J. Dairy Sci. 96:1–16
http://dx.doi.org/10.3168/jds.2012-6335

Prevalence of periparturient diseases and effects on fertility of seasonally calving grazing dairy cows supplemented with concentrates

E. S. Ribeiro, F. S. Lima, L. F. Greco, R. S. Bisinotto, A. P. A. Monteiro, M. Favoreto, H. Ayres, R. S. Marsola, N. Martinez, W. W. Thatcher, and J. E. P. Santos[1]
Department of Animal Sciences, University of Florida, Gainesville 32611

ABSTRACT

The objectives were to characterize the prevalence of periparturient diseases and their effects on reproductive performance of dairy cows in seasonal grazing farms. A total of 957 multiparous cows in 2 farms (555 in farm A and 402 in farm B) were evaluated and diseases characterized. At calving, dystocia, twin birth, stillbirth, and retained fetal membranes were recorded and grouped as calving problems. On d 7 ± 3 and 14 ± 3 postpartum, cows were evaluated for metritis and on d 28 ± 3 for clinical endometritis based on scoring of the vaginal discharge. From parturition to 30 d after artificial insemination (AI), prevalence of mastitis, lameness, and digestive and respiratory problems were recorded. For subclinical diseases, diagnosis was based on blood samples collected from 771 cows and analyzed for concentrations of Ca, nonesterified fatty acids (NEFA), and β-hydroxybutyrate. Cows were considered as having elevated NEFA concentration if the concentration was ≥0.70 m*M*, subclinical ketosis if the β-hydroxybutyrate concentration was ≥0.96 m*M*, and subclinical hypocalcemia if the Ca concentration was ≤2.14 m*M*. Ovaries were scanned on d 35 ± 3 and 49 ± 3 postpartum for determination of estrous cyclicity. All cows were enrolled in a timed AI program and inseminated on the first day of the breeding season: on average, 86 d postpartum. Overall, 37.5% (359/957) of the cows presented at least 1 clinical disease and 59.0% (455/771) had at least 1 subclinical health problem. Prevalence of individual diseases was 8.5% for calving problems, 5.3% for metritis, 15.0% for clinical endometritis, 13.4% for subclinical endometritis, 15.3% for mastitis, 2.5% for respiratory problems, 4.0% for digestive problems, 3.2% for lameness, 20.0% for elevated NEFA concentration, 35.4% for subclinical ketosis, and 43.3% for subclinical hypocalcemia. Clinical and subclinical diseases had additive negative effects on reproduction, delaying resumption of estrous cyclicity and reducing pregnancy per AI (P/AI). Occurrence of multiple diseases further reduced reproductive efficiency compared with a single disease. Individually, subclinical hypocalcemia, elevated NEFA concentration, metritis, and respiratory and digestive problems reduced estrous cyclicity by d 49 postpartum. Elevated NEFA concentration, calving problem, metritis, clinical and subclinical endometritis, and digestive problems reduced P/AI on d 65 after AI. Moreover, calving problems and clinical endometritis increased the risk of pregnancy loss between gestation d 30 and 65. Serum concentrations of Ca and NEFA were negatively correlated, and both were associated with prevalence of uterine diseases. In conclusion, periparturient diseases were highly prevalent in seasonally calving grazing dairies and affected cows had delayed resumption of estrous cyclicity, reduced P/AI, and increased risk of pregnancy loss.

Key words: dairy cow, disease, grazing, reproduction

INTRODUCTION

Seasonal calving is often used in grazing dairy farms to maximize pasture nutrient utilization and avoid temporary environmental constrains such as heat stress during early lactation and the breeding period. In this type of dairy production system, reproductive efficiency is essential to obtain a concentrated calving season on a yearly basis (Morton, 2010). Cows must become pregnant in a short and preestablished period of time, which, in many cases, follows a calendar day to begin and end for all cows. To achieve adequate reproductive performance, high submission rate and pregnancy per AI (**P/AI**) are mandatory (Morton, 2010). Although estrus detection is not perceived by producers as a major constraint for reproductive management in grazing farms (Brownlie et al., 2011), 13 to 48% of cows are anovular at the beginning of the breeding season, which limits submission to AI after detection of estrus (Rhodes et al., 2003). The adoption of timed AI programs maximizes submission rates, but P/AI of anovular cows are still poor (McDougall, 2010; Ribeiro et al., 2011; 2012). Moreover, factors such as extensive loss of BCS and postpartum health problems have been im-

Received November 1, 2012.
Accepted May 14, 2013.
[1]Corresponding author: jepsantos@ufl.edu

plicated with extended anovulation period, reduced P/AI, and greater risk of pregnancy losses (Santos et al., 2009, 2010). Therefore, minimizing health problems, loss of BCS, and anovulation become cornerstones to achieve high reproductive efficiency in dairy herds.

