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Constraints for nutritional grouping in Wisconsin and Michigan dairy farms

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ABSTRACT

A survey was conducted in Wisconsin (WI) and Michigan (MI) to quantify the proportion of farms that use a single diet for all lactating cows and to better understand the reasons for current grouping strategies and the limitations to grouping for better nutritional management. A questionnaire was mailed to all WI dairy farmers with ≥ 200 lactating cows (971 farms) and to a random sample of grade-A MI dairy farmers (800 farms) of varying herd sizes. The survey return rate was 20% in WI (196 farms) and 26% in MI (211 farms; 59 of them had ≥ 200 lactating cows). Feeding 2 or more different diets to lactating cows was predominant: 63% in WI (124 farms, all ≥ 200 lactating cows), 76% in MI farms with ≥ 200 lactating cows (45 farms), and 28% in MI farms with < 200 lactating cows (43 farms). Farmers feeding more than 1 diet used 1 or more of the following criteria for grouping lactating cows: stage of lactation, milk production, or body condition score. Overall for both states, 52% of the farms (211 from 407 farms) feeding more than 1 diet grouped cows according to their nutritional needs. However, a notable population of farms fed the same diet to all lactating cows: 37% in WI (72 farms), 24% in MI (14 farms) for herds of ≥ 200 lactating cows, and 72% in MI for herds of < 200 lactating cows (109 MI farms). “Desire to keep it simple” and “milk drops when cows are moved to a different group” were identified as main constraints to having more groups within a farm for nutritional purposes. Farm facilities and labor were also limiting factors to grouping in farms with herd sizes of < 200 lactating cows.

Key words: feed efficiency, precision feeding, diet management, survey

INTRODUCTION

A major challenge in feeding high-producing dairy cows has been to find the right nutritional balance (fiber, NFC, protein, and fat) to promote rumen health and maximize feed energy intake and nutrient flow to the mammary gland for milk synthesis (VandeHaar et al., 2012). Also, a major limitation to increase feed efficiency in many dairy farms is the unwillingness of farmers to group cows according to their nutritional needs, because feeding a single diet across lactation cannot maximize both production and efficiency simultaneously (VandeHaar et al., 2012). McGilliard et al. (1983) developed a method for grouping dairy cows based on protein and energy requirements (cluster). That method was compared against grouping by daily test milk, FCM, or dairy merit. The cluster procedure was the most effective for grouping cows and was more homogeneous to meet their nutrient requirements (McGilliard et al., 1983). Schucker et al. (1988) performed a validation study and follow-up studies by Williams and Oltenacu (1992) and St-Pierre and Thraen (1999) corroborated that cows grouped by their energy and protein nutrient requirements were more homogeneous than cows grouped by milk production.

Managing multiple-diet groups across lactation has the potential to improve productivity, efficiency, and feed cost savings to dairy producers (Williams and Oltenacu, 1992; Allen, 2009; Zwald and Shaver, 2012). Based on the cluster method (McGilliard et al., 1983), Cabrera et al. (2012) developed and tested an online tool, “Grouping strategies for feeding lactating dairy cows” (<http://dairymgt.uwex.edu/tools.php>), to group cows based on nutrient requirements and income over feed cost. The analysis was conducted using data for cow identification, parity, DIM, milk yield, and milk fat content from 30 Wisconsin commercial farms. The analysis consistently demonstrated that income over feed cost in all farms was greater for the strategy of using 3 feeding groups per farm than a no grouping strategy (Cabrera et al., 2012).

Previous research supports the practice of grouping animals and adjusting diets according to their energy

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requirements to maximize feed efficiency and profitability in dairy farms (Allen, 2009; Maltz, et al., 2013); tools already exist to facilitate this task. However, the proportion of dairy farms in the upper Midwest grouping lactating cows according to nutritional requirements or conducting any management to enhance feed efficiency of lactating cows is unknown. Furthermore, the reasons for current grouping practices and constraints to implementing greater grouping are poorly understood. Therefore, the objective of the current survey study was to quantify the proportion of farms that uses a single diet for all lactating cows in commercial dairy farms in Wisconsin (**WI**) and Michigan (**MI**) and to better understand the reasons for current grouping strategies and the limitations (perceived or real) to grouping for better nutritional management.

