J. Dairy Sci. 90:2069–2081
doi:10.3168/jds.2006-702
© American Dairy Science Association, 2007.

Dry Period Length in US Jerseys: Characterization and Effects on Performance

M. T. Kuhn,[1] J. L. Hutchison, and H. D. Norman
Animal Improvement Programs Laboratory, Agricultural Research Service, USDA, Beltsville, MD 20705-2350

ABSTRACT

The objectives of this research were to characterize dry period lengths for US Jerseys, determine the effects of days dry (DD) on subsequent lactation actual milk, fat, and protein yields, fat and protein percentages, somatic cell score (SCS), and days open (DO), and to determine the dry period length that maximizes yield across lactations. Field data, collected through the Dairy Herd Improvement Association, on US Jersey cows first calving between January 1997 and November 2004 were used. Characterization of DD included a frequency distribution of dry period lengths as well as factors affecting US Jersey DD. Of the factors considered in this research, the primary ones affecting dry period length were DO, milk yield, and SCS. Cows with longer DO, lower milk yield, and higher SCS received longer dry periods. The model for analyses included herd-year of calving, year-state-month of calving, parity of calving, previous lactation record, age at calving, and DD as a categorical variable; records were preadjusted for cow effects. A total of 123,032 records from 73,797 cows in 808 herds were used for estimation of DD effects on subsequent lactation actual milk yield. Jersey milk, fat, and protein yields in the subsequent lactation were maximized with 61 to 65 DD. Dry periods of 30 d or fewer resulted in large reductions in subsequent lactation production. A short dry period was beneficial for fat and protein percentages in the subsequent lactation. Short dry periods also resulted in fewer DO in the subsequent lactation; however, this was entirely due to the lower milk yield associated with shortened dry periods. The biggest difference between Jerseys and Holsteins was a much larger detrimental effect on SCS in Jerseys for dry periods of 30 d or less. Jersey SCS increased 10%, relative to the overall mean, for dry periods of 20 d or less and 4.6% for DD between 21 and 30 d. Dry periods of 45 to 70 d maximized yields across adjacent lactations. A dry period length, after first lactation, of 45 to 70 d also maximized actual milk yield across lactations 1, 2, and 3. The final recommendation to Jersey producers is to avoid dry periods of <45 d. Long dry periods (>70 d) should also be avoided because these are even more costly to total yield than dry periods <30 d.

Key words: days dry, Jersey, fertility, somatic cell score

INTRODUCTION

The last 4 to 5 yr have seen a renewed interest in the effects of dry period length on the performance of dairy cattle. Although this topic has received considerable attention in the past (Schaeffer and Henderson, 1972; Coppock et al., 1974; Dias and Allaire, 1982; Funk et al., 1987), dairy cattle populations have changed substantially, both genetically and phenotypically, over the last 20 to 30 yr. Selection has brought substantial genetic changes (AIPL, 2006) in all breeds, and management practices have evolved considerably as well. Thus, recent research (Bachman, 2002; Gulay et al., 2003; Kuhn et al., 2005b; Rastani et al., 2005) has explored length of dry period effects for modern-day dairy cattle in modern management systems.

Much of the past research, as well as recent research, on days dry (**DD**) has focused on effects on subsequent lactation performance, and primarily effects on production. Several studies (Gulay et al., 2003; Annen et al., 2004; Rastani et al., 2005; Kuhn et al., 2006b), however, have examined subsequent lactation effects on other traits such as fertility, SCS, and fat and protein percentages, and one recent study (Kuhn et al., 2006a) examined effects on lifetime performance. Furthermore, research has been conducted on interactions of DD with previous lactation days open (**DO**), SCS, age at calving, and milk yield (Kuhn et al., 2005b). However, one aspect that has received little attention, if any, in either past or recent research on DD is whether breeds respond differently to variations in dry period length; virtually all research has been conducted using only Holsteins. The objectives of this research were first to characterize dry period lengths for US Jerseys and to determine the effects of DD on subsequent lactation milk, fat, and

Received October 24, 2006.
Accepted December 15, 2006.
[1]Corresponding author: mkuhn@aipl.arsusda.gov

protein yields, fat and protein percentages, SCS, and DO for US Jerseys. Characterization of DD included a frequency distribution of dry period lengths as well as factors affecting US Jersey DD.

