

Hidden Expenses and Problems with Natural Service Bulls

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Dairy managers are faced with one of two options when breeding cows and heifers: artificial insemination (AI) or natural service bulls. AI breeding programs have long been recommended for producers that raise their replacement heifers because the genetic and economic advantages of AI have been well established. For example, the February 1997 USDA sire summary estimates a net merit dollars advantage of \$98 per lactation for a cow sired by an average active AI bull compared with a cow sired by an average proven natural service bull born during the past eight years. This is a conservative estimate for two reasons. First, managers can purchase semen from above-average bulls for AI. Second, the genetic merit of the average proven natural service bull is greater than that of most unproven bulls used for natural service. A recent Hoard's Dairyman survey (Table 1), however, indicates a trend toward increased use of bulls, a paradox considering the economic advantages of AI.

TABLE 1. Percent of respondents reporting use of natural service bulls for breeding dairy cows and heifers.

	1990	1992	1994	1996
Use a Bull for Breeding Dairy Cows	34.9%	36.2%	38.8%	41.7%
Use a Bull for Breeding Dairy Heifers	44.0%	46.9%	47.0%	49.9%

Source: Hoard's Dairyman Continuing Market Study 1997

Why are dairy managers incorporating natural service bulls into their AI breeding programs or abandoning AI for natural service bulls? Many managers believe that bulls are an inexpensive, foolproof, and convenient alternative to AI. Others assume that a bull's innate ability to identify and service females in estrus will decrease days open and calving intervals in their herd. In many cases, cows that fail to conceive after two or three consecutive services and cows that cannot be serviced by AI because they are never detected in estrus are turned in with a "clean-up" bull. At a 40% conception rate, common for modern, high-producing dairy cows, only 64% of cows in a herd will conceive after two or fewer services and 78% will conceive after three or fewer services. A bull that services the remaining 22% to 36% of the herd is a major contributor to the breeding and genetics program rather than a "clean-up" for repeat breeders and cows that are never detected in estrus.

A more recent trend is for dairies to purchase replacement heifers from breeders who use AI with semen from proven bulls rather than raising their own replacement heifers. These producers assume that bulls always are the logical choice when the genetic advantages of AI no longer apply because all or most replacement heifers are purchased rather than raised within their herd.

What are the hidden expenses and problems with natural service bulls? Are bulls always the better choice when replacement heifers are purchased? Here are a few items managers should consider before choosing to use natural service bulls.

Hidden Expenses...

A frequent assumption is that natural service bulls are practically free after the initial expense of acquiring them. Bulls also are perceived to save money and time by eliminating inefficient estrus detection programs that often hinder the effectiveness of AI. Both of these assumptions should be reexamined. First, for those who raise their own replacement heifers, costs of estrus detection should

be considered an investment rather than an expense because of the proven advantages of AI. Second, many of the costs of managing bulls are hidden within the overall expenses of a dairy operation. For example, a bull that consumes \$2 worth of feed per day costs \$730 per year in feed maintenance costs. At the commonly used bull to female ratio of 1:25, the cost per pregnancy of using bulls is nearly \$30 in feed costs alone. Of course, this cost depends on the bull to female ratio and ultimately on the number of pregnancies a bull produces per year. Feed maintenance costs for bulls also incur opportunity costs because this feed could be used to produce milk if fed to lactating cows.

Bulls require holding pens during periods of nonuse and incur wear and tear costs when housed in free-stall barns designed for cows. Introduction of bulls into a herd also displaces an equal number of productive cows from a housing facility. Veterinary costs for bulls include vaccinations, periodic breeding soundness and semen quality examinations, and treatment for sicknesses and injuries. Head gates and squeeze chutes also should be purchased for safe handling and restraint of bulls during these activities.

The nuisance that bulls present to a dairy operation is difficult to assess monetarily but should be considered nonetheless. Bulls frequently disrupt daily feeding, cleaning, and milking routines. The havoc a bull can cause upon pursuing a cow in estrus into a milking parlor is a safety hazard to other cows and to farm personnel. In Wisconsin alone, dairy bulls were responsible for one fatality per year during the past four years, a poignant reminder of the danger dairy bulls pose to humans.

