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The impact of training on stockpersons' behaviour and cows' fear response

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Abstract In tropical developing regions, such as Brazil, animal welfare (AW) has been gaining increasing attention, while stockperson job satisfaction, which is intimately related to AW, is often neglected. This research evaluated the effects of AW training on stockpersons' attitudes and behaviour towards dairy cows and the impact on cows' fear of humans. Ten dairy farms with pasture-based systems where animal handlers are farm owners or employees were selected from three regions of Sao Paulo, Brazil. The experiment consisted of four stages: 1) Selection of pasture-based dairy farms; 2) First assessment of attitudes, human behaviour, and cows' flight distance (day one – D1); 3) Pre-assessment of owners' and employees' AW knowledge, and training (day two – D2); and 4) Final assessment of attitudes, human behaviour, cows' flight distance, and owners' and employees' AW knowledge (day three – D3), focusing on the training's effects on human attitudes and behaviour, and cows' fear of humans. Among owners and employees, positive attitudes were more often expressed, and negative attitudes were less frequent on day three (D3) after training. Nevertheless, the expression of positive attitudes by farm owners was less common compared to employees. Stockpersons manifested positive behaviour more frequently at D3 than on day one (D1), before training, in contrast to negative behaviour at D1. Taking all cow handling observations together, including those before and after training, the greatest percentage of negative behaviour was at the time of moving the cows from the holding area to the milking stalls (18% of all observed human behaviour), followed by moving cows out of the milking parlour (17%), positioning cows for milking (15%) and placing/removing the milking suction devices (1%). Positive human behaviour usually occurred when moving cows from the holding area to the milking stalls (21%) and during the positioning of cows for milking (19%). After training, cows' flight distances decreased. In conclusion, the training may have promoted positive human behaviour and reduced the number of fearful cows. Therefore, AW training may positively influence human behaviour, technical expertise, the reduction of fear in cows, and stockpersons' attitudes.

Keywords: animal welfare, attitudes, human-animal relationship, positive animal handling, training

1. Introduction

The connection between stockpersons' attitudes and animal welfare (AW) has been extensively investigated (Coleman et al 1998; Breuer et al 2000; Hemsworth et al 2000; Waiblinger et al 2002; Boivin et al 2007; Jansen et al 2009; Ellingsen et al 2014). Several studies have indicated a relationship between positive attitudes and positive human behaviour towards livestock. Hemsworth and Coleman's (1998) proposal exemplified this model, in which attitudes modulate the stockpersons' behaviour, influence the animals' fear of humans, and, subsequently, have an effect on AW and productivity.

Attitude and behaviour are different concepts. Attitudes are learned dispositions (beliefs) that may change depending on the context (Eagly and Chaiken 2007). Then again, behaviour refers to actions performed according to attitudes. However, attitudes do not solely determine behaviour, defined by the results associated with its "feedback" on the stockperson's attitudes (Hemsworth and Coleman 2011). In other words, even if the stockperson believes that positive handling facilitates the working routine, alternative animal handling procedures may be adopted if the stockperson receives positive "feedback" from these alternative methods.

Some studies illustrate that attitudes to animals may change through the cognitive-behavioural intervention approach (Hemsworth et al 1994; Coleman et al 2000; Hemsworth et al 2002). Two essential aspects support this approach: 1) providing information about animal handling, the sensitivity of cows to negative human behaviour, and the adverse effects of mishandling on animal productivity; and 2) providing handling examples and respective animals' responses (Hemsworth and Coleman 2011). Therefore, training based on the cognitive-behavioural approach may help establish a more positive livestock management culture. Following staff training, animals have been shown to display a shorter flight zone, which means less fear of their handlers (Hemsworth et al 1989; Hemsworth et al 1994; Coleman et al 1998).

Despite the importance of offering AW training on farms, few publications incorporate AW in good livestock

handling manuals, which is explained by the lower priority given to this topic within this field (English et al 1992; Hemsworth and Coleman 2011).

The impacts of AW-focused training on stockpersons (employees and farm owners) in dairy systems were evaluated in the current study, along with the possible effects on attitudes and human behavior towards dairy cows and on cows' fear of humans.

