

Avoidance of tape-recorded milking facility noise by dairy heifers in a Y maze choice task

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Abstract

The effect of noise pre-recorded from a commercial milking facility on the choice behaviour of dairy heifers in a Y maze was examined. Sixteen animals were individually trained to associate noise onset with a particular maze arm and no noise (quiet) with the other maze arm. After a maze familiarisation period, each heifer was exposed to a mixture of training trials, where access to only one maze arm was made available, and choice trials, where both maze arms were available. In order to reduce possible interference from animals' original side preferences or response patterns under two-alternative choice situations, training and choice trials were interspersed and the noise stimulus was presented in the maze arm first chosen after familiarisation. Over 11 exposures to the maze across 3 days, choice of maze arm (during choice trials), avoidance behaviour (time taken to enter maze arm, number of stops, handler intervention required) and heart rate (HR) were measured. Results showed that the percentage of heifers that chose the quiet arm changed significantly ($p < 0.01$) from 31.3% to 81.3% over the course of the experiment. In addition, during training trials, animals took longer ($p < 0.05$) to enter the maze arm, stopped more, required more handler intervention when entering and were more restless in the noise compared to the quiet arm. During training trials there was also a trend ($p = 0.06$) indicating some increase in HR during noise trials compared to quiet trials. Overall, the results of this experiment indicate that milking facility noise is fear-provoking for dairy heifers and that they will learn to avoid this noise when given the opportunity. The experiment has also demonstrated successful use of this Y maze choice methodology for assessment of environmental stimuli in dairy heifers (previously Y maze methods have only been used to assess handling and husbandry practices in cattle).

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1. Introduction

Arnold et al. (2007) investigated the effect of unavoidable exposure to noise recorded from a milking facility on the behavioural and physiological responses of dairy cows. The findings indicate some activation of fear-related responses in the presence of this noise based on behavioural responses and changes in HR. The current experiment was aimed at assessing the impact of the same noise on heifers' choice behaviour. A number of studies have investigated the aversiveness of noise for animals (but not cattle) using choice behaviour (e.g., McAdie et al., 1993; Talling et al., 1998). Use of both direct aversion and preference testing methods has been advocated by Pajor et al. (2003), who assessed responses of dairy cows to various handling treatments using both methods (Pajor et al., 2000, 2003).

The way in which fear-related responses of cows to various stimuli, such as noise, manifest in preference behaviour (under volitional control) is an important consideration in commercial milking situations, as voluntary entry by cows into milking facilities is desirable. Thus, the present study was aimed at developing a methodology to assess the effect of tape-recorded milking shed noise on the choice behaviour (i.e., under animal's volitional control) of dairy heifers.

The Y maze as a measure of choice behaviour has been used to assess restraint procedures for sheep (Grandin et al., 1986; Rushen, 1986), deer (Pollard et al., 1994) and beef cattle (Grandin et al., 1994). In dairy cows, choices relating to various treatments, including feeding, shouting, electric shock, hitting (Pajor et al., 2003) and being milked (Prescott et al., 1998) have been assessed using Y maze methodology. Most of these studies did not include measurement of any additional indicators of fear, such as avoidance behaviour and/or physiological indices. Of those that did, Pollard et al. (1994) found that, in addition to a preference for no restraint, deer hesitated more and required more force to enter a crush restraint option than a no restraint option, providing additional validation for interpretation of an aversion to restraint. Because choice behaviour may be affected by different attributes of the stimulus or the animal that lead to attraction or avoidance responses (e.g., Prescott et al., 1998), the inclusion of alternative measurement techniques will assist with more accurate interpretation of choice outcomes.

Furthermore, many Y maze experiments fail to account for a number of other factors which may affect overt choice behaviour; for example, preferred response patterns, original location preferences (e.g., Grandin et al., 1986), and the impact of other situational variables on ability to learn associations between maze location and stimulus presentation. For example, in the study by Pollard et al. (1994), animals that were trained using forced (i.e., only one option available) exposures to the two maze options more readily learnt location–stimulus associations than animals that were trained under conditions of free access to either option. Thus, forced training trials appear to be an important inclusion in Y maze procedures for use with farm animals.

In addition to incorporating forced training trials (i.e., trials where only one option is made available in the Y maze), the methodology in the present experiment was also designed to minimise impact of location and response pattern preferences on choice behaviour. There are two common response patterns reported in the literature that can naturally occur under two-alternative choice conditions such as in a Y maze. The first is spontaneous alternation (Dember and Richman, 1989), where the animal oscillates between the two maze arms over a number of choice trials. The second is perseverance (Rodriguez et al., 1992), where the animal persists with a particular maze arm choice over repeated trials. In order to minimise potential interference of these response patterns in the current experiment, training trials were arranged in an alternating

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