Fertility time trends in dairy herds in the central area of Portugal

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Introduction

The economics of dairy production are in great part dictated by the reproductive efficiency of the herds. In previous work (Rocha et al. 2001) we reported high non-return (NR) and calving rates (CR) and low heat detection rates and delayed calving to conception intervals, in herds of the main dairy area of northern Portugal. More recently (Rocha et al. 2010) a small but steady deterioration of reproductive parameters was reported for the same area. Albeit a small country, there are considerable differences of climate, soil productivity and farming practices among the different regions of the country. The present study was carried out to assess fertility time trends of dairy herds in central Portugal.

Material and Methods

The farms studied had an average of 43 milking Holstein cows (ANABLE, 2009). In the majority of the farms cows are milked twice a day, and fed concentrate and corn silage or totally mixed rations throughout the year. Direct assess to grazing is limited, but generally animals have access to non-paved paddocks throughout the year. The average production in 305 days was 8,065±1,487 kg. Cows are bred exclusively by AI performed by technicians at the farm or by inseminators working for dairy coops. The voluntary waiting period (VWP) varies between 42 to 60 days.

The following reproductive efficiency indexes were studied:

Calving to 1st AI (CAI) and calving to conception interval (CCI), defined as the total number of days from calving to the 1st postpartum AI and from calving to the AI (up to 10) from which the parturition resulted, respectively. Calving interval (CI) was defined as the period (in days) between two consecutive parturitions.

Non-return at first AI was computed as the total number of females inseminated by the first time after calving that were not re-inseminated in the next 90 days (NR), divided by the total number of first inseminations x 100.

Calving rate at first AI (CR) was calculated as the total number of females pregnant to first AI, as indicated by a subsequent parturition, divided by the total number of first inseminations x 100. Pregnancies had to be the result of a 1st AI with no more inseminations before the subsequent parturition, and calving had to occur 282±15 days after that insemination.

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Heat detection rate (HDR) was estimated using the formula: (Nº of eligible estruses÷{[CCI-VWP) ÷21]+1}) x 100.

The data consisted of records collected from farms of the central region of Portugal from 1993 to 2008 and were made available by the ANABLE (National Association for Dairy Herd Improvement).

Time-trends of the reproductive indexes were studied using fixed linear models. All traits were adjusted for age of cow (linear and quadratic), herd, parity order and year/season (Y-S, 2 seasons) or year/trimester (Y-T), depending on the structure of the data. CR and NR were further adjusted for the effect of the inseminator. Estimated linear contrasts of least square means were computed from each model to make inferences and evaluate differences between levels of main effects.

Results

Adjusted means and SE for the studied period are expressed in Table 1. Time trends are depicted in Figure 1-A through 1-F. There is a steady significant ($P < 0.05$) increase over time for CAI, CCI and CI. NR is also increasing (0.54% / year) but is not statistically different from zero. On the other hand, a consistent decrease ($P < 0.05$) was noted for CR and HDR over the years (Figure 1-E and 1-F).

Table 1. Adjusted means (±SE) and number of observation (n) for each reproductive parameter*

Parameter	Mean ± SE (n)
Calving to 1st AI – CAI	94.56±0.96 (103,927)
Calving to conception – CCI	241.34±2.67 (76,734)
Calving interval - CI	411.96±1.23 (168,437)
Non-return at 90 days – NR	53.00±4.87 (78,002)
Calving rate at 1st AI – CR	45.42±3.28 (55,174)
Heat Detection Rate – HDR	51.43±4.11 (76,734)

*Data were from dairy herds in central Portugal obtained between 1993 to 2008.

Discussion and Conclusions

The parameters related to fertility at insemination, namely 53% of NR and 45% of CR at 1st AI are indicators of an acceptable conception rate for Holstein cows, compared to international data (Dobson et al. 2007). However, CAI and in particularly CCI are longer than expected, considering the modest milk production. These augmented intervals may be attributed to the poor HDR (CAI), concomitant with decreased fertility (CCI), rather than to lactational anoestrus and/or negative correlation with milk production.