2. Materials and Methods

Ten dairy farms with pasture-based systems where animal handlers are farm owners or employees were selected from three regions of Sao Paulo, Brazil. The experiment consisted of four stages:

1) Selection of pasture-based dairy farms;
2) First assessment of attitudes, human behaviour, and cows' flight distance (day one – D1);
3) Pre-assessment of owners' and employees' AW knowledge, and training (day two – D2);
4) Final assessment of attitudes, human behaviour, cows' flight distance, and owners' and employees' AW knowledge (day three – D3), focusing on the training's effects on human attitudes and behaviour, and cows' fear of humans.

2.1. Selection of farms

First, dairy farmers from three different regions, Avaré (23°05'55''S, 48°55'33''W) (region A), Campinas (22°54'20''S, 47°03'39''W) (region B), and Piracicaba (22°43'31''S, 22°43'31''W) (Region C), were contacted. Subsequently, the first visits were performed, and D1 was scheduled on the same day. Finally, ten pasture-based dairy farms were considered for data collection. No owners or employees received training focused on good AW practices, assessments, or certifications. Table 1 displays the general description of the farms.

2.2. First assessment of attitudes, human behaviour, and cows' flight distance

2.2.1. Assessment of attitudes

Stockpersons' attitudes toward cows were assessed using the system proposed by Hemsworth et al (2002). Each stockperson (owner or employee) answered a questionnaire containing 27 items targeting their belief about cows (Table 2), which was presented to collect their impressions about working with cows. They were informed that their opinions formed part of a study on dairy management.

The answers were given according to a five-point scale, defined as totally disagree (1), disagree (2), neither disagree nor agree (3), agree (4), strongly agree (5): the greater the value of positive items, the more positive the attitudes to the cows, and the greater the values of negative items, the less positive the attitudes.

2.2.2. Assessment of human behaviour

The stockpersons' behaviour was observed during the first milking of the day, according to the protocol applied by Hemsworth et al (2002). Thus, two previously trained observers recorded stockpersons' actions throughout the following activities:

a. moving the cows from the holding area to the milking stalls;
b. positioning the cows in the milking stalls;
c. placing and removing the milking suction devices;
d. moving the cows out of the milking parlour.

The human tactile interactions with cows were classified as positive (POS) or negative (NEG). Positive interactions included petting or supporting the cows with the hand, whereas negative ones included hitting with a hand/object, pulling, or pushing. In addition, two types of NEG interactions were recognised: from slightly to moderately aversive (hitting, pulling – NEG1) and those more aversive (aggression, hitting hard, tail twisting – NEG2). NEG1 was distinguished from NEG2 by the degree of noise associated with the contact and the forcefulness of the actions taken to move the cows. A five-second interval was utilized to differentiate them.

2.2.3. Assessment of cows' flight distance

The evaluation was performed after milking when cows were at the pasture. This assessment considered the flight distance (FD), the distance between the observer's hand and the animal's snout. The flight distance is when the animal moves backward or turns its head away to flinch (Welfare Quality®, 2009). The greater the flight distance, the greater the chances of the animal being afraid of humans.

As determined by the Welfare Quality® protocol, the following distances are possible: cows can be touched (FD = 0), a person can reach up to 50 cm ($0 < FD \leq 50$), between 50 and 100 cm ($50 < FD \leq 100$) and a person cannot get closer than 100 cm ($FD > 100$).

2.3. Pre-assessment of owners' and employees' AW knowledge, and training

Before training, owners and staff answered a questionnaire about general knowledge of AW. Then, the training sessions focused on the most critical points noticed during the first visit. The questionnaire addressed the following aspects: animal welfare, biology and behaviour, animals' physical and psychological needs, AW practices, and the stockperson's role in AW improvement. Subsequently, they watched a 15-minute video about dairy cattle handling and positive interactions (Parker et al 2009). After that, there was an open discussion with farmers and stockpersons where they could share their knowledge and perceptions. Finally, all topics, theoretical and practical, were reviewed.

2.4. Final assessment of attitudes, human behaviour, and cows' flight distance

Two months after D2, other attitudes, behaviour, and flight distance were assessed using the same methodology applied during the first visit. Furthermore, stockpersons

completed the AW questionnaire again to check knowledge retention.