Bull Fertility...

Many managers assume that all sexually mature bulls can successfully identify, service, and impregnate cows that come into estrus. Bulls, however, introduce variables including bull fertility, libido, mating ability, and venereal diseases into a breeding program that are eliminated or controlled when using AI. Conception rate to natural service is a product of the bull's fertility and the fertility of the cows he services. Thus, one subfertile or infertile bull affects the conception rate of every cow he is expected to service. Bull fertility varies widely, and, if breeding soundness and semen quality is not periodically evaluated to identify subfertile or infertile bulls, poor conception rates may occur. Furthermore, injuries and sicknesses can reduce the fertility of an otherwise fertile bull.

Libido and mating ability also affect fertility and vary widely among bulls. Libido is a bull's desire to locate and attempt to service females in estrus, whereas mating ability is a bull's ability to complete those services. Unfortunately, the most fertile bulls may not always exhibit acceptable libido and vice versa. Younger inexperienced bulls may exhibit adequate libido but often lack mating ability. Larger dairies often require many bulls to service a large group of cows. Whenever two or more bulls interact socially within a herd, a pecking order is established with the dominant bull servicing a disproportionate percentage of eligible females. If the dominant bull is subfertile or infertile, poor conception rates may occur despite an adequate or excessive bull to female ratio. In contrast, an inadequate bull to female ratio can exhaust the breeding capacity of a bull.

Heat stress during summer months in many parts of the United States can be severe enough to impair bull fertility. Semen quality in dairy bulls is reduced by continual exposure to ambient temperatures of 86° F for five weeks or 100° F for two weeks with no apparent effect on libido. Heat stress impairs bull fertility by decreasing sperm concentration, lowering sperm motility, and increasing the percentage of morphologically abnormal sperm in an ejaculate. Once heat stress occurs, semen quality does not return to pre-stress conditions for two months. This prolonged effect of heat stress on bull fertility interacts with reduced conception rates of cows experiencing heat stress to further decrease herd fertility.

For those who view bulls as the only solution for breeding cows that are never detected in estrus, new alternatives such as Ovsynch, a protocol for timed AI without regard to estrus behavior in

lactating dairy cows, are now available. Finally, bulls can transmit venereal diseases. Reputable AI organizations not only ensure their bulls are free of venereal diseases by periodic testing and through addition of antibiotics to semen, but also screen bulls for certain genetic defects.

Control of Reproduction...

An important benefit of a well managed AI program is access to records such as breeding dates, first service pregnancy rates, interestrus intervals, and days to first service that can be used to monitor fertility. Because these records are not available when using bulls, fertility often is assessed by monitoring calving interval. Unfortunately, if a fertility problem does occur, four to five months must elapse before the problem is reflected by a change in calving interval. Identification and correction of fertility problems in herds using natural service is always a challenge.

Expected calving dates can be calculated from AI breeding dates and used to optimize dry periods and manage transition cows. Oftentimes, expected calving dates of bull-bred cows are underestimated or overestimated by as many as two weeks, and this variation can have an impact on profitability. Insufficient dry periods do not allow time for adequate mammary cell regeneration and result in decreased milk production during the ensuing lactation, whereas excessive dry periods are costly due to lost productive days in lactation. Nutritional management of dry cows includes feeding a transition ration several weeks before calving. Economic losses accrue due to production losses and increased incidences of metabolic and physiologic disorders when transition diets are fed too early or too late with respect to calving.

Conclusion...

Hidden expenses and problems with natural service bulls should carefully be considered before choosing to introduce bulls into a breeding program or abandoning AI altogether. In many cases, bulls are not an inexpensive, foolproof, and convenient method for breeding dairy cows and heifers. The cost of maintaining bulls can approach or exceed that of AI without considering the long-term genetic advantages of AI. Bulls introduce variables such as bull fertility, libido, mating ability, and venereal diseases that are controlled or eliminated when using AI. Rather than eliminating management and labor costs, bulls require additional facilities, equipment, and careful attention to husbandry practices. Finally, no cost can be placed on injuries and fatalities that result each year from dairy bulls. No one can predict when or where a bull will attack. A straw of semen, however, has never caused the accidental death of an employee, coworker, or family member.