Applied Animal Behaviour Science xxx (2016) xxx–xxx

Contents lists available at ScienceDirect

Applied Animal Behaviour Science

journal homepage: www.elsevier.com/locate/applanim

Validity and feasibility of Human-Animal Relationship tests for on-farm welfare assessment in dairy goats

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ARTICLE INFO

Article history:
Received 23 July 2015
Received in revised form 5 March 2016
Accepted 13 March 2016
Available online xxx

Keywords:
Dairy goats
Human-Animal Relationship
Welfare assessment
Avoidance distance
Behavioural tests

ABSTRACT

This study aims at establishing suitable tests to measure the quality of the Human-Animal Relationship (HAR) in dairy goats for on-farm welfare assessment protocols by evaluating the predictive validity of different categories of HAR tests and their feasibility in on-farm condition. Twelve commercial dairy farms in Northern Italy were selected and classified as "good" (n = 6) and "poor" (n = 6) HAR on the basis of reports from a technical advisor. Some variables were tested to measure the HAR: sneezing – the number of alert sounds; voluntary approach (VA) test – in a stationary situation, the latency to the first contact by goat and the% of goats that entered in contact with the test person and within a 1.5 m radius around her were recorded, both continuously and at scan sample intervals; avoidance distance (AD) test – the avoidance distance from a moving and approaching person and the% of tested goats, of contacts with the test person followed by withdrawal or of acceptances of gentle stroke were recorded. The feasibility of each test was evaluated based on costs, time consumption, safety and training requirement. Sneezes were rarely and random expressed, so they do not seem suitable to be included in a protocol. Both Principal Component Analysis and One-way ANOVA confirmed the predictive validity of most of the variables, which were able to discriminate between "good" and "poor" HAR farms. Latency to first contact resulted valid (P = 0.01) and a high feasibility was reported. The indicator was easy to be recorded and the VA test could be stopped immediately after the first contact, saving time. Variables from the AD test resulted valid (% tested goats: P = 0.006; AD mean: P = 0.016; % contacts: P = 0.006; % acceptance: P = 0.003), although they were more time consuming or required a more specific training compared to latency to first contact. The correlation among variables seemed to support also a convergent validity of the tests used. The investigation pinpointed promising behavioural tests to be included into on-farm welfare assessment protocols in dairy goats. Taking into account species, test results and feasibility considerations, we suggest the inclusion of latency to the first contact with the test person into on-farm welfare assessment protocols. However, these results should be further tested in a larger number of farms of different dimensions, to overcome the limitations of this study due to the small sample size and to check the effect of farm size.
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1. Introduction

The Human-Animal Relationship (HAR) is commonly defined as the degree of relatedness or distance between animals and humans, i.e. their mutual perception (Waiblinger et al., 2006a). The perception and consequently the responses of animals towards humans may be influenced by different factors: the genetic and underlying personality traits (e.g. fearfulness/emotionality; Visser et al., 2001), that may play an important role in the reactivity that animals show when interacting with humans; the experience of positive handling in early life stages, that is reported to have durable effects in some species (e.g. goats; Lyons, 1989), but not in others (e.g. dairy cows; Boissy and Bouissou, 1988); the stockperson behaviour, that is considered one of the major factors able to influence the reaction of animals towards humans. In fact, the quality of HAR in farm animals may be influenced by the number, duration and nature of daily interactions with the stockpeople (Estep and Hetts, 1992; Hemsworth and Coleman, 2010). Many studies have confirmed the sequential relationship of the stockperson attitude, behaviour and the reaction of animals (e.g. Lensink et al., 2000; for review:

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http://dx.doi.org/10.1016/j.applanim.2016.03.012
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Please cite this article in press as: Battini, M., et al., Validity and feasibility of Human-Animal Relationship tests for on-farm welfare assessment in dairy goats. Appl. Anim. Behav. Sci. (2016), http://dx.doi.org/10.1016/j.applanim.2016.03.012

Waiblinger et al., 2006a). A good HAR may help to reduce the perceived aversiveness of some procedures (Boivin et al., 2000; Lensink et al., 2001); on the contrary, a poor HAR may induce fear and distress that worsen the perception of farm practices and negatively affect both animal welfare (Rushen et al., 1999) and production (Hemsworth, 2003; Hemsworth and Barnett, 1991; Lensink et al., 2001; Lyons, 1989). Therefore, HAR is strictly linked to animal welfare, and should be taken into account in welfare assessment schemes. To this aim, behavioural tests for assessing the quality of HAR due to previous experiences are commonly adopted at farm level (Jackson and Hackett, 2007; Waiblinger et al., 2006a).

HAR tests used in on-farm welfare assessment mainly belong to two categories: tests measuring the reaction either to a stationary person or to a moving person (Waiblinger et al., 2006a). These tests resulted valid, feasible and reliable in several species (sheep: Napolitano et al., 2011; fattening bulls: Windschnurer et al., 2009a; buffalos: de Rosa et al., 2005; dairy cows: Waiblinger et al., 2002, 2003; Windschnurer et al., 2008). A convergent validity (Kamphaus and Frick, 2005; Waiblinger et al., 2006a) was checked in these studies as different measures used to assess the quality of HAR were significantly correlated among them and/or with stockperson behaviour or attitude. Avoidance distance in dairy cows was validated further by showing its sensitivity to gentle human interactions (Windschnurer et al., 2009b). The above-cited tests were found highly consistent across time and a good repeatability was reported among different observers.

