Alley floor Cleanliness in Dairy Cubicle Barns

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Abstract

Different alley flooring systems have been found to influence claw health and locomotion among dairy cows in cubicle barns. The ability to keep the alley floors clean and dry is part of this. It is, however, challenging to keep the alleys clean at all time. Different cleaning regimes are used, and barns are equipped with a diversity of scrapers and alley surfaces. Scrapers are earlier found to greatly improve the hygiene on rubber-slatted alley floors.

The objective of the present study was to evaluate how different alley flooring systems and cleaning regimes influenced floor cleanliness in dairy cubicle barns.

231 barns from different parts of Norway were included in this study. Manure accumulation (depth of manure) in the alleys was measured at 16 different locations in each alley using a traditional ruler. In addition, floor type (solid vs. slatted floors, rubber on solid or slatted floors), type of manure scrapers and frequency of scraping were observed.

The most common floor types were slatted concrete floors (57%) and solid concrete floors (35%), while 7% had solid rubber floors and 1% had slatted rubber floors. Preliminary results show that slatted floors had significant less manure accumulated compared to solid floors. Regardless of floor type, the cleanest part of the alley was in front of the feed bunk while the amount of manure increased across the alley. The variation in accumulated manure in the alleys indicates that floor type and cleaning regime influence on alley cleanliness and thereby on cow cleanliness and hygiene.

Keywords: Cubicle housing, alley flooring, floor cleanliness

1 Introduction

According to Næss & Bøe (2010), the alleys represented 55.6 % of the free accessible area in cubicle barns for dairy cows. The main types of flooring in the alleys are solid flooring with mechanical scrapers or slatted flooring. Concrete is widely used in dairy barns with solid flooring because of its low cost and durability. In order to keep the alley surface dry it is often
recommended to make grooves in the floor surface or to make a 2 % slope into the middle of the alley. Alternative materials like mastic asphalt have been tested, and the use of rubber flooring seems to be increasing. For slatted floor systems, rubber coating has been developed as an alternative to traditional concrete slats.

Magnusson et al. (2008) reported that the cleaner alley floor had a positive effect on the cleanliness of the cubicles and the udder and teats of the cows. However, the knowledge on cleanliness of the alley surfaces is scarce.

Interestingly, Phillips & Morris (2001) found that the friction on flooring with hard surfaces clearly influenced locomotion, and in another study they showed that slurry from cattle excreta on concrete flooring reduced walking speed and altered limb angles (Phillips & Morris, 2000). The importance of alley surface on lameness and claw disorders is documented in several studies (e.g. Vokey et al., 2001; Fjeldaas et al., 2011).

The objective of the present study was to evaluate how different alley flooring systems and cleaning regimes influenced floor cleanliness in dairy cubicle barns.

2 Materials and methods

2.1. The herds

Layouts from 231 cubicle-stalled dairy herds with a mean herd size of 38.0 ± 14.5 (range 17.6 – 80.2) cows located all over Norway were obtained. To be included in the study, farmers had to meet our inclusion criteria; volunteer to participate, have a herd size > 20 cows, and have a barn built in the years 1995 to 2005. The number of cows (herd size) on each farm was extracted from the Norwegian Dairy Herd Recording System (NDHRS) for the year of visit. During the indoor feeding period (September 2006 - May 2007), all the barns were visited once by trained observers and all relevant dimensions for the layout were obtained.

2.2. Observations of alley flooring and floor cleanliness

Floor cleanliness was recorded by measuring the thickness of the manure (mm) at sixteen different locations in the feed alley (Alley 1), and similarly in the alley between the two first rows of cubicles (Alley 2) (Figure 1). An inch rule was placed on the floor, and the depth of the manure was recorded. In barns with solid floors, observations of floor cleanliness were carried out approximately one hour after the last run of the manure scraper.

In addition, floor type (solid vs. slatted floors, rubber on solid or slatted floors), type of manure scrapers and frequency of scraping were observed.

![Figure 1: Measuring points in the alleys](image-url)
2.3. Models and statistical analyses

Statistical analyses were performed using one way Anova Test (PROC ANOVA) in SAS version 9.3. The level of significance was set to (P < 0.05). Variables included in the analyses were floor type and amount of manure in the alleys.

3 Results and Discussions

The most common floor types were slatted concrete floors (57% of the herds) and solid concrete floors (35% of the herds), while 7% of the herds had solid rubber floors and 1% had slatted rubber floors. Looking at solid floors, 98% of the barns had mechanical manure scrapers. 70% had hydraulic scrapers while 28% had other kinds of scrapers.

Preliminary results show that slatted floors had significant less manure accumulated compared to solid floors (Fig. 2). Regardless of floor type, the cleanest part of the alley was in front of the feed bunk while the amount of manure increased across the alley. The variation in accumulated manure in the alleys indicates that floor type and cleaning regime influence on alley cleanliness and thereby on cow cleanliness and hygiene.

4 Conclusions

As expected, the amount of manure was least in barns with slatted floors. The cleanliness of solid floors is dependent on the frequency of the scraping. However, the effect of alley cleanliness on cubicles cleanliness and animal cleanliness is unknown.

Figure 2: Amount of manure in alley 1 (next to the feed table) and alley 2.
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6 References


