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Behavioural reactions before and during vaginal examination in dairy cows

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ABSTRACT

Vaginal examinations are routine procedures on dairy farms to diagnose pregnancy or puerperal diseases. Cows express their discomfort in certain situations with discrete behavioural reactions. These reactions can be described in their occurrence and extent. Although there is evidence that human contact is potentially stressful for cows, the impact of vaginal examinations on animal welfare has not been evaluated. Therefore, we hypothesized that (1) cows show discomfort before and during vaginal examination with different behavioural reactions, (2) these reactions can be semi-quantitatively scored and (3) the examination with a Metricheck device is less invasive than an examination with the gloved hand. In experiment 1, the behaviour of 10 cows during vaginal examination was videotaped and analysed. In total, 15 different behavioural reactions were identified. Based on these observations, a numerical rating system was created. The avoidance reactivity score (ARS) includes evasive reactions, which are scored on a 4-point scale, and signals of discomfort, scored with 1 point each. In Experiment 2, evasive reactions of cows were videotaped and scored by two observers and three times by the examiner. The inter- and intra-repeatability was 0.70 and 0.87, respectively. In experiment 3, vaginal examinations of 30 cows were videotaped and scored with the ARS by four observers and three times by one observer. The inter- and intra-observer repeatability during examination was 0.44 and 0.81, respectively. In experiment 4, 435 vaginal examinations were conducted either with the gloved hand (group GH) or the Metricheck device (group MD). Behaviour before and during examination was scored. The median ARS increased from 1 before (IQR: 1–2) to 3 during examination (IQR: 2–4) and cows in the group MD showed less avoidance reactions compared to cows in the group GH ($P < 0.05$). Parity, days in milk, vaginal discharge or repeated examinations did not influence the ARS. Our study provides evidence that vaginal examinations cause stress in cows. Furthermore, we demonstrated that behavioural reactions can be assessed with a score. Substantial inter-observer and substantial intra-observer repeatability proves that the ARS can be applied in practice. The ARS – although imperfect – might be a useful tool in the field and in research to estimate a cow's stress level.

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1. Introduction

Veterinary examinations and treatments have the potential of causing discomfort, stress and pain in cattle (Minton, 1994; Petyim et al., 2007). Transrectal or vaginal examinations to diagnose pregnancy or endometritis,

Abbreviations: ARS, avoidance reactivity score; DIM, days in milk; GH, gloved hand; MD, Metricheck device; SD, standard deviation; VDS, vaginal discharge score.

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respectively, are routine practice for most commercial dairy herds (LeBlanc et al., 2002; Romano et al., 2007). Interestingly, the impact of such examinations on animal behaviour has not been evaluated.

Stress behaviour of mammals can be categorised into the patterns fight, flight, freeze, and fiddle about (Bowen and Heath, 2005), which help an animal to cope with stress. Whilst fight and flight are part of an active coping style, freeze and fiddle about are indicative of a passive coping style (Van Reenen et al., 2005). The choice of stress responses depends on the specific situation and varies between individuals, species and breeds (Koolhaas et al., 1999). Individual variation in stress behaviour is a function for the animal's adaptability to changes in its environment (Koolhaas et al., 2007). Some behavioural reactions of feral animals still can be observed in dairy cows. However, the process of domestication limited the range of behavioural reactions (Price, 1999).

On commercial dairy farms, stressors are prevalent in a wide variety and intensities. It has been demonstrated that the mere human contact might cause discomfort in dairy cows (Hagen et al., 2004). Most kicking followed human handling (i.e. teat cleaning, teat cup attachment) and significantly less kicking was observed in automatic milking systems compared to milking in a 2×6 herring-bone parlour (Hagen et al., 2004). Vocalisation (Grandin, 2001), tail flicking, flinching or lifting a leg (Waiblinger et al., 2004) were described as signals of discomfort in cows.

