Evaluation of beef herd responses to unfamiliar humans and potential influencing factors: An exploratory survey on French farms

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ABSTRACT

The human-animal relationship plays a major role in animal welfare, production, and farmers' work safety. However, few on-farm experiments have been conducted with beef cattle to assess the human-animal relationship. This exploratory study on beef cattle farms aimed to investigate relationships between farmers' practices (herd management), attitudes towards their animals and handling, and animals' reactions to humans. This study was conducted on 20 French beef cattle farms with a wide range of sizes (utilized agricultural area, permanent pasture area and number of cattle). A semi-structured interview to understand practices related to the human-animal relationship, a questionnaire assessing farmers' attitudes towards their animals and animal handling, and a behavioral test of animals' reactions to humans (an avoidance test) were performed. A Generalized Linear Mixed Model was used to analyze relations among data. Farm size characteristics were not related to animal fear responses. Farmers reporting a lack of time for handling their cattle monitored them less frequently (p < 0.05). Their cattle kept a larger avoidance distance from an unfamiliar human during the avoidance test (p < 0.01). Avoidance distance also tended to be larger for the cattle of farmers who reported not making physical contact with cattle when monitoring them and not including behavior as a genetic criterion for selection (p < 0.1). Making physical contact with cattle during monitoring, monitoring frequently, and including behavior in genetic selection were identified as three "relational practices" (i.e., those that farmers purposely adopt to reduce fear responses and improve the human-animal relationship). This exploratory study was able to reveal significant links between farmers' reported practices and animals' behavioral responses.

1. Introduction

The human-animal relationship plays a major role in human and farm-animal welfare. Conceptual frameworks in ethology postulate that this relationship is based on repeated human-animal interactions and is related to the level of fear or confidence that an animal feels in the presence of a human (Rushen et al., 1999; Waiblinger et al., 2006). Fear of humans can impair animal productivity and welfare (Hemsworth, 2003). In dairy cattle, for example, fear of humans induces acute and chronic stress responses, lower milk yields, and reduced milk let-down (Rushen et al., 1999; Waiblinger et al., 2002; Breuer et al., 2003). Animals that are highly reactive around humans can also impact human and animal safety, and increase the risk of accidents (Boivin et al., 1994; Lindahl et al., 2016). Animals that feel confident around humans are easier to handle and show fewer behavioral and physiological stress responses during routine handling and veterinary investigations (Lensink et al., 2001a; Waiblinger et al., 2004; Schmied et al., 2010).

Many trials conducted under experimental conditions have focused on effects of different types of handling treatments, and at different ages, on cattle reactions to people to study the human-cattle relationship (e.g., Boivin et al., 1992; Rushen et al., 1999; Lensink et al., 2001a; Waiblinger et al., 2004). Studies conducted on commercial dairy farms examined relationships between measures of approach/avoidance and potentially influential variables such as stockperson behaviors and attitudes, management and housing, or animal characteristics such as breed or age (Waiblinger et al., 2002; des Roches et al., 2016). A study of veal calves on commercial farms also showed that animal behavior in

avoidance tests was related to stockperson attitudes, behaviors, and years of experience; type of feeding system (bucket or trough); and breed (Leruste et al., 2012). Data about impacts on avoidance and approach behavior in fattening bull production exist (Mounier et al., 2008; Windschnurer et al., 2009), but similar data have not been published for beef herds on commercial farms.

Studies have been conducted on beef cattle to assess and study cattle response to handling, but only in experimental conditions (Boivin et al., 1992; Boivin et al., 1994; Grignard et al., 2000; Grignard et al., 2001; Turner et al., 2011; Probst et al., 2012). They demonstrated, in particular, that genetic traits for response to handling exist, as do sensitive periods of contact when cattle are young. For instance, gentle touching decreased avoidance distance in suckler beef calves up to 9 months of age and reduced physiological stress responses. These animals were also easier to handle and yielded more tender meat than control animals (Probst et al., 2012).

To our knowledge, only one study of beef herds on commercial farms investigated farmers' attitudes towards handling, but it did not investigate the relationship between these attitudes and animal behavioral responses to humans. Indeed, Boivin et al., (2007) showed, using a mail-out questionnaire, that most farmers emphasized human contact and quality of the facilities as important factors influencing the ease of handling Limousin suckler beef cattle.

The exploratory study reported here was an on-farm investigation into relationships between farmer practices (herd management and housing) and attitudes, as well as animal reactions to humans on beef cattle farms. To describe human-animal interactions, variables of animal behavior and reported monitoring practices were used. According to results of previous studies of dairy cattle (Waiblinger and Menke (1999); Waiblinger et al., (2003); des Roches et al. (2016)) and beef cattle (Boivin et al., (2007), we hypothesized that attitudes and declared practices of farmers (e.g., amount of human contact and handling), as well as herd size and breed, influence animal responses to humans.