Information on the effects of DD in the subsequent lactation is a necessary first step for a complete understanding of the consequences of various dry period lengths. But cows also lose production in the previous lactation because of dry off. A further objective, then, was to determine the dry period length for Jerseys that maximizes yield across adjacent lactations. Even total yield across adjacent lactations, however, is not entirely complete information. If either short or long DD resulted in greater culling late in the lactation following the dry period, then this would be an impact on lifetime performance or value that would not be reflected in the mere total across adjacent lactations. A final objective, then, was to provide some assessment of the potential impact of varying dry period lengths on lifetime performance.

Jerseys were an optimal choice in the United States for examining DD effects in an alternative breed because, although a distant second, Jerseys rank only behind Holsteins in terms of number of cows on test. Thus, adequate sample sizes for research were more likely for Jerseys than for other breeds.

MATERIALS AND METHODS

General Description of Data

Data used in this research were DHIA records from the Animal Improvement Programs Laboratory's national database. Only records on Jersey cows first calving in January 1997 or later were eligible for inclusion because dry dates were not stored prior to 1997. Furthermore, actual lactation yields were to be used in this research, in contrast to standardized (mature-equivalent) yields, because research (Kuhn et al., 2005b) has shown that standardized lactation yields conceal variation caused by dry period length. Thus, herds were required to be on continuous test after their first date of inclusion to ensure that the cows included had complete lactations recorded.

Records also had to be initiated no later than November 2004 to be included, which, given that data were extracted from the database in May of 2006, was also done to ensure complete lactations. Thus, calving dates for records included in this research spanned the period of January 1997 to November 2004. Herds were not required to be on test for the entire period; rather, they were only required to be on test continuously, up to May of 2006, after their first date of inclusion. For example, if a herd was not on test until 1999, it was still included provided it remained on test until May of 2006. This alternative resulted in larger sample sizes, compared with requiring herds to be on test continuously from 1997 to 2006.

Additional edits included exclusion of records initiated by abortion and exclusion of cows known to be donor dams, because these factors would result in unexpected or artificially abnormal dry period lengths. Donor dams can be identified from 2 sources of information in the Animal Improvement Programs Laboratory database: 1) pedigrees supplied by the breed association that identify calves as "ET" (embryo transfer) and thus their dams as donor dams; and 2) the reproductive record known as format 5, which allows reporting of donor dams. Another edit was to require actual calving dates to be within 10 d of the expected calving date, given the last reported breeding date, which ensured that the owner knew, at least at one point in time, when the cow was going to calve. Finally, any herd that had fewer than 5 cows in any year was deleted, which was done to ensure adequate sample size for adjustment of herd effects.

Actual lactational yields for milk, fat, and protein were calculated using the test-interval method (Sargent et al., 1968) and the lactation shape adjustment factors of Shook et al. (1980). The only standardization done was to a twice-daily milking basis. Records less than 305 d were not extended to 305 d, and all production beyond 305 d was included.

Factors Affecting Dry Period Length

To determine the effects of DD on performance following the dry period, the trait of interest (e.g., milk yield) would be the dependent variable and DD an independent variable in the model. However, to determine how various factors affect dry period length, the opposite is done; DD becomes the dependent variable and factors from the lactation preceding the dry period (previous lactation) are the independent variables of interest.

The linear fixed effects model used for assessment of factors affecting dry period length in US Jerseys was:

$$\text{DD} = \text{Herd} + \text{Yr} + \text{Mo} + \text{Parity} + \text{Age} + \text{DO} + \text{Milk} + \text{Last\_SCS} + \text{e} \quad [1]$$

where Herd, Yr, Mo, and parity were herd, year, month, and parity of calving in the lactation preceding the dry period; Age and DO were age at calving and DO in the previous lactation; Milk was the actual lactational milk yield in the previous lactation; and Last_SCS was the SCS on the last test-day in the previous lactation. Age, DO, milk, and Last_SCS were all fit as categorical variables. Categories for age were defined as follows: 1) 2 yr of age or younger, 2) 2 to 2.5 yr, 3) 2.5 to 3 yr, 4) 3

Download English Version:

https://daneshyari.com/en/article/2440584

Download Persian Version:

https://daneshyari.com/article/2440584

Daneshyari.com