J. Dairy Sci. 99:1–13
http://dx.doi.org/10.3168/jds.2016-11445

Survey of reproduction management on Canadian dairy farms

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ABSTRACT

The objectives of this study were to (1) quantify current reproduction management practices, and (2) assess the association between these practices and herd reproductive performance on dairy farms in Canada. A bilingual survey was developed, validated, and administered from March to May 2014 to collect general and reproduction management and performance measures [annual 21-d pregnancy rate (PR), 21-d insemination rate (IR), and conception risk (CR)]. Associations between management practices and reproductive performance measures were tested using linear regression models. A total of 832 questionnaires were completed online and by mail, representing a response rate of 9%. On average, farms had 77 lactating cows (median = 50) and 13 dry cows (median = 10), and Holstein was the most common breed (92% of herds). Lactating cow housing was tiestall on 61% of the farms, freestall on 37%, and bedded pack on 2%. The average voluntary waiting period was 58 d in milk (DIM). The main reproduction management practice per farm was defined as the means employed for >50% of inseminations. Farms reported their main reproduction management practice for first and subsequent inseminations, respectively, as visual estrus detection (51 and 44% of herds), timed AI (21 and 23% of herds), automated activity monitoring (AAM; 10 and 10% of herds), other management practice (bulls; 2 and 2% of herds), and a combination of management practices (16 and 21% of herds). On farms using visual estrus detection, cows were observed for signs of estrus on average 3.5 times per day, for an average total of 36 min/d. The most common use of reproductive hormones was to synchronize ovulation using Ovsynch (58% of the farms). Average PR, IR, and CR were 17.6, 44.1, and 40.5%, respectively. In linear regression analyses adjusted for confounders, pregnancy rate was significantly associated with geographic region, housing (tiestall: PR = 15.4%, freestall: PR = 17.6%), herd size (<50 lactating cows: PR = 16.2%, 50–100 cows: PR = 16.5%, >100 cows: PR = 17.8%), voluntary waiting period (≤60 DIM: PR = 17.6%, >60 DIM: PR = 15.9%), and frequency of insemination per day (once daily: PR = 16.6%, twice or more daily: PR = 18.1%). The main reproduction management practice at first and subsequent inseminations was divergently associated with IR and CR, but not with PR (visual heat detection: PR = 17.4%, timed AI: PR = 18.4%, AAM: PR = 17.1%, combined practices: PR = 18.2%).
Key words: reproduction management, reproductive performance, survey, Canada

INTRODUCTION

Reproductive performance is highly variable among dairy herds in North America (LeBlanc, 2005; Ferguson and Skidmore, 2013), as are general and reproduction management practices (Caraviello et al., 2006b). Traditionally, visual observation of cows' behavior has been the main approach for identifying cows in estrus, but the limits and challenges of this practice have been known for decades (Foote, 1975; Senger, 1994; Van Eerdenburg et al., 1996) and include shorter and less intense estrus episodes and decreased labor on dairy farms. Various management tools and technologies are available to producers, and randomized clinical trials have shown comparable herd reproductive performance with different programs for synchronization of ovulation and timed AI or with automated activity monitoring (**AAM**) systems (Neves et al., 2012; Fricke et al., 2014). Although randomized controlled trials are very useful, they do not reflect the complex reality of variable performance among commercial farms or over time within a farm because of other variables including management practices, nutrition, heat stress, work-force availability and skills, or compliance with a program (Neves et al., 2012; Dolecheck et al., 2016).