2. Materials and methods

2.1. Farm sampling

In 2015, following the methodology of Burton et al., (2012), beef cattle farmers were identified by consultants from *Bovins Croissance* (a national French network of consultants for beef cattle farms). They provided a list of 30 beef cattle farmers in the Burgundy region of France, 20 of whom agreed to meet with us. Burgundy was chosen because it had the most suckler beef cattle among French regions. From 2000–2010, mean herd size in Burgundy increased by 30%, and in 2010, 50% of its beef cattle farms had more than 80 suckler beef cattle (Bruley, 2012). In the absence of more recent data, and since herd size can worsen human-cattle relationships by increasing the avoidance distance from humans (Waiblinger and Menke, 1999), we built a non-random farm sample based only on herd size. For each farm, for which the farmer was the main responsible caretaker, consultants from *Bovins Croissance* provided measures of farm size: utilized agricultural area (UAA), number of cattle, and number of workers. Farms in the sample had a herd size of 40–160 beef cows (median = 80) (Table 1). Our sample size was the same as that of Mounier et al., (2008) and nearly double that of observational studies that have yielded promising perspectives on a similar topic (Windschnurer et al., 2009; Lindahl et al., 2016). Thus, our sample size seemed sufficient for obtaining promising results about the human-animal relationship on farms.

On average, farmers were 42 (standard deviation (SD) = ± 11) years old and their farms had 216 (± 111) ha of UAA, 126 (± 52) ha of permanent pasture (PP), 90 (± 34) beef cows, and 1.8 (± 1) workers. According to the *Bovins Croissance* consultants, all of the farmers were interested in understanding the behavior of their cattle better. Table 1 details the diversity of the farms.

Data collection took 4–6 h per farm and was conducted in the following order: (1) a semi-structured interview (i.e., both open-ended and closed-ended questions) with the farmer, (2) a questionnaire assessing attitudes of the farmer towards his/her cattle and (3) an avoidance test of heifers. Before this procedure, farmers were told that they would answer questions about the human-animal relationship.

2.2. Semi-structured interview

To understand practices related to the human-animal relationship, the semi-structured interview explored three themes designed to become increasingly specific about handling:

1. general description of the farm and herd management policy (reproduction system, sale of cattle, grazing period, calving period)
2. organization of work with cattle (herd monitoring frequency, hoof trimming, feeding organization, type of monitoring of the herd on pasture) and whether farmers felt they lacked the time to do their work
3. farmer and animal relationships (number of accidents with cattle, value of having a good farmer-cattle relationship, methods facilitating handling)

The questions were presented to farmers in an open-ended format (Table 2). After a pre-test of the questionnaire, one interviewer conducted all the interviews.

2.3. Questionnaire assessing farmers' attitudes

The farmers then completed the 42-question attitude questionnaire designed to assess their behavior during handling, their beliefs about cattle, and their feelings about their job. The questionnaire, adapted from that used in commercial farms by Waiblinger et al., (2002) and Rennie et al., (2003), was made up of five subgroups of statements:

1. "What do you do during handling?" (e.g., "During handling, it is appropriate to speak loudly to be obeyed")
2. "What beliefs about cattle do you have?" (e.g., "Cattle are dangerous")
3. "What makes for easy handling?" (e.g., "Genetics is the most important factor for ease of handling")
4. "What activities do you like to do on your farm?" (e.g., "I like to vaccinate the calves")
5. "How do you feel about your job?" (e.g., "My work with cattle is dangerous").

Farmers responded to each statement using a 6-level scale: (1) "strongly disagree", (2) "disagree", (3) " slightly disagree", (4) "slightly agree", (5) "agree" and (6) "strongly agree" .

2.4. Avoidance test

The avoidance test was modified according to Waiblinger et al., (2002). It aimed to evaluate herd reactions on pasture to the approach of an unfamiliar human. To avoid dangerous situations for the experimenter due to an aggressive bull or a productive cow with her calf, only heifers (1–3 years old, kept on a separate pasture without bulls or cows) were tested. All tests were conducted by the same experimenter (an unfamiliar woman) on all farms to rule out the possible influence of different researchers. All the heifers tested had been on pasture for 1–2 months. Stocking density of pastures was less than 1.5 cows/ha.

The experimenter first entered the heifer pasture on foot, approached the nearest heifer until reaching a distance of 20 m, and then stood immobile for 5 min. The experimenter (with arms alongside her body) then slowly approached (one step per second) a heifer head-on in the pasture. The experimenter, who had received one week of training