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Influence of Dairy Housing on Freshwater Usage on Commercial Dairies in Western Kansas

J. P. Potts and M. J. Brouk

Summary

Fresh water pumping records were obtained from 24 western Kansas dairy farms for a 10-year period from 2000 through 2009. Farms were divided by facility type: dry lot (DL), free stall (FS), or a combination (DL+FS). Of the facility types studied, DL averaged smaller ($P < 0.05$) demand for water at 52.6 gal/cow per day compared with FS at 61.3 gal/cow. Both DL and FS facilities had less water demand than the combination facilities of DL+FS at 71.1 gal/cow of water daily. In all cases, average freshwater pumping was less than the daily amount of 134.7 gal/cow commonly used in dairy facility design. The difference may result from water conservation efforts of the dairies and the efficiency gained from operating larger milking parlors.

Key words: free stall, dry lot, water conservation

Introduction

Water is an essential part of any dairy operation. Fresh water is needed to cool cows and milk, flush alleyways, wash udders in wash pens, water cows, and clean milking equipment. Similar to water intake requirements for cows, dairy operation water use can vary greatly depending on management practices, location, and the recycling of water on the dairy. The purpose of this study was to examine the effect of facility type on the freshwater demand of western Kansas dairy operations.

Experimental Procedures

Freshwater pumping records were obtained from the Division of Water Resources in Topeka, KS, from 24 farms for the years 2000 through 2009. The records contained a total of 189 observations during this time frame. Of the 24 farms, 12 were free stalls (FS), 10 were dry lots (DL), and 2 were combination DL+FS farms. Water usage was first adjusted annually by operation and then converted to a per-cow per-day basis before analysis. Procedures of SAS (SAS Institute, Cary, NC) were used to analyze the data with the MIXED procedure. Dairy types (FS, DL, or DL+FS) were the fixed effects and year was considered a random effect.

Results and Discussion

The DL dairies were the largest, with an average of 4,387 cows per farm, or 755 and 2,353 more cows per farm than the FS and DL+FS dairies, respectively (Figure 1). The average daily amount of fresh water pumped during the decade reported was 57.3 gal/cow (Figure 2), which is less than the 135 gal/cow considered the average for estimating water demand on Kansas dairy operations. Of the facility types studied, DL averaged smaller ($P < 0.05$) demand at 52.6 gal/cow per day compared with FS at 61.3 gal/cow. Both DL and FS were less than the combination facilities of DL/FS at 72.1 gal/cow daily. The variation in water usage by facility may be caused by different methods of cow cooling, pen washing, and water recycling, or by herd size. Other research has shown that positioning udder wash pens before the milking parlor can increase water usage by more than 100 gal/cow daily. Wide variation was detected when comparing the ranges of water usage on the 3 facility types on a month-to-month basis during the 10-year

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period. The FS ranged from 20.1 to 193.1 gal/cow per day; DL, 15.1 to 170.1 gal/cow per day; and DL/FS, 30.9 to 90.9 gal/cow per day. Similar variation has been noted in other studies. The results indicate that annual freshwater demand by western Kansas dairy farms may be less than suggested by certain guidelines. This may occur in part because more water conservation practices or efficiencies are associated with operating larger milking parlors.