Various scientific approaches to assess behaviour of cows can be found in the recent literature. The mere occurrence of behaviour describes the presence of a reaction, i.e. head turning (Marti et al., 2010) or arching the back (Walker et al., 2008). However, the extent of certain behavioural reactions characterises a progression. Especially, reactions of the locomotor system vary in their extent, i.e. the inclusion of one or more legs into a gait pattern (Sprecher et al., 1997) or the stiffness of joints (Flower and Weary, 2006). The combination of occurrence and extent of different reactions has been used to analyse and score animal behaviour. Specifically, Sprecher et al. (1997) modified a lameness score, which consists of the presence of an arched back in combination with different gait patterns.

Vaginal and transrectal examinations are conducted to identify cows at risk of postpartum infections, and they are a part of protocols for reproductive management in bovine practice (LeBlanc et al., 2002). Transrectal palpation of the reproductive tract is performed multiple times during lactation to monitor involution of the uterus for diagnosing puerperal diseases (Tsousis et al., 2010) or pregnancy (Dunne et al., 2000).

Vaginal examination in cows can be conducted with a speculum, the Metricheck device (Zimcro, Hamilton, New Zealand), or the gloved hand (LeBlanc et al., 2002; Pleticha et al., 2009; Runciman et al., 2009). An endometritis scoring system has been described (Sheldon et al., 2006) to determine the severity of postpartum infections based on the quality of the vaginal discharge (LeBlanc et al., 2002).

Direct observations of spontaneous behaviour have been used widely in the literature. As suggested, behaviour may be regarded as events or states (Altmann, 1974). She explained that event behaviour describes all behaviours in the moment they occur, whilst state behaviour lasts over a certain time. Furthermore, she established different sampling methods for interpretation of behavioural observations.

Several numerical scoring systems were created to help farmers and veterinary practitioners to assess a cow's health. Zaaijer and Noordhuizen (2003) proved that the scores for body condition, rumen fill and faecal consistency are useful to indicate fertility risks in a herd due to nutritional problems. Another study showed the association between a scoring system of the cows' gait and sole ulcers (Chapinal et al., 2009). Referring to behavioural reactions of cows, this score has been demonstrated to be a good predictor of hoof lesions. Streyl et al. (2011) created a parturition score which is also based on behavioural observations. This score helps to predict calving within the next 12 h, allowing a better monitoring of calving and management of individual cows (Streyl et al., 2011), which affects cow welfare on farms.

In the past, several issues related to animal welfare have been studied intensively (Rushen, 2003; Whay et al., 2003). Both, physiology and behaviour can be used to investigate the mental health of animals (Dawkins, 2006). Von Keyserlingk et al. (2009) reviewed different concepts of animal housing and husbandry and concluded that animal welfare consists of three important issues relating to affective states; i.e. pain, pleasure, and naturalness of animals. Repeated vaginal examinations, as conducted on commercial dairy farms due to fertility management, are interference to a cow's daily environment. Hence, the impact of vaginal examinations on cow's behaviour may be part of an impact on animal welfare on farms.

Animal welfare per se is difficult to measure, because the complexity of behaviour relies on subjective interpretations of different observers (Mason and Mendl, 1993). Moreover, there are many various stimuli on farms which may affect animal behaviour, and different species show different behaviours to a similar pain stimulus (Livingston, 2010). Although, there is an ongoing discussion whether cows have a sensation of discomfort or pain, the impact of reproductive examinations on animal behaviour has not been examined. Therefore, the overall objective of this study was to determine the effect of vaginal examinations on the behaviour of dairy cows. Specifically, we hypothesized that (1) cows show discomfort before and during vaginal examination with different behavioural reactions, (2) these reactions can be semi-quantitatively scored and (3) the vaginal examination with the Metricheck device is less invasive than an examination with the gloved hand.

2. Material and methods

Four experiments were conducted between April 2010 and November 2011.

2.1. Experiment 1

In a preliminary study, 10 dairy cows were examined by manual vaginal examination 30 ± 7 (mean $\pm$ standard deviation, SD) days in milk (DIM). The examination was

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