J. Dairy Sci. 90:1073–1079
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# Voluntary Waiting Period Management Practices in Dairy Herds Participating in a Progeny Test Program

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## ABSTRACT

A survey was mailed to approximately 4,000 herds participating in a young sire progeny test program to estimate the percentage of herds that selectively alter the voluntary waiting period (VWP) for individual cows or groups of cows. Responses were received from 673 herds (17%; 583 Holsteins, 55 Jerseys, 35 other dairy breeds). The mean VWP cited by respondents was 56 ± 0.6 d (range = 30 to 90 d) and did not differ by breed. Among responding herds, 64% (432/673) indicated the VWP was selectively altered for one or more reasons. The most frequently cited reasons for altering the VWP were postpartum health (50%), season (18%), milk yield (18%), parity (14%), and other reasons (14%). In Holstein herds that altered the VWP based on milk yield, the highest production group averaged 14 more days to first service than the lowest production group (≥40 vs. <20 kg of energy-corrected milk, respectively). In contrast, days to first service were nearly identical for all production groups in Holstein herds that did not vary the VWP based on milk yield. In conclusion, management decisions to selectively alter the VWP led to differences in days to first service and may have a confounding effect on genetic estimates of daughter fertility. Opportunities to improve the accuracy of daughter pregnancy rate estimates may reside in models that adjust for VWP management decisions on a within-herd basis.

**Key words:** voluntary waiting period, daughter pregnancy rate, progeny test program

## INTRODUCTION

The reproductive efficiency of dairy cattle in the United States has declined significantly during the last 20 to 25 yr (Lucy, 2001; Washburn et al., 2002). This decline in fertility has been associated with changes in the management and environment of commercial dairy herds and with genetic selection for increased milk production. Although the heritability of fertility is low (Nadarajah et al., 1988; Stålhammar et al., 1994; VanRaden et al., 2004), the economic importance and phenotypic variation is extremely high. The first genetic evaluations for daughter pregnancy rate (**DPR**) in the United States were released in February 2003 (VanRaden and Tooker, 2003; VanRaden et al., 2004), and provide dairy producers with a valuable tool to thwart further declines in female reproductive efficiency. These procedures estimate the genetic component of the variance in days to conception following a voluntary waiting period (**VWP**) that is assumed to be 60 d in length and homogeneous within and across herds. However, numerous studies suggest that the accuracy of female fertility estimates are highly subject to management biases, such as selective alteration of the VWP within herds (Janson and Andreasson, 1981; Oseni et al., 2003; Oseni et al., 2004). Goodling et al. (2005) concluded that use of estrus synchronization to manage insemination substantially reduces residual variances and moderately reduces sire variances for days to first breeding, days open, and pregnancy rate by 120 DIM, an encouraging result which implies that the accuracy of DPR estimates may be improved as management biases are identified and accounted for within evaluation models.

Although DPR evaluations indicate that possibilities exist to select for both production and reproduction, the relationship between milk yield and DPR is largely antagonistic (VanRaden et al., 2002). However, a number of studies have reported significant economic returns for high-producing dairy cows assigned to an extended VWP (Bar-Anan and Soller, 1979; Arbel et al., 2001; Tenhagen et al., 2003). Herds that alter the VWP based on milk production would tend to confound and exaggerate the negative relationship between milk yield and DPR. Other studies indicate advantages afforded by altering the VWP for individual cows, groups of cows, or both based on lactation (Tenhagen et al., 2003) or season of calving (Oseni et al., 2003). Although it is well recognized that many herds selectively alter the VWP for various reasons, the impact of these management decisions on the accuracy of DPR estimates is unknown because there are presently no estimates of

Received March 18, 2006.
Accepted August 24, 2006.
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the percentage of herds that selectively alter the VWP. The objectives of this study were to estimate the incidence and basis for management decisions to selectively alter the VWP for individual cows or groups of cows in herds that participate in a young sire progeny test program and to determine the impact of these decisions on days to first service.