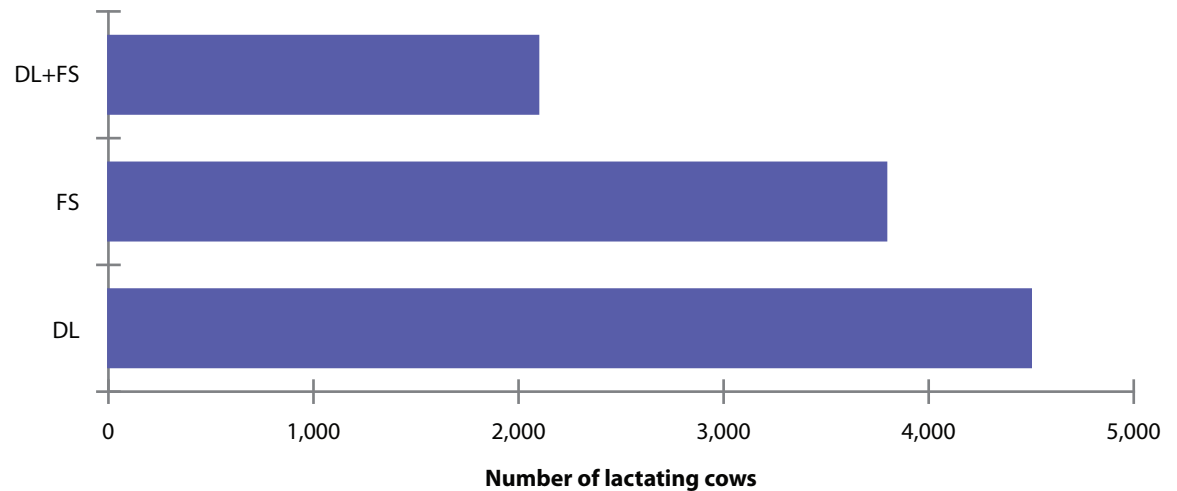


Figure 1. Average number of cows by type of dairy (DL, dry lot; FS, free stall; or DL+FS, dry lot and free stall facility).

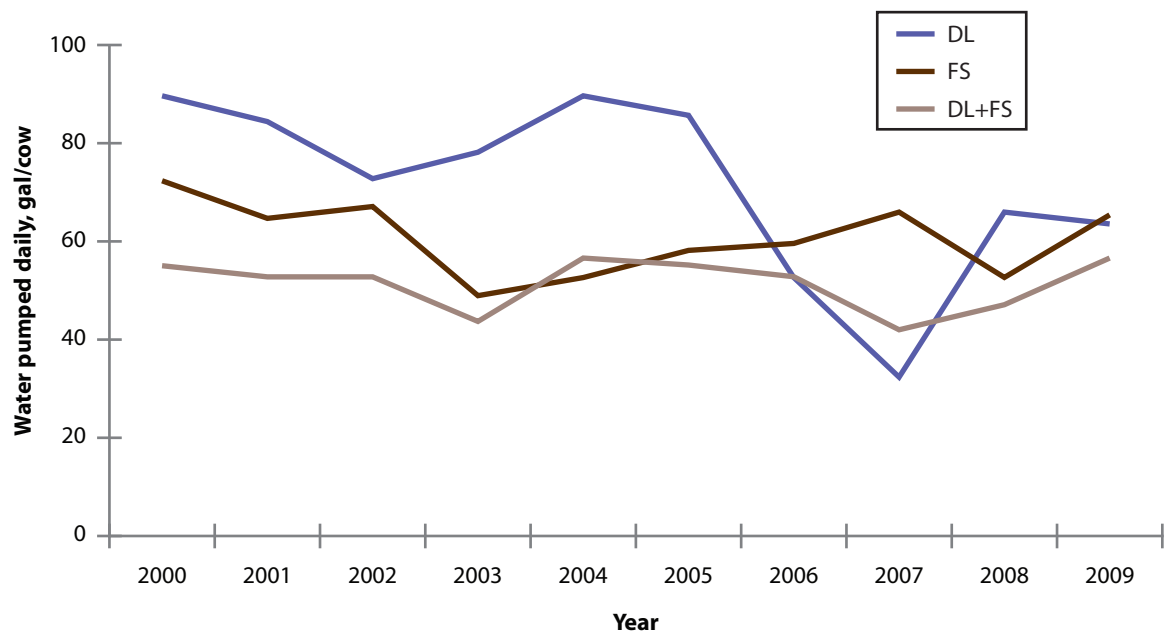


Figure 2. Ten-year comparison of fresh water pumping by different types of dairy facilities (DL, dry lot; FS, free stall; or DL+FS, dry lot and free stall facility).