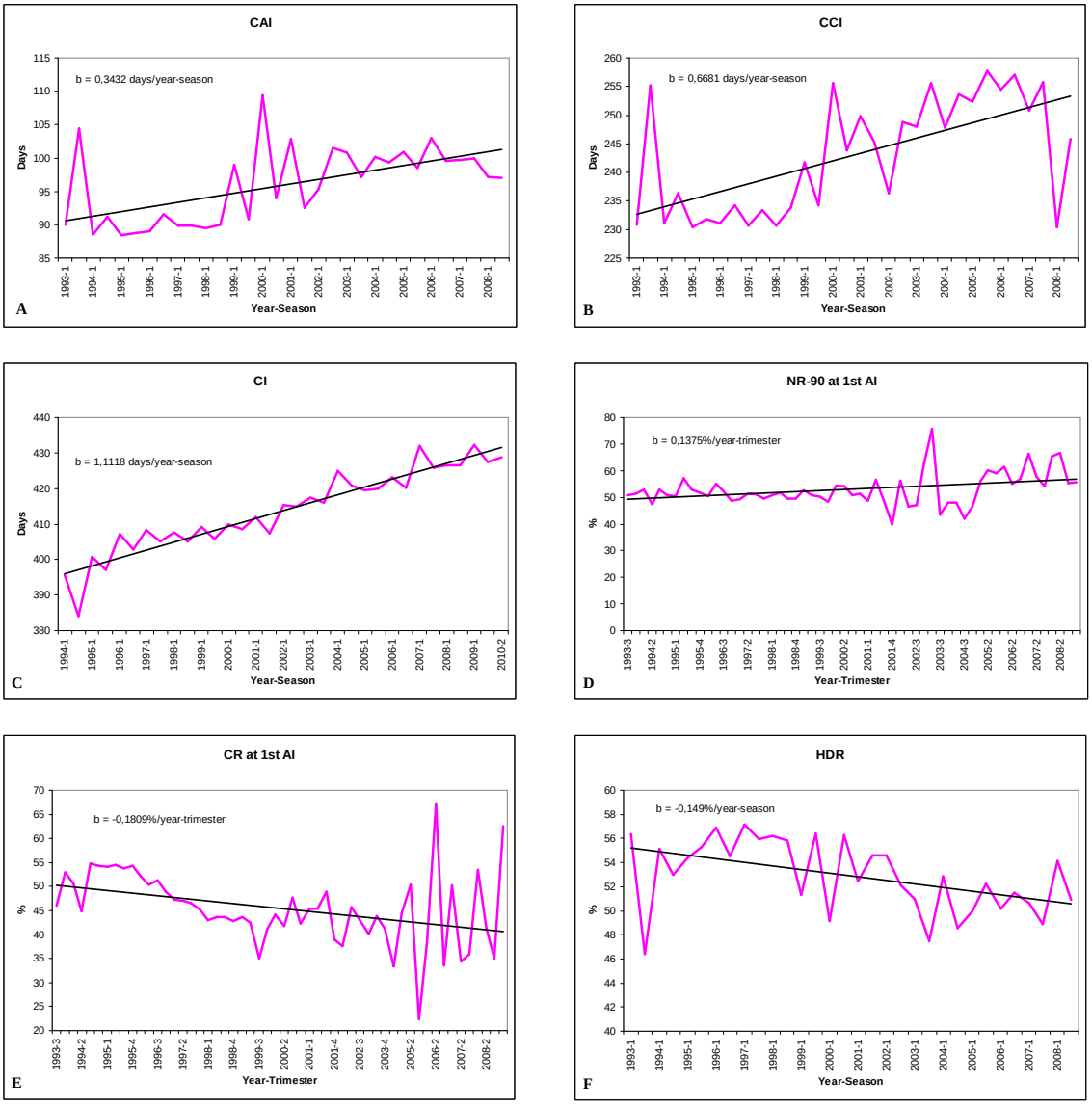

Figure 1. Time trends for 6 reproductive indexes. A = Calving to 1st AI interval; B = Calving to conception interval; C = Calving interval; D = Non-return at 90 days; E = Calving rate at 1st AI; F = Heat Detection Rate. ("b" is the regression coefficient).

With the exception of NR, all parameters suffered slight but steady deteriorations over the years. The slight increase of NR at first AI is at odds with the increase of the "real" fertility measured by CR at 1st AI. This apparent contradiction is probably due to the steady deterioration of HDR, which results in the augmentation of false positive pregnant cows, when pregnancy is assesses by absence of oestrus as in the case of NR.

The identification of the causes for temporal variation of fertility was out of the scope of this study. The medium to low level of production reported for the Holstein cows of this study should allow the implementation of strategies to decrease or reverse this fertility downward trend, e.g., use of better technologies related with heat detection, increase in veterinary assistance during the post-partum period and implementation of programs for oestrus and ovulation synchronization for fixed time AI.

References:

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