MATERIALS AND METHODS

A survey instrument was developed, reviewed, and approved by the University of Wisconsin-Madison Education Research and Social and Behavioral Science Institutional Review Board. The survey was mailed to 971 farmers in WI and 800 farmers in MI. All WI farmers with ≥ 200 milking cows and a random sample of MI grade-A dairy farmers were invited to participate. The survey package contained (1) a consent form explaining that the survey was reviewed and authorized by the Education Research and Social Behavioral Science Internal Review Board at the University of Wisconsin-Madison and researchers' contact information; (2) a letter briefly describing the goals and objectives of the project, indicating that this project was supported by the Agriculture and Food Research Initiative Competitive Grant no. 2010-85122-20612, with a list of participating universities and faculties, and a survey code number so that the producer could complete the questionnaire online if desired; (3) a 2-page questionnaire; and (4) a preaddressed, stamped return envelope. All potential respondents were informed that the questionnaire was anonymous unless they chose to divulge their identity at the end of the questionnaire. The questionnaire had 2 sections: (1) basic dairy farm information and (2) feeding and diets for lactating cows. Section A had 8 questions about dairy cattle numbers, rolling herd average (**RHA**) and individual cow milk production, primary manager of the farm, who performs the role of nutritionist, pasture-based farm (or not), certified organic (or not), housing facilities, and reasons for current physical grouping of lactating cows. In the questions of reasons for current physical grouping of lactating cows, Likert scale (Bowling, 2009) ranks from 1 to 5 were provided to assess the level of farmer agreement to formulated statements. A rank of 3.0 meant

the farmer neither agreed nor disagreed with the statement (neutral), rankings closer to 1.0 meant the farmer disagreed or strongly disagreed with the statement, and a rank closer to 5.0 meant that the farmer agreed or strongly agreed with the statement. Section B was divided into 4 questions about (1) feeding different diets to different groups of lactating cows; (2) reasons for grouping lactating cows for feeding purposes; (3) feeding systems for lactating cows; and (4) constraints to feeding groups of lactating cows. Reasons for grouping lactating cows for feeding purposes and constraints to feeding groups of lactating cows (second and fourth questions) also had Likert scale responses ranked from 1, strongly disagree, to 5, strongly agree.

The data were analyzed using the nonparametric Wilcoxon-rank scores with SAS (SAS Inc., Cary, NC), which compared the responses among different herd size groups. It was analyzed in this manner because it was suspected that greater opportunities for nutritional grouping would exist with larger herd size. For both WI and MI, these groups were defined to have a similar number of farms in each group. To assess the responses between WI and MI at similar herd sizes, MI surveys were divided in 2 herd-size categories: those farms with < 200 lactating cows and those farms ≥ 200 lactating cows. Therefore, herd size categories in WI were 200–250, 251–380, 381–525, 526–802, and > 802 lactating cows. Herd size categories in MI for ≥ 200 lactating cows were 200–240, 241–310, 311–420, 421–600, and > 600 . Herd size categories in MI for < 200 lactating cows were < 40 , 40–62, 63–89, 90–132, and > 132 . In addition, an ANOVA was conducted within the questions of physical grouping, feeding groups, and constraints to feeding groups of lactating cows to compare the significance among the options within each question and among these questions. Significance was declared at $P \leq 0.05$.

RESULTS AND DISCUSSION

The survey return rate was 20% in WI (196 questionnaires returned) and 26% in MI [211 questionnaires; 28% (59) with ≥ 200 lactating cows]. In WI, farms in the range of 200 to 400 cows had the greatest frequency (91 farms), whereas in MI farms < 200 lactating cows had the largest frequency (152 farms, Figure 1). Average herd size for WI was 603 lactating cows (SD = 493; Table 1), with an average RHA of 12,157 kg/cow per year (SD = 1,409), ranging from 7,031 to 14,969 kg/cow per year, and average daily milk yield of 37.5 kg/cow per day (SD = 4.7), ranging from 13.6 to 47.6 kg/cow per day. Average herd size for all respondent farms in MI was 205 lactating dairy cows (SD = 320), with an average RHA of 10,393 kg/cow per year (SD = 1,940),

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