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Dairy heifers benefit from the presence of an experienced companion when learning how to graze

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ABSTRACT

Pasture remains important on many dairy farms, but the age of first contact with pasture varies depending on the month of birth, weaning age, and farm management. Regardless of age, naïve dairy heifers must learn to graze when first introduced to pasture. This study investigated whether being grouped with experienced dairy cows would affect the development of grazing behaviors. Sixty-three Holstein heifers (mean ± SD 14.2 ± 1.3 mo; 546 ± 60.7 kg) and 21 dry Holstein cows (2.6 ± 0.8 lactations; 751 ± 53.9 kg) were assigned into 7 groups of 12 animals (3 dry cows and 9 naïve heifers), and each was divided and assigned to an experienced (3 cows and 3 heifers) and nonexperienced (6 heifers) sub-group. Sub-groups were introduced to pasture in different paddocks without visual contact with any other cattle. No difference was found in the time after introduction to the paddock for heifers to first attempt to nibble grass [experienced: 0:23 (0:17–0:43) vs. nonexperienced 0:40 (0:35–0:46); median (quartile 1 − quartile 3), h:mm]. However, heifers grouped with experienced cows showed a shorter latency to begin grazing [experienced: 0:47 (0:28–00:52) vs. nonexperienced 2:13 (1:25–2:30)]. During the first hour after introduction to pasture, heifers in the experienced treatment showed fewer stomping events [experienced: 2.5 (1.25–4) vs. nonexperienced: 6.5 (4–8)] and vocalized less often [experienced: 3.5 (1.25–5.75) vs. nonexperienced: 7 (5–8.75)]. After this initial period, animals in both subgroups began to graze normally; treatments did not differ in grazing behaviors over the 3-d observation period. These results indicate that grouping heifers with pasture-experienced cows improves grazing behavior of dairy heifers in the first hours following introduction to pasture.

Key words: feeding behavior, social learning, social facilitation, dairy replacement, neophobia

INTRODUCTION

In the North American dairy industry, indoor housing systems with zero grazing have become increasingly prevalent (Fulwider et al., 2008), with less than 5% of lactating dairy cattle having access to pasture at some point during the year (NAHMS, 2010). If pasture is used by producers, it is frequently incorporated during the spring and summer months for growing heifers because pasture use results in reduced costs associated with purchased feed and reduction in labor (Hanson et al., 2013).

Beef calves are often born outside and spend much of their early life grazing with their mother and other social partners (Enríquez et al., 2011); in contrast, on intensive dairy farms calves are typically separated from the dam soon after birth (USDA, 2008; Vasseur et al., 2010), reared indoors, and provided no access to pasture until at the earliest after weaning, and sometimes much later depending on season and management on that farm. Lopes et al. (2013) found that providing grazing experience during the growing phase increased grazing time and positively affected milk production when dairy cows introduced to pasture after calving. However, most dairy replacement animals do not have the opportunity to graze when they are young, and often first-season grazing dairy heifers are placed on pasture without any companions.

These first-time grazers are thus faced with several challenges, including learning how to eat a novel feed type (Hessle, 2009; Costa et al., 2014), habituating to a novel environment (De Paula Vieira et al., 2012), and often coping with new conspecifics (De Paula Vieira et al., 2010) as heifers are frequently commingled when put out onto pasture. Numerous challenges are associated with regrouping, particularly in terms of feeding and social behavior (Hasegawa et al., 1997; see also review by von Keyserlingk and Weary, 2010). Thus, the combined effects of regrouping and the introduction to

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a novel environment may be disruptive to young heifers when transitioning from indoor housing to pasture.

To our knowledge, limited research has been conducted on the challenges that naïve dairy replacement heifers face during the introduction to pasture, and acute effects have not been investigated. One possible solution to the challenges faced by first-time grazers is to provide experienced animals that can act as social models. Thus, the aim of this study was to test if the presence of cows with previous experience on pasture would facilitate the development of grazing behavior of naïve dairy heifers when first introduced to pasture.

