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An assessment of dairy herd bulls in southern Australia: 1. Management practices and bull breeding soundness evaluations

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ABSTRACT

In the pasture-based, seasonally calving dairy herds of southern Australia, the mating period usually consists of an initial artificial insemination period followed by a period of natural service using herd bulls. Bull breeding soundness evaluations (BBSE) were performed on 256 bulls from 32 dairy herds in southwest Victoria, using guidelines produced by the Australian Cattle Veterinarians, before and immediately after a single natural mating period. At the same time, herd managers were questioned regarding the management of the bulls. The objectives of this study were to describe the management practices of dairy herd bulls; to describe the causes of increased risk of reduced fertility in dairy herd bulls, as measured by a standard BBSE; and to describe the reasons for bull removal by herd managers during mating. At the premating BBSE, 19.5% of bulls were classified as high risk of reduced fertility, mostly due to physical abnormalities and reduced semen quality. At the postmating BBSE, 36.5% of bulls were classified as high risk of reduced fertility, mostly due to physical abnormalities, primarily lameness. Of the bulls used, 15.9% were removed from normal mating use by the herd manager, predominantly due to lameness and injuries. A premating BBSE is recommended in dairy herd bulls to identify bulls at risk of reduced fertility. Lameness is the most common problem in dairy herd bulls during the natural mating period, and risk factors associated with lameness in these bulls should be identified to better manage herd bulls.
Key words: dairy herd bull, bull breeding soundness evaluation, lameness, seasonally calving herd

INTRODUCTION

The majority of dairy herds in southern Australia (predominately winter rainfall, temperate climate) are managed so that cows calve as a group, which allows herd energy requirements to coincide with the timing of maximum pasture growth; they are made up of roughly equal proportions of seasonally calving herds and split calving herds. In seasonally calving herds, a mating start date is defined as 1 gestation length (typically 282 d) before the desired calving start date of the herd manager, and the mating period lasts for a predetermined number of weeks with no matings allowed outside of this period. Split- or batch-calving herds have 2 or 3 mating periods, with start dates defined by the herd manager and no matings allowed outside of the mating periods. Herds that have cows calving continuously throughout the year are referred to as year-round calving herds. Fertility is a key driver of the profitability of any dairy herd (De Vries, 2006), and, due to the finite period in which cows need to resume cycling and conceive, pressure is placed on reproductive performance in seasonally calving herds (Roche et al., 2007). In contrast to year-round calving herds, where the period from calving to confirmed conception is used to measure reproductive performance, in seasonally calving herds the key indicators of reproductive performance focus on the proportion of the herd that conceived within the defined periods following the start of the mating period (e.g., 6-wk in-calf rate, 12- and 21-wk not-in-calf rate; Morton, 2010). The mating period(s) usually consist of an initial AI period followed by a period where herd bulls are run with the milking herd on a continuous basis to perform natural service (these will be referred to as dairy herd bulls). Replacement heifers for these herds are usually kept from the offspring produced by AI, with calves sired by the herd bull sold shortly after birth. Therefore, the purpose of the herd bull is initiating lactation, not genetic gain.

The reproductive performance of Australian dairy herds has been in steady decline in recent decades. In the largest study of its type in Australia, in split- and seasonally calving dairy herds between 2000 and 2009 there was a decline of approximately 1% per year in the 6-wk in-calf rate, with similar declines in reproductive performance as measured by 12- and 21-wk not-in-calf

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rates; these figures reflect a general decline with no single explanatory factor (Dairy Australia, 2011). An important implication from these trends is that in seasonally or split-calving herds there are increasingly more cows that are not in-calf to AI, and therefore a greater proportion of the herd presented to the herd bulls in the subsequent natural mating period.