Feasibility can be evaluated considering time, financial and safety requirements. As to the first two concerns, tests used in the above-mentioned studies were relatively quick and simple to be adopted in on-farm situation. Furthermore, no specific instruments were required to perform the tests: this is a considerable advantage in economic terms. Concerning the safety of the observer, some studies reported limitations if the behaviour of the animals has to be collected from inside the pen. For example, sheep were observed to run towards the observer, due to their marked gregarious behaviour. This experience suggested that it was advisable collecting measures with animals gathered at the manger (Napolitano et al., 2011). Similar conclusions were drawn for the evaluation of HAR in fattening bulls (Windschnurer et al., 2009a): the avoidance distance at the feeding rack was preferable and safer than performing the test inside the pen. However, in dairy cows the validity of tests performed outside the pen seemed lower than the validity of tests conducted in the pen (Waiblinger et al., 2003).

Both stationary and moving person tests can be performed when animals are in their home pen (familiar situation) or in a test arena (unfamiliar situation). Tests conducted in an arena are not suitable for the inclusion into on-farm welfare assessment protocols for feasibility reasons (e.g. moving the animals, building the test arena; Rousing and Waiblinger, 2004). Moreover, in the arena the reaction of animals may be influenced by a novel situation (e.g. stress induced by constraint, forced movement, isolation from the familiar group; Waiblinger et al., 2006a).

As for goats, so far the majority of HAR studies have used tests in an arena and scarce information is available about validity and feasibility of behavioural tests performed in the home pen. In this species, stationary, moving and pursuing person tests were performed and different variables were collected to evaluate the HAR in a test arena: latency to proximity, time in proximity, latency to contact, time in contact, and approach-withdrawal (Lyons, 1989; Lyons and Price, 1987; Lyons et al., 1988). Furthermore, the latency to approach a stationary person was adopted by Jackson and Hackett (2007) in a test arena to estimate the positive effect of a gentle handling treatment, whereas Mattiello et al. (2010) tested goats in their home pen, successfully applying the avoidance distance test to a moving person developed for cattle by Waiblinger et al. (2002, 2003) and further improved by Windschnurer et al., (2008, 2009a,b). However, Muri et al. (2013) reported strong avoidance behaviour and goats flocking around when the observer tried to perform the avoidance distance test described by Mattiello et al. (2010).

Therefore, some tests are available for evaluating HAR in goats, but most of them were only used in an experimental setting and are not feasible in the context of an on-farm welfare protocol, as they either are time consuming, or a test arena is necessary, while for the avoidance distance test performed in the home pen feasibility results by Mattiello et al. (2010) and Muri et al. (2013) are contradictory.

Further development of less intrusive and time consuming, but still valid methods for HAR evaluation in goats would be useful for the inclusion of this welfare issue into an on-farm welfare assessment scheme for this species (Battini et al., 2014). Given the circumstances, this study aims at establishing suitable tests to measure the quality of the HAR in dairy goats for on-farm welfare assessment protocols. The study evaluated the predictive validity of different categories of HAR tests and their feasibility in on-farm condition.

2. Material and methods

2.1. Farms

The study was conducted in January 2013 in Lombardy region (Northern Italy).

A technical advisor, who regularly provided assistance to dairy goat farms, was asked to select 6 farms with the best HAR and 6 with the worst HAR. The evaluation of the technical advisor was based on his experience with dairy goats management and his familiarity with the farms. HAR had never been specifically assessed before in those farms, as this is not part of the veterinary official evaluation in Italy. The advisor used his expertise and the evaluation was based on his impression on the stockperson attitude and behaviour towards the animals. According to this judgment, farms were classified as having a “good” HAR (n = 6) or a “poor” HAR (n = 6). In all the farms, lactating goats were housed in one single pen, with no access to outdoor run. The mean size of the assessed pens was 73.00 ± 59.39 adult lactating goats (min 12; max 201). Although the mean pen size in “good” farms (36.83 ± 10.43; min 12; max 84) was smaller than in “poor” farms (96.83 ± 26.26; min 51; max 201), no statistical differences in pen size were present between “good” and “poor” HAR farms and some “good” farms were larger than some “poor” farms and *vice versa*. Goats were of Saanen and Alpine breeds, the two more widespread cosmopolitan dairy breeds.

2.2. Attitudinal questionnaire

In order to provide greater support of the advisor classification of the farms into “poor” and “good” HAR, the persons in charge of the handling of the animals were asked to answer to a questionnaire (partly modified from a questionnaire already adopted for dairy cows; Waiblinger et al., 2002) regarding their attitude towards goats and handling of goats (Table 1). On all farms only one person per farm, the farmers themselves, were caring for the goats. Stockpeople attitudes were shown to be the most important predictors of stockperson behaviour (for review see Hemsworth and Coleman, 2010). The attitudinal questionnaire was thus used to get information on farmer attitudes and some estimation of their behaviour.

2.3. HAR tests

Two researchers (the interviewer and the test person) conducted the farm visits. The interviewer was the only person

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