MATERIALS AND METHODS

This experiment was conducted between April 25 and July 4, 2013, at The University of British Columbia's (**UBC**) Dairy Education and Research Centre, located in Agassiz, British Columbia, Canada (49°N, 121°W). All procedures were approved by the UBC Animal Ethics Committee.

Animals

A total of 63 pregnant Holstein heifers (mean ± SD: 14.2 ± 1.3 mo; 546 ± 60.7 kg; BCS 3.2 ± 0.5, range from 2.5 to 4; scored from 1 to 5 following Edmonson et al., 1989) with no previous experience on pasture and 21 nonlactating Holstein cows (2.6 ± 0.8 lactations; 751 ± 53.9 kg; BCS 3.5 ± 0.5, range from 2.5 to 4) were assigned to 7 groups of 12 animals; each group had 3 nonlactating cows and 9 naïve heifers.

Each group was formed 3 wk before introduction to pasture. All cows had some experience on pasture as growing heifers and in the case of the multiparous cows during the previous summers if they were nonlactating. All experimental animals regardless of age were housed for at least 6 mo before the beginning of the experiment in a freestall barn with no access to the outdoors or to pasture during this time.

Experimental Design

The experimental period lasted 28 d per group, and groups were tested consecutively. During the first 21 d, each group was housed indoors in a pen configured with 12 freestalls. On d 22 groups were sub-divided into 2 groups of 6 animals each: 1 with 6 naïve heifers and 1 with 3 naïve heifers and 3 experienced cows. Each sub-group was placed on pasture for 72 h, starting at 0900 h. Treatment order was randomized: one sub-group was placed on pasture first on d 22, and the other sub-group stayed in the home pen until d 25 when they were granted access to pasture.

Housing and Management

Three experimental pens in a naturally ventilated freestall barn (width = 38 m, length = 156 m) with a north-south orientation and curtained sidewalls were used for this experiment. Each pen (width = 9.5 m and length = 12.3 m) had 12 freestalls (1.2 m center to center) separated by freestall divider loops with a diameter of 0.89 m (Y2K stall dividers, Artex, Langley, British Columbia, Canada). The bed of each stall was 2.6 m long and had a brisket board that was 1.7 m from the internal side of the curb (0.2 m height), providing a lying area of approximately 2 m^2/cow. The neck rail was positioned 1.2 m above the stall surface and 1.2 m from the rear curb of the stall. The stall was covered with a geotextile mattress and bedded with approximately 5 cm of river sand. Alleys were scraped 8 times per day with an automatic scraper, and crossovers were scraped by hand once per day.

The distance between the pasture and the barn varied according to the paddock used; the closest was 7 m and the farthest was 65 m from the barn. The pasture and the barn were connected via a 4.0-m-wide path covered with bark mulch. The path was cleaned and checked for obstacles daily. Pasture composition was determined using 8 haphazard 1-m^2 samples cut before the beginning of the experiment and the material was sorted into the species that were previously planted, the portions were weighed, and relations were determined. The pasture was approximately 45:40:10:5 festulolium [tall fescue (*Festuca arundinacea*) × ryegrass (*Lolium perenne* L.) cross]: orchard grass (*Dactylis glomerata* L.): ryegrass (*Lolium perenne* L.): white clover (*Trifolium repens*). The pasture was divided into 16 paddocks of 1,400 m^2 each managed using a rotational grazing system, where each group was introduced to a new paddock. A water trough located adjacent to the fence in each paddock was filled with fresh water automatically. No shade was provided on pasture.

Weather conditions (air temperature, relative humidity, rainfall, and wind speed) were recorded automatically throughout the study by an Environment Canada weather station in Agassiz, British Columbia, located adjacent to the research farm. During the course of the experiment (April to July 2013), the average ± SD daily temperature recorded was 15.7°C ± 3.6°C, minimum temperature was 10.7°C ± 3.3°C, and maximum daily temperature was 20.6°C ± 5.0°C. Precipitation averaged 3.8 ± 8.5 mm (range from 0 to 45.2 mm/d), relativity humidity was 73.2 ± 9.3% (range from 34 to 99%), and wind speed was 9.6 ± 9.4 m/s (range from 0 to 24 m/s).

Pasture samples were taken 1 h before the introduction of each new group. Each sample consisted of 6