Nutrient intake is of special concern in grazing farms, as the supply by pasture-only diets is often limited, especially when genetics from high-producing cows not selected for production under grazing conditions are used (Bargo et al., 2003; Kolver, 2003). Even when concentrate is supplied, cows of high genetic merit for production increase milk yield without alleviating the extent and duration of negative energy balance and loss of BCS (Pedernera et al., 2008; Lucy et al., 2009) or without improving reproductive performance (Horan et al., 2004). Therefore, even when grazing cows are supplemented with concentrates, loss of BCS in early lactation can be extensive and compromise reproduction.

In confinement herds in North America, the adoption of standardized health programs for diagnosis and treatment of diseases is common (LeBlanc et al., 2006). Cows are typically evaluated daily during the first few weeks postpartum because of the high incidence of health problems in early lactation. The prevalence of clinical and subclinical diseases in high-producing dairy herds is well characterized in North America (Santos et al., 2009; Chapinal et al., 2011) and some authors have suggested that diseases affect more frequently high-producing cows under confinement than cows on grazing farms (Washburn et al., 2002). Diseases have been associated with reduced reproductive performance of cows in confinement (Santos et al., 2010) and in more traditional grazing systems with limited concentrate supplementation such as in New Zealand (McDougall, 2001). The impact of calving problems, anovulation, and loss of BCS have been well characterized in grazing dairy herds (McDougall, 2001; Rhodes et al., 2003; Ribeiro et al., 2011), but limited information is available on the prevalence of subclinical and clinical postpartum diseases and their effects on reproduction of grazing cows in the United States.

Therefore, the objectives of this study were to characterize the prevalence of periparturient clinical and subclinical diseases and their effects on resumption of estrous cyclicity, P/AI, and pregnancy loss of grazing dairy cows of North America supplemented with concentrates and subjected to timed AI on the first day of the breeding season. It was hypothesized that prevalence of clinical and subclinical diseases in the seasonally grazing farms studied would be comparable to values observed in high-producing dairy cows and that diseases would compromise the reproduction of dairy cows.

MATERIALS AND METHODS

The Institute of Food and Agricultural Sciences at the University of Florida (Gainesville) Animal Care and Use Committee approved all procedures involving cows in this study.

Cows, Pastures, and Management

The study was conducted in 2 commercial grazing dairy farms located in Florida. Both were fall/winter seasonally calving herds with similar genetics and management practices. The rolling herd average milk production per cow was approximately 6,000 kg. A total of 957 lactating multiparous dairy cows (North American genetics: 255 Holsteins, 88 Jerseys, and 614 crossbreds), 555 in farm A (237 Holsteins, 44 Jerseys, and 274 crossbreeds) and 402 in farm B (18 Holsteins, 44 Jerseys, and 340 crossbreeds), were enrolled. The crossbred cow population was mostly composed of F1 (50/50) and F2 (25/75) generations of crossbreeding between Holsteins and Jerseys. Different genetic groups were managed together in a pasture-based system in both herds. Cows were maintained under irrigated pasture paddocks of 2.7 ha and managed in a daily rotational method, allowing a 15-d resting period. Stocking rate for the total area of pasture was approximately 10 cows/ha. The pasture was composed of annual ryegrass (*Lolium multiflorum* Lam.) during winter and early spring (cool season), and perennial bermudagrass Tifton 85 (*Cynodon* spp.) during late spring, summer, and fall (warm season). Expected yearly yields of DM per hectare were approximately 3 to 4 t for annual ryegrass and 12 to 15 tons for Tifton 85. The typical composition of ryegrass consumed by cows under grazing is 18 to 20% CP and 45 to 50% NDF, whereas consumed Tifton 85 contains 15 to 18% CP and 50 to 55% NDF. Cows were offered 7 to 13 kg of concentrates/d on an as-fed basis (86 to 88% DM) during and immediately after each milking according to forage availability, which was estimated at the entrance to each paddock using rising plate meters. The concentrate was based on soybean hulls, citrus pulp, whole cottonseed, cottonseed hulls, corn gluten feed, corn meal, soybean meal, molasses, and a mineral-vitamin premix, and designed to contain approximately 15% CP, 4.5% ether extract, and 28% NDF. Cows did not receive glucogenic or Ca supplementation postpartum. Cows were milked twice daily throughout the lactation.

Characterization and Diagnosis of Health Problems

At calving, dystocia characterized by assisted calving, twin birth, stillbirth, and retained placenta char-