the development of objective indicators that are both capable of providing scientifically reliable information on an animal's quality of life and immediately usable by professionals [3]. As animals are sentient beings that can experience both positive and negative emotions, the indicators must reflect not only their physical health but also their feelings about the conditions where they live. It becomes clear that different environmental facilities and housing equipment can influence the ability of the animal to cope [4]. For example, the number, design and location of feeders and troughs

can influence livestock activities (feeding and watering), as well as their social behaviour and the occurrence of physical injuries [5], thus affecting productivity and the health and welfare of livestock. Furthermore, some experts argue that vacant housing would lead to a higher risk of lameness [6]. In this context, the current study aims to highlight the impact of housing type on the health of the locomotor system by identifying the forces and weaknesses of these agricultural housing systems, as well as their impact on the health and welfare of dairy cows, using indicators or simple health scores to determine the degree of lameness in dairy cows.

2. Materials and Methods

The study included 300 Holstein and Montbeliarde cows, 166 females housed in free-stall farms and 134 females housed in tie-stalls. The analysis of cow welfare indicators focused on lameness scores of the locomotor system according to the type of housing. The test consists of evaluating the cow's locomotion score using the method of Sprecher et al. [7]. This test should be performed on an animal in a static position and walking on a comfortable, flat surface, while observing the back position and gait appearance. The score is between 1 (normal) and 5 (severe lameness). A single-factor variance analysis is performed (ANOVA 1 test) using Graph Pad Prism 7.00 software. Differences were considered significant at $p < 0.05$.

3. Results and Discussion

The prevalence of lameness in dairy cows housed in both types of housing is reported in Table 1. The frequency of lameness is influenced by the type of housing ($p < 0.0001$). During spring, healthy females (score 0 and 1) with normal gait were significantly more numerous in free housing than in confined housing ($73.71 \pm 10.10\%$ (134) vs. $33.71 \pm 4.11\%$ (77); $p < 0.001$). In contrast, we observed the absence of cows suffering from severe lameness (score 4 and 5) housed in free housing as compared to those in confined housing (0% vs. $12.32 \pm 2.93\%$ (13); $p < 0.0001$). Overall, the type of housing has a significant influence ($p < 0.01$) on the average limp score. In contrast to the restricted housing, females from free-range farms are ranked best and have a significantly low mean lameness score (1.21 ± 0.09 (166); $p < 0.01$).

Table 1. Prevalence of dairy cow lameness in relation to type of housing (percentage and average score: mean $\pm$ S.E.M.).

Lameness Score		Free Stall		Tie-Stall		<i>p</i>
		%	n	%	N	
Healthy cow	[0–1]	73.71 ± 10.10 ***	134	33.71 ± 4.11	77	<0.0001
Light lameness	[2–3]	42.76 ± 9.23 **	32	26.035 ± 2.4	44	
Severe lameness	[4–5]	0 ***	0	12.32 ± 2.93 *	13	
Average score		1.21 ± 0.09 **	166	1.97 ± 0.81	134	<0.01

* Significant difference ($p < 0.05$). ** High significant difference ($p < 0.01$). *** High significant difference ($p < 0.001$).

For bovines, most epidemiological surveys agree that lameness is the third most common disease after infertility and mastitis [7]. According to one study, which is in agreement with ours, Cook [6] notes that in free-range herds, the average prevalence of lameness in winter is significantly higher than during summer (27.8 vs. 22.8%; $p = 0.004$). Furthermore, Bernardi et al. [8] argue that lameness is one of the major problems in increasing dairy production and a cause of pain and discomfort in dairy cows, represented by reduced mobility and altered behaviour. In addition, it has been demonstrated that significantly higher access to pasture in free-standing systems [9] facilitates the cow's movement and transition from a standing to a lying position relative to restrained

housing conditions [4,10]. Conversely, during periods of restricted housing, cows being confined to the farm after a period of free access to pasture may cause marked differences in locomotor activity.

4. Conclusions

This study showed that the welfare of dairy cows and the frequency of lameness are strongly influenced by the housing system. The high incidence of severe lameness and inadequate management practices in stalled holdings led to the appearance of physiological disorders. Therefore, these major welfare problems in dairy cows led to the deterioration of their overweight condition, which had an impact on their milk yield.

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