The purpose of the bull breeding soundness evaluation (**BBSE**) is to assess the ability of a bull to seek out, mount, and serve estrous females and, subsequently, impregnate them. The BBSE assesses risk of reduced fertility of the bull on the day of evaluation. The Australian Cattle Veterinarians (**ACV**), a special interest group of the Australian Veterinary Association, has developed a standard format for the BBSE (Beggs et al., 2013). Five major components of such a BBSE can include general physical evaluation and examination of the reproductive tract; scrotal circumference measurement; crush-side semen assessment; laboratory assessment of sperm morphology; and serving ability assessment. It is common in dairy situations, where paddocks are small and bulls mounting cows during the season can be observed, to omit the serving ability part of the evaluation because the risks of disease spread and poor animal welfare outcomes outweigh the benefits of the examination results.

The applications of a BBSE have been extensively reviewed in the beef industry, and a BBSE is easily performed, repeatable, and associated with the subsequent fertility of the bull. Several authors have correlated characteristics included in a BBSE with bull fertility (Coulter and Kozub, 1989; Farin et al., 1989; Holroyd et al., 2002; Menegassi et al., 2011). The BBSE has been shown to have a direct, short-term economic benefit to beef producers (Nöthling and Irons, 2008), with the return on investment for performing a BBSE in a commercial beef herd being as high as $19 per dollar spent (Menegassi et al., 2011). Whereas no comprehensive cost-benefit analysis of the BBSE has been performed in the dairy industry, n Tasmanian study, using Australian industry benchmarks, predicted a return on investment of nearly A$9 for every dollar spent on performing a BBSE (Dwyer, 2013a).

Few studies have reported BBSE findings from dairy bulls, and those studies report findings from bulls where the semen is collected for AI rather than bulls intended for natural service (Andersson and Alanko, 1992; Foote et al., 1977; Hoflack et al., 2006) or in dairy breeds used in a beef system (Makarechian et al., 1987). Previous studies focus on factors relating to semen quality, and the application of these findings to natural service bulls used in dairy herds is of limited value. The fertility (Overton and Sischo, 2005; Lima et al., 2009) and cost (Overton, 2005; Lima et al., 2010) of dairy herd bulls has been reported in studies from other countries, but the use of these bulls was different than the Australian dairy herd context. Few reports exist regarding management practices of dairy herd bulls, and these are not peer-reviewed papers (Risco et al., 1998, 2011; Champagne et al., 2002; Chenoweth et al., 2003; Dwyer, 2013a,b). Only been a handful of studies have collected pre- and postmating BBSE findings in beef herds (Smith et al., 1981; Boyd et al., 1989, 1991; Godfrey and Lunstra, 1989; Ellis et al., 2005), and to our knowledge no studies have reported on dairy herds. The findings of these studies vary, and due to the differences in bull use between beef and dairy industries, their relevance to the dairy industry is limited.

In the context of dairy herd bulls in seasonally calving herds in southern Australia, the current study was designed to investigate dairy bull management practices, the causes of reduced fertility in dairy herd bulls, the causes of bull removal by herd managers during mating, and possible associations between bull management practices and bull fertility. To achieve these goals, pre-and postmating BBSE were performed and the results were interpreted in conjunction with an evaluation of bull management practices. In this, the first of 2 companion papers, the management practices of dairy herd bulls, the results of the pre- and postmating BBSE, and the causes of bull removal during mating in the study population are discussed.

MATERIALS AND METHODS

Animals and Herds

This study was composed of 2 cross-sectional studies (1 before and 1 after the natural mating period) of natural-mating bulls in 32 herds. Commercial dairy herds were selected from the client base of The Vet Group, a veterinary practice servicing a large area of southwest Victoria, Australia. The practice services approximately 450 herds and the study herds appeared broadly representative of the practice herds with respect to herd size, breed, and calving pattern. Eligible herds were seasonally or split-calving herds that were planning to use dairy herd bulls with their milking herd for a period that immediately followed a period of AI. Study herds were selected on the basis of convenience, being approached for involvement in the study by the corresponding author through various channels; these included direct contact while providing unrelated veterinary services, through word of mouth via other veterinarians in the practice, and through advertising in the practice newsletter.

Bulls eligible for the premating BBSE were bulls that the herd manager planned to use in the upcoming natu-