2.5. Data collection and analysis

On dairy farms, many cows may be kept by a few stockpersons. Thus, the number of workers is one of the main differences between dairy and other enterprises, such as urban ones (e.g., industry). On that basis, some limitations arose when defining the experimental design:

- The number of participants: in 10 farms, there were 30 respondents, both farm owners (n=10) and employees (n=20). Nevertheless, some employees left the job throughout the research period, and a few farm owners were absent at D2. Thus, the present study excluded those holdings. By the end of the experiment, 22 respondents (eight owners and 14 employees) were present on all research days. For staff welfare assessment, reports consider urban enterprises with many workers, most with more than 280 (Albuquerque, Tróccoli et al 2004). On the other hand, dairy farms usually present a limited number of employees, typically two persons responsible for milking the cows and one responsible for handling the animals (Table 1).
- An imbalance in the number of participants between farms where owners are the animal handlers and farms where employees are responsible for handling the cows: the second group of farms had a larger number of cows compared to the first group, and that was the reason for the difference in the numbers of participants.

In the following manner, descriptive data analysis was chosen to analyse the attitudes, human behaviour, knowledge, and cows' flight distance. For attitudes, the sum of listed items from each group of questions resulted in a single value. Regarding human behaviour analysis, the observations were counted and classified as positive (POS) or negative (NEG), and the latter was divided into two levels (NEG1 and NEG2). Moreover, AW knowledge was analyzed using each farm group's mean percentage of right answers. Finally, the mean flight distance was utilized to evaluate the cows' fear of humans.

Table 1 General description of the selected pasture-based dairy farms.

Farm	Region	Animal Handler	N° of lactating cows	Milk yield (litres/day)	Area (ha)	N° of stockpersons	N° of cows milked per stockperson
1	C	Owner	32	500	40	2	16
2	C	Owner	31	450	44	1	31
3	C	Owner	25	250	40	1	25
4	C	Owner	20	200	55	2	10
5	C	Owner	17	180	55	1	17
6	C	Owner	14	150	50	1	14
7	B	Employee	190	4300	102	5	38
8	C	Employee	170	2150	104	4	42
9	A	Employee	59	960	120	3	19
10	C	Employee	52	1000	195	2	26

3. Results

On average, farms, where owners handle the animals displayed less positive attitudes than farms where employees are responsible for handling the animals at D1 and D3. Meanwhile, negative attitudes were more frequent among owners than among employees at D1 and D3 (Table 3).

Table 4 displays the percentages of positive and negative human behaviour towards cows on the assessment days. The behaviour was divided into positive (POS), negative level one (NEG1), and negative level two (NEG2).

For both groups, negative behaviour was predominant at D1, and the opposite occurred at D3 when positive behaviour was more common (Table 4). Farm owners performed positive behaviour less frequently in comparison to employees (16.4% and 47.2%, respectively). Nonetheless, behaviour NEG1 was more common among owners than employees (44.3% and 35.3%, respectively). Similarly, owners displayed more NEG2 behaviours than employees (39.3% and 15.5%, respectively). Then, at D3, the percentage of positive behaviour increased for both groups, while both levels of negative behaviour decreased.

Overall, 1,220 cows in 20 milking sessions were observed. Taking all cow handling observations together, including those before and after training, the greatest percentage of negative behaviour was at the time of moving the cows from the holding area to the milking stalls (18% of all observed human behaviour), followed by moving cows out of the milking parlour (17%), positioning cows for milking (15%) and placing/removing the milking suction devices (1%). Positive human behaviour usually occurred when moving cows from the holding area to the milking stalls (21%) and during the positioning of cows for milking (19%).

Table 2 Questionnaire of beliefs about dairy cows (Hemsworth et al 2002).