Although a good body of experimental evidence exists on various reproductive management programs, few data are available on how, and how widely, various techniques and tools are implemented on Canadian farms and how management affects reproductive

Received May 11, 2016.
Accepted July 27, 2016.
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performance. Studies on large commercial farms in the United States showed that a combination of visual estrus detection and timed AI was used in most (>90%) herds, and aids to visual heat detection such as tail chalk were reported to be used in more than half of the herds, while pedometers were used in only 8 to 13% (Caraviello et al., 2006b; Ferguson and Skidmore, 2013). Management characteristics such as the length of the voluntary waiting period (**VWP**), accuracy of timing of insemination, stocking density, housing, insemination technique, and use of a resynchronization program were identified as explanatory variables for reproductive performance (Caraviello et al., 2006a; Schefers et al., 2010). Ferguson and Skidmore (2013) suggested that reproductive management that results in higher insemination rate was associated with excellent reproductive performance, yet the approach to reproductive management (e.g., visual heat detection, timed AI, or AAM) was not identified as a major explanatory variable for reproductive performance in other studies (Caraviello et al., 2006a; Schefers et al., 2010).

Without strong evidence on which reproductive management practices perform the best, it would be useful to identify associations of herd variables or programs with reproductive performance, and identify possible interactions of herd variables with chosen practices. Therefore, the first objective of the present study was to quantify current reproduction management practices in a representative sample of Canadian dairy farms. The second objective was to assess the association between reproduction management practices and herd reproductive performance. The hypothesis was that different reproduction management practices would be associated with different measures of reproductive performance.

MATERIALS AND METHODS

Experimental Design

A survey study was developed to collect general and reproduction management information on dairy herds across Canada. This study was evaluated and approved by the University of Guelph Research Ethics Board (no. 14JA048). To survey farms nationally, a quantitative questionnaire was created in English then translated to French and validated with pilot groups and back-translation techniques (Scholl et al., 1992; Dufour et al., 2010). Briefly, 3 experts in dairy reproduction drafted the questionnaire and chose the most pertinent questions (n = 99). Questions were then translated from English to French by the first author. These questions were then translated back to English by a bilingual collaborator that had not previously read the questionnaire. The 2 English versions were then compared to identify potential errors or inadequate translations. To have closer meanings in both languages, 5 modifications of the content and sentence structure were made in the English questionnaire and 2 in the French version. Twenty herd managers (10 English-speaking and 10 French-speaking) were contacted and asked to answer the questionnaire online. They were then contacted by phone to evaluate the clarity of the questions and the length of the response process. No changes were necessary for the clarity of the questions, but 29 questions were removed to reduce the duration to approximately 30 min. The full questionnaire is available (Supplemental Data File S1; http://dx.doi.org/10.3168/jds.2016-11445).

From March to May 2014, the questionnaire was administered to Canadian dairy farmers by internet (FluidSurveys, Ottawa, ON, Canada) and mail. A web link to the questionnaire was sent to all available email addresses of subscribers to the milk recording (DHIA) services in Canada: CanWest DHI (Guelph, ON, Canada) and Valacta (Sainte-Anne-de-Bellevue, QC, Canada), representing a total of approximately 3,000 dairy farms. A printed advertisement card with the web address and a QR code link was distributed through milk recording services communications to reach farmers for whom we did not have an email address (in *The Milk Producer* magazine for CanWest DHI members and the monthly report for Valacta members), reaching approximately 8,000 dairy farmers in total. To maximize reach, a paper copy of the questionnaire was sent to 2,000 randomly selected milk recording subscribers with their monthly DHIA report (1,000 CanWest DHI and 1,000 Valacta members). Some overlap was expected in the population reached via different methods of communication, and we estimated the total population contacted to be nearly 9,000 dairy herds. At that time, there were 11,962 dairy herds in Canada (Canadian Dairy Information Center, 2014). To increase the response rate, we offered an estimate of completion time, emphasized the objective of the study, and provided a financial incentive for completion (entry in a drawing to win $250; Dillman et al., 2008; Dohoo et al., 2009).

The respondents were allowed to leave any question unanswered. The questionnaire had a total of 70 questions about demographic information, farm characteristics, general management practices, transition management, and reproduction management. Questions on opinions and attitudes toward reproduction were also asked but will be reported in a separate paper. In the section for reproduction management, respondents were asked to give the proportion of inseminations that were based on visual estrus detection, timed AI, AAM, or other means. When the choice "other" was selected,