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## A prospective exploration of farm, farmer, and animal characteristics in human-animal relationships: An epidemiological survey

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### ABSTRACT

Human-animal relationships are essential for dairy farming. They affect work comfort and efficiency, as well as milk production. A poor human-animal relationship can result in stress and accidents to both animals and caretakers and needs to be improved. However, many studies have demonstrated the multifactoriality of these relationships. We aimed at assessing the relative importance of the various factors expected to be associated with poor human-animal relationships. On 118 dairy farms, we applied a standardized avoidance distance test to cows at the feeding rack. The sample of farms covered a wide range of situations: lowland versus highland, small versus medium size farms, cubicles versus deep-bedded systems, milking parlor versus automatic milking systems, and Holstein versus Montbéliarde breeds. We used Poisson regression to analyze the links between the number of cows that accepted being touched, and farm characteristics, animals, management, and farmers' attitudes. A multivariate analysis yielded a final model that explained 32.7% of the variability between farms. Calving conditions ("Main calving location" and "Cleaning or adding litter after calving") accounted for a significant part of the variability observed (respectively 25.8 and 13.6% of variability explained by the model, SSB). Fewer cows accepted being touched on farms where the main calving location was in the barn, and where farmers cleaned or added litter after calving. The proportion of cows that accepted being touched increased with the proportion of lean cows in the herd (18.8%), with worker/cow ratio on the farm (11.7%), when farmers considered "health" or "human-cow relationships" as most impor-

tant issues for farm success (10.4%), and with farmers' years of experience (10.8%). Farmers with more negative behavioral attitudes toward cows had a lower proportion of cows that accepted being touched (8.9%). In conclusion, the human-animal relationship was not found to be associated with farm characteristics (e.g., housing or milking system) but varied with farmers' attitudes and management. We confirm that cows' fear of people is linked to negative attitudes displayed by caretakers toward cows, and is reduced in farms where several caretakers are present. Our study also suggests further exploring the key role of factors linked to calving conditions, as cows are more likely to be afraid of people when disturbed at calving.

**Key words:** human-animal relationships, animal welfare, dairy cow, farmer's attitude

### INTRODUCTION

In most farming conditions, animals are in contact with humans, so human-animal relationships are essential for farmers and other stakeholders. In the dairy industry, poor human-animal relationships result in low work comfort and efficiency, are associated with reduced milk production, and can result in accidents to both animals and caretakers (Rushen et al., 1999; Hemsworth and Boivin, 2011; Kallioniemi et al., 2011). Good human-animal relationships are also essential for animal welfare because they affect animals' emotions, such a fear during rough handling. The current intensification of dairy systems in Western countries, associated with larger herds and less human contacts, may even worsen human-cattle relationships if the only contacts are aversive (Waiblinger and Menke, 1999).

The human-animal relationship is defined as the mutual perception of the animal and the human, reflected in their mutual behaviors (Waiblinger et al., 2006). Several factors are associated with variations in human-animal relationships at individual and herd levels (European Food Safety Authority, 2009). Cattle's reactions

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to humans depend on their previous experiences with humans (Seabrook, 1984; Boivin et al., 1998; Breuer et al., 2000; Hemsworth et al., 2000) and especially on the behavior of caretakers when they interact with animals (Hemsworth and Coleman, 2010). The behavior of caretakers is strongly influenced by their attitudes. As defined by Eagly and Chaiken (1993), an attitude is a “psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor.” Attitudes can be cognitive (beliefs about animals, e.g., one can believe that cows are dangerous) or behavioral (tendency to behave in a particular way, e.g., some caretaker may consider that animals need to be handled gently), and are generally linked to job satisfaction (the degree of comfort one feels in different tasks; Hemsworth and Coleman, 2010). Attitudes are assessed through interviews and questionnaires (e.g., a behavioral attitude is often assessed by asking how frequently someone produces a given behavior; Hemsworth and Coleman, 2010). Farmers’ behavior depends also on gender, with women showing more positive behavior than men (Lensink et al., 2000). Beside the type of interactions with the animal, the time at which they occur is essential. Handling is determining for human-animal relationships at 3 periods: early life (Jago et al., 1999; Probst et al., 2012; Schütz et al., 2012), weaning (Boivin et al., 1992; Fukasawa, 2012), and parturition (Hemsworth et al., 1989b).

The animals themselves have an effect on their relation with humans. More specifically, genetic factors seem to play a key role. Animals’ reactivity is inheritable (Grandin and Deesing, 1998), and large differences are present both between dairy and beef breeds (Murphy et al., 1980, 1981), and between individuals within a beef cattle breed (Haskell et al., 2014). However, to date, no difference in the human-animal relationships has been reported among dairy breeds (Waiblinger et al., 2003), but this last study did not include the Holstein breed. The age of animals can also affect human-animal relationships, but with strong variations between dairy farms, the easiest cows to approach are either the youngest or the oldest (Waiblinger et al., 2003). The health status of animals may also affect their responses to humans: lame cows are easier to approach, whereas the opposite is observed in cows with mastitis (Mülleider et al., 2003; Ivemeyer et al., 2011). Some production indicators such as total milk yield, milk fat, and milk proteins over lactation are associated with human-animal relationships (Breuer et al., 2000; European Food Safety Authority, 2009), but to date, the association between the nutritional status of dairy cows and human-animal relationships has not been studied. Finally, the social context of animals within the group

is also linked to human-animal relationships: the higher the cohesion in the group as shown by frequent positive encounters between animals (such as licking) and rare aggressions, the more readily the animals approach humans (Waiblinger et al., 2003).

Several authors argue that farm characteristics and the way animals are managed affect their relation to humans (Boivin et al., 1994). Grandin (2010) highlights the importance of handling facilities for interventions on cattle on subsequent cattle stress during handling. Other factors such as herd size and work organization can affect caretaker behavior (Waiblinger and Menke, 1999; Lensink et al., 2000; Seabrook, 2001; Hemsworth and Coleman, 2010) and in turn the human-animal relationships. For instance, the larger the farm, the less time is spent with the cows, and the more difficult cows are to approach (Waiblinger and Menke, 1999; Waiblinger et al., 2003).

However, the respective roles of farm characteristics, animals, management, and farmers’ attitudes in human-animal relationships remain to be disentangled. The aim of the present epidemiological study was to estimate to what extent these factors are statistically associated with variation in human-dairy cow relationships, assessed through avoidance reactions of cows. Such information is crucial to develop intervention strategies in dairy farms and to improve human-animal relationships and safety of both humans and animals. We chose an epidemiological approach to take full account of the diversity of the situations.

## MATERIALS AND METHODS

A total of 118 commercial dairy farms were visited in 2 French regions (lowlands in Western France—Brittany and Pays de Loire—versus highlands in central and eastern France—Auvergne and Rhône-Alpes). All the farms were family-run, had loose-housing systems (cubicles or deep-bedding barns), and used a milking parlor or an automatic milking system (AMS). All the farms belonged to a milk control organization. Herd size ranged from 21 to 120 dairy cows, and cows were of Montbéliarde (French dual-purpose breed) or Holstein breeds. The farms had been selected at random from exhaustive, anonymous lists provided by the French Health Prevention Group (“Groupement de défense sanitaire”). Random sampling was performed using R 2.15.2 software (R Development Core Team, 2009). Each farm was visited once. The organization of the farm visit followed the Welfare Quality protocol (Welfare Quality, 2009). Five observers carried out the visits. They had been trained previously by an associate from the Welfare Quality project. During training

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