Item		Content description
1	Ease of work	It is easy to work with dairy cows
2		Dairy cows are stimulating to work with
3		Dairy cows are friendly
4	Negative beliefs	Dairy cows are noisy
5		Dairy cows are malodorous
6		Dairy cows are ugly
7		Dairy cows do not feel pain
8	Pleasant animals	Dairy cows are beautiful
9		Dairy cows are pleasant to work with
10		Dairy cows are smart
11		Dairy cows are funny
12		Working with dairy cows requires previous training
13		Working with dairy cows requires previous experience
14		Dairy cows are easy to handle
15		Some time is required to handle dairy cows
16	Negative features	Dairy cows are gluttonous
17		Dairy cows are aggressive
18		Dairy cows are easily scared
19		Dairy cows are curious
20	Good behaviour	Dairy cows' reaction to stockpersons is positive
21		Dairy cows' reaction to non-familiar persons is positive
22		Dairy cows react positively to routine changes
23		Dairy cows react positively to milking
24	Effort to handle	Physical effort is required to handle dairy cows
25		It is necessary to speak loudly or shout to handle dairy cows
26	Talking to animals	Talking to milking heifers is important
27		Talking to milking cows is important

Table 3 Positive and negative scores and the mean total score on days one (D1) and three (D3).

Attitudes	D1		D3	
Positive	Owner	Employee	Owner	Employee
Ease of working	11.4	12.1	10.5	12.8
Pleasant animals	17.4	20.3	17	19.9
Good behaviour	14.8	15.9	15.7	16
Talking to animals belief	9.1	9	8.5	9
Total score	52.7	57.3	51.7	57.7
Negative	Owner	Employee	Owner	Employee
Negative beliefs	8	9.7	9.6	9.2
Negative features	14	13.1	13.4	12.6
Effort to handle	5.8	4.7	5.9	4.2
Total score	27.8	27.5	28.9	26.1

Table 4 Mean percentages of positive (POS) and negative (NEG) human behaviour towards cows observed at milking time on days one (D1) and three (D3).

	D1			D3		
	POS (%)	NEG (%)		POS (%)	NEG (%)	
		NEG1	NEG2		NEG1	NEG2
Owner	16.4	44.3	39.3	45.5	43.2	11.3
Total (n)	10	27	24	20	19	5
Employee	47.2	37.3	15.5	64.2	29	6.8
Total (n)	167	132	55	122	55	13

Comparing the results before and after training, the total percentage of human behaviour towards cows at milking was more positive at D3 than at D1 (61% vs. 43%, respectively). The opposite was evident for negative behaviour, which was more predominant at D1 than D3 (57% vs. 39%, respectively). The flight distance (FD) was utilised to analyse cows' fear of humans. A greater percentage of cows allowed assessors to touch or approach them at D3 than at D1 (Table 5).

Regarding stockpersons' knowledge assessment, there were more right answers at D3 than on the training day (D2). Stockpersons from the employees' group performed better than members of the farm owners' group (Table 6).

Table 5 Percentage of cows that could be touched (FD = 0), that allowed the assessor get closer than 50 cm (0 < FD ≤ 50 cm), between 50 and 100 cm (50 < FD ≤ 100 cm), and that did not allow the assessor to get closer than 100 cm (FD > 100 cm).

Flight distance (FD; cm)	FD = 0 (%)		0 < FD ≤ 50 (%)		50 < FD ≤ 100 (%)		FD > 100 (%)	
	D1	D3	D1	D3	D1	D3	D1	D3
Owner	46.8	62.9	24.5	25.2	17.3	9.8	11.5	2.1
Total (n)	65	90	34	36	24	14	16	3
Employee	23.4	42.2	31.1	27.2	26.3	22.8	19.1	7.8
Total (n)	49	87	65	56	55	47	40	16

Table 6 Mean percentage of correct answers to the animal welfare test, approximate number of correct questions and number of participants on the training day (D2) and two months later (D3).

	D2	D3	n
Owners	49% (6/12)	55.2% (7/12)	8
Employees	55.7% (7/12)	69.3% (8/12)	14

4. Discussion

The results concerning attitudes could be explained by higher scores for "Pleasant animals" given by participants in the employee group at D1 and higher scores for "Ease of work" and "Pleasant animals" at D3. In addition, comparing different days (D1 and D3), owners had lower scores for positive attitudes at D3 than at D1, while owners' negative attitudes were more frequent at D3 than at D1. The employees' group gave opposite results, displaying more positive and fewer negative attitudes at D3 than at D1.

Some studies (Hemsworth et al 2002; Windschnurer et al 2009; Ruis et al 2010) noted that stockpersons participating in training sessions based on cognitive-behavioural intervention improved their attitudes and behaviour toward animals compared to stockpersons who did not have the same opportunity. Their findings could only explain the outcomes concerning attitudes among the employees in the present study, which did not find similar results for both positive and negative attitudes among owners.