## MATERIALS AND METHODS

A VWP questionnaire was printed on self-addressed, postage-paid postcards (Appendix 1) and mailed to approximately 4,000 dairy herds that were participating in a large-scale progeny testing program (Select Sires, Inc., Plain City, OH). Herds were classified by the predominant breed of cattle in the herd. Holsteins and Jerseys were considered separately, but the remaining breeds (Ayrshires, Brown Swiss, and Guernseys) were combined into an "other breeds" group. The percentage of herds that selectively altered the VWP for various reasons was compared across breeds using logistic regression and chi-squared procedures. The actual VWP reported and the average herd sizes were compared across breeds using ANOVA. In a GLM, average herd size was also compared within each respective category for altering the VWP, including the effects of breed, altered VWP ("yes" or "no"), and breed × altered VWP interaction.

Survey results were matched with insemination and production records obtained from Dairy Records Management Systems (**DRMS**, Raleigh, NC) to determine the effects of reported alterations of the VWP on the mean days to first service after calving. Days to first service were determined from insemination records routinely retrieved for all progeny test herds processed by DRMS. However, only a subset of respondents report to DRMS, and insemination records were not available for all respondents. Inseminations were restricted to the most recently available data at the conclusion of the survey, which encompassed first services occurring from July 1, 2004, to September 30, 2005. Cows with calving dates prior to June 1, 2004, were excluded to enhance accuracy in the definition of first-service insemination. Cows >250 DIM at first insemination were also excluded. Seven herds with <10 first services were excluded. The final edited data set included 54,452 first-service inseminations from 347 Holstein and 30 Jersey herds. Because of the limited sample size, other dairy breeds were excluded from the analysis of the effects of VWP management on days to first service. The effects of the reason cited for altering the VWP on least square mean days to first service were analyzed independently using general linear regression models. Each model included the effects of breed, altered VWP ("yes" or "no"), and the interaction of breed × altered VWP, with herd included as a nested variable within breed and the categorical VWP grouping.

Because of the highly confounded nature of these data, extensive nesting of effects within models was required for more detailed analysis of some variables, as described in the models below. All statistical analyses were performed using SAS JMP Statistical Discovery Software (SAS Inst. Inc., Cary, NC).

The effects of an altered VWP by lactation number on days to first service were evaluated in the following model:

$$\text{DFS} = \text{Breed} + \text{LACT} + \text{Breed} \times \text{LACT} + \text{SPAR(LACT, Breed)} + \text{Parity(SPAR, LACT, Breed)} + \text{Herd(SPAR, LACT, Breed)} + \text{residual error},$$

where DFS is days to first service after last calving; Breed is breed of the herd cited by the respondent, categorized as Holsteins, Jerseys, or other dairy breed; LACT is the survey response to an inquiry of altered VWP by lactation number ("yes" or "no"); SPAR is the survey response to identify the parity that had the longer VWP among herds that altered the VWP by lactation number; and Parity is the parity of the individual cow as defined in DRMS insemination records, grouped as primiparous or multiparous. Responses to SPAR were categorized into 4 levels: 1) the VWP not altered by LACT, 2) primiparous cows having a longer VWP, 3) multiparous cows having a longer VWP, or 4) unknown because the respondent suggested the VWP was altered by lactation number but did not indicate which group had the longer VWP.

The effects of an altered VWP by season were evaluated in the following model:

$$\text{DFS} = \text{Season} + \text{Season avoided(Season)} + \text{CALVMY(Season avoided, Season)} + \text{Herd(Season avoided, Season)} + \text{residual error},$$

where DFS is days to first service after last calving; Season is the survey response to an inquiry of an altered VWP by season ("yes" or "no"); Season avoided is a survey response indicating that the season VWP 1) was altered to avoid summer breeding and freshening, 2) was altered to avoid winter freshening, or 3) was not altered by season; and CALVMY is a categorical classification of month and year of calving.

The effects of altered VWP by milk yield were evaluated separately for each breed using the following model:

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