One plausible explanation is the short training period (approximately one hour) employed by the present study despite it being based on cognitive-behavioural intervention. The initial model proposed by Hemsworth and Coleman (1998), and applied by Hemsworth et al (2002), performed one-hour individual training and routine visits to check the difficulties of attaining and/or maintaining behavioural change reinforcing the previously transferred knowledge. Thus, the training offered to the owners in this experiment was ineffective in changing attitudes. Perhaps, for this group, there is a need to provide training of a longer duration that is more applicable to the owner's experience of everyday life.

Another explanation is the choice of the questionnaire, which was limited to beliefs about cows, the stockpersons' behaviour, cows' behaviour, and the importance of talking to animals (cognitive aspect), without assessing emotions and conation (the aspect of mental processes or behaviour directed toward action or change, including impulse and desire). Despite the methodology's feasibility and correctness (Hemsworth and Coleman 2011), according to Fishbein and Ajzen's theory of reasonable action (Ajzen and Fishbein 1977; 1980), the best proposal to explain the relationship between attitudes and behaviour involves analysis of cognitive, affect and conation aspects.

Otherwise stated, personal beliefs and their evaluations contribute to forming attitudes (Ajzen and Fishbein 1980). In that sense, the intention is the immediate reason to transform attitudes into behaviour. Thus, attitudes are determined by the combination of beliefs in possible results following a specific behaviour, and the assessment of these results (Hemsworth and Coleman 2011). On the other hand, Hemsworth et al (2002), using the same questionnaire of attitudes, observed an improvement in attitude in two items only ("Effort to handle" and "Talking to heifers"). The authors suggested that the difference highlighted the training as a factor in changing attitudes and reducing negative interactions during milking. This suggestion is supported by the improvement in beliefs that use little effort to handle cows and that speaking to heifers facilitates handling them, especially in a new environment.

The model of Hemsworth and Coleman (1998) relating attitudes, behaviour, and animals' fear has been confirmed by several studies (Coleman et al 1998; Breuer et al 2000; Hemsworth et al 2000; Waiblinger et al 2002; Boivin et al 2007; Jansen et al 2009). Some have also suggested a link

between attitudes and animal productivity (Breuer et al 2000; Hemsworth et al 2000; Waiblinger et al 2002; Hanna et al 2009), although, Panamá-Arias and Spinka (2005) did not find this connection. Furthermore, Hanna et al (2009) came across other aspects besides attitudes that strongly correlated to productivity, such as empathy and satisfaction at work. Despite the partial disagreement among studies, they did not emphasise the AW aspect but only the possible connection between animal productivity and other human factors, apart from attitudes, which correlate with productivity. Hence, new discussions may arise about the possible relationship between AW and factors other than human attitudes. In the present study, negative behaviour (NEG1 and NEG2) was expressed by owners more frequently than by employees. This possibly occurred because touch was more often used when the owner had no control over the cow, resulting in an aggressive handling action. Nevertheless, at D3, the percentage of positive behaviour increased for both groups, while both levels of negative behaviour decreased. These results could be explained by the positive impact of training on animal handling, which seemed more positive in employees than in farm owners.

Rosa and Paranhos da Costa (2001) highlighted the interaction between stockpersons and dairy cows when led from the holding area into the milking parlour. Nevertheless, the same authors perceived less interaction when cows left the milking parlour, and "outstanding negative" interactions between stockpersons and cows took longer to move. Some studies (Hemsworth et al 2002; Windschnurer et al 2009; Ruis et al 2010) indicated that, after training, stockpersons' behaviour was more positive compared to the group without training. It may explain the present experiment's results, highlighting the role of training in positive animal handling.

Another point to be highlighted is the positive training feedback from the participants at the end of the experiment, even though the analysis did not include it. Spontaneously, some employees, managers, and owners shared their opinions, such as: "I stopped hitting the cows"; "I did what you recommended, and I thought cows behaved better"; "I understood the cows' point of view and it improved my way of handling them"; "Cows feel pain like humans; they are smart…after your presentation, I started to treat them better"; "I knew shade provision is relevant for their comfort…welfare…however, I needed someone to tell me. Today we are building two shelters following the dimensions you suggested"; "After training, I noticed that stockpersons are handling cows better".

Hemsworth et al (2002) and Breuer et al (2000; 2003) identified that cows handled by trained stockpersons displayed short flight distances, indicating a reduced level of fear of humans compared to cows treated by untrained stockpersons. Moreover, Breuer et al (1997) perceived that negative handling procedures increased flight distance among heifers. Other studies also indicated animal fear decreased when stockpersons undertook attitude and behaviour training (Hemsworth et al 1989; Hemsworth et al 1994; Coleman et al 1998). Nonetheless, Ruis et al (2010) observed training did not affect flight distance. The authors claimed that the period between the training and the second visit could have been too short to allow changes in human behaviour to affect animal behaviour.

Other actions which take into account training of stockpersons for positive animal handling have demonstrated successful results. According to a study by Magalhães et al (2007), adopting positive calf handling practices led to decreased calf mortality rates, reduced use of antibiotics, and a lower incidence of diarrhoea and dehydration. Other research also correlated less fear of humans with productivity (Hemsworth et al 1981; 1989; Hemsworth and Barnett, 1991; Breuer et al 1997; Breuer et al 2000, Hemsworth 2003), and attitudes and positive behaviour with enhanced productivity and AW (Hemsworth et al 1989; Hemsworth et al 1994; Coleman et al 1998; Breuer et al 2000; Hemsworth et al 2000; Hemsworth et al 2002; Waiblinger et al 2002; Boivin et al 2007; Jansen et al 2009; Ellingsen et al 2014).

Finally, although the present study employed a shorter training period than Hemsworth et al (2002), the knowledge retention results were positive. They highlighted the importance of training on human resources development with AW knowledge in farms.

Therefore, despite the unfavourable attitudes to AW in the results, human behaviour was more positive towards cows during milking, and flight distance was shorter at D3 than at D1.

There is clear evidence that positive attitudes and behaviour can be valuable to livestock. The model proposed by Hemsworth and Coleman (1998) has a significant potential to achieve high levels of AW in the livestock sector. Although, there are other essential factors to be considered, such as the work routine and culture within each farm and the improvement of facilities (Burton et al 2012).

Regarding the training, some authors (Santanna and Paranhos da Costa 2007; Hemsworth and Coleman 2011) have indicated limitations of selecting specific training that covers the change of attitude and human behaviour towards livestock. Some of them are the lack of interest within farms and industry in this topic and the lack of understanding by stockpersons of the relevance of animal welfare to productivity.

5. Conclusions

As indicated by the results, the training may have positively affected human behaviour towards cows and reduced cows' fear of humans and AW knowledge. The variable "attitudes" outcomes were positive for employees but not for farm owners. As a result, the AW training may have influenced human behaviour, knowledge, cows' fear, and stockpersons' attitudes.

Globally, society's concern is promoting significant changes in AW. On the farm, handling and facilities may be the most critical points for society and, consequently, the business sector. Nevertheless, other AW factors have been increasingly considered by ethically aware consumers.

Even though the need of ethical livestock systems to focus almost exclusively on animals, other factors, such as staff welfare, must be considered. The human factor is essential in implementing a harmonious culture in farms. Thus, the more positive the human-animal relationship, the easier animal handling becomes, and both animals and humans are benefited.

Allowing stockpersons to be happy and satisfied in their work environment is crucial. Successful implementation of AW programmes has to consider human welfare. Rural enterprises must invest in human resources management programmes based on staff selection, training, and needs. The lack of discussion about this topic in the livestock field indicates the need to work with human resources specialists and develop training programmes that target the reality of the livestock sector and the welfare of stockpersons.

In most localities worldwide, there is still little discussion about this topic. Hence, despite some limitations (number of farms, time, and budget), this research work is one first step towards giving more attention to human welfare in the livestock scenario and, consequently, to successful AW programmes. Animal and human welfare deserve equal treatment in an integrated agribusiness management system.

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Ethical considerations

This study was conducted under the approval of the Ethics in Research Committee of the College of Agriculture “Luiz de Queiroz” (ESALQ/USP) (Protocol number 140).

Conflict of interest

The authors declare that there is no conflict of interest.

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