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Management of Natural Service Sires in Dairy Herds

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The use of natural service sires continues to be popular with many dairymen across the U.S. The 45th Annual Hoard's Dairyman Continuing Market Survey reported that respondents using bulls for reproductive management of their milking cows had remained rather steady from 1990 to 2000 with approximately 35-40% using bulls in their lactating herd.³ Natural service sires are commonly used in start-up or expansion dairies to allow producers time to concentrate on basic management tasks such as feed delivery and milking routines, thus providing time to hire qualified personnel and implement AI breeding. On other dairies, especially large western dry lot dairies, bull breeding is the method of choice. Many of these dairies have made a conscious decision to be "low input" and run very simple, straightforward businesses concentrating on feed delivery and milk harvest. These dairies are not very concerned about genetic improvement since most, if not all, heifer replacements are purchased just prior to calving. Other producers choose to use bulls based on the belief that bulls offer the best opportunity to improve reproductive management, yet they require very little management input.

However, to get the best performance from natural sires, active management is required. Any decision to use bulls, even on a temporary basis, should be made only after considering both the management requirements and the potential problems associated with keeping bulls on dairies such as the risk of venereal disease introduction, unknown or unproven genetic potential, an unknown risk for dystocia in offspring, and the potential for serious injury to farm employees and veterinarians. The objective of this paper is to describe management techniques and approaches that may mitigate some of the potential problems associated with using natural service sires either in a clean-up role or as the primary source of reproductive management. Much of the information in this manuscript is adapted from previously presented work at both the Western Veterinary Conference and the American Association of Bovine Practitioners annual meeting.⁵

Natural service sires have one purpose on dairies – to locate, service, and ultimately impregnate estrual cows as quickly as possible. Bulls destined for breeding should be screened with this objective in mind. Bulls should possess good libido, adequate semen quality, sound physical tools, above average genetic potential and reasonable dispositions.

Bulls that are selected for breeding management in the milking herd should be virgin bulls approximately 13-15 months of age that are selected out of top quality cows and high genetic merit AI sires. Bulls should also be in good general health with no ocular problems, good feet and legs with no evidence of lameness, and moderate body condition. Bulls with excessive body condition tend to have lower libido and are more susceptible to the effects of heat stress. Younger bulls may not be large enough to physically cover larger cows and older, more mature bulls tend to be more aggressive and dangerous to farm personnel.

Once the initial screening criteria have been met, bulls should be subjected to a more rigorous examination to evaluate their breeding potential. A breeding soundness evaluation (BSE), as described by the Society of Theirogenology guidelines, provides a platform for objective assessment of the necessary physical and reproductive tools. The BSE consists of a

thorough physical examination, an examination of the reproductive tract including palpation per rectum to evaluate seminal vesicles, prostate, and ampullae, scrotal circumference measurement, collection of a preputial sample for testing for *Tritrichomonas foetus*, and finally, semen collection and evaluation.

Scrotal circumference is evaluated to determine sperm production potential. When evaluating bulls, there is no estimate of quantity of semen or sperm produced. Instead, since there is a high correlation between the scrotal circumference measurement and total sperm output, and scrotal circumference is very repeatable, it is used as a proxy of sperm production ability. The Society of Theriogenology has established an absolute minimum of 30cm, but the minimum criteria increases as the bull ages. The other reason for performing a scrotal circumference evaluation is that scrotal development in the male is highly correlated to age at which their offspring reach puberty.

The final step in a BSE, performed only after a bull has passed each of the other aspects of the exam, is the collection and evaluation of a bull's semen. Generally, semen is collected using an electroejaculator and evaluated for both motility and morphology. Care must be exercised to protect the sperm from both heat and cold shock while performing the evaluations. Bulls must have at least 30% progressively motile sperm and at least 70% morphologically normal sperm to pass the exam. If bulls meet the minimum guidelines for each of the components of the evaluation, the bull may be classified as "satisfactory" as a potential breeder. Other classifications included "unsatisfactory" or "classification deferred", depending upon the evaluation results and the prognosis for recovery.

A BSE that is properly performed is extremely valuable in identifying potential breeding problems, but is limited in that the BSE does not evaluate a bull's libido. Unfortunately, there is not an easy, on-farm method of evaluating libido.

"How many bulls do we need to use?" is a common question that producers often ask. A common recommendation used in the beef world is to use 1 bull per 20-40 non-pregnant females, depending upon whether synchronization programs are used and the age of the bulls.² Dairy bulls are at a disadvantage compared to beef bulls due to their younger average age while in service and due to housing environments (concrete and crowded conditions). Factors that must be considered in making recommendations regarding stocking density of bulls include housing (confinement freestall vs. dry lot or pasture), stocking density of the pen (overcrowding probably decreases heat detection intensity due to lack of freedom to move around and higher risk of lameness), age of the bulls being used, total pen size (larger cow numbers require more total bulls, but also increase infighting among the bulls) and bull fertility. Based on surveys taken by Champagne et al and by the author, most California dairymen are using bulls at the ratio of 1:15-20 non-pregnant cows.

Dairy bulls are both dangerous and unpredictable and they pose a serious health risk to farm employees and veterinarians. Bulls should be handled with the utmost respect and personnel should be trained in how to work around bulls. First and foremost, one should never work around a bull alone. When approaching or moving a bull, talk to him or make noise to prevent startling. Always try to keep a few cows with him rather than move him alone. Carry a cattle paddle or whip, but try to maintain a clam demeanor while handling. When entering a bull pen, always have a plan of escape. If confronted by a bull, a person can reaffirm dominance (bluff) by making a broadside threat using a frontal stance with arms outstretched. If the bluff does not cause the bull to back down, employees should be instructed to slowly back away into a

safe area, but to never turn their back to the bull and run away. Bulls should be culled at the first indication of problems or at 2.5 years of age, whichever comes first.

Bulls are predisposed to health problems, especially lameness, due to the nutrient dense diets that are traditionally fed and the often constant exposure to concrete. One management recommendation to help address some of these problems and to improve the bulls' libidos is to implement a rotational management system. The most common form of rotational management recommended for freestall dairies involves the maintenance of 2 bull cohorts- a working set and a resting set. In this routine, one group of bulls is housed with the lactating cows for a period of 2-4 weeks (typically 21-days). These bulls are considered the "working" group and should be actively breeding cows. The second group is housed separately from the milking cows, preferably on an open dry lot or pasture system and is considered the "resting" group. These resting bulls are fed a ration of lowered nutrient density without any cotton products. The benefits are that bulls can get a rest from the concrete, reduce the total calories, protein and calcium ingested, reduce the negative effects of gossypol accumulation, and take a sexual rest. It is important to remember, however, that the ration change should not be so dramatic as to increase the risk of acidosis upon the return to the lactating diet. Rations that have worked well include the typical preparturient heifer ration or a blend of the lactating diet with additional grass or small grain hay, as long as cotton byproducts are removed from the mixes.

While there is no published data to date to support this recommendation, my clinical impression is that herd fertility has been improved and the risk of lameness and subsequent culling of individual bulls has decreased in this system. The rationale for the improved reproductive efficiency is at least partially explained by the Coolidge effect.^{1,4} Briefly, the Coolidge effect refers to the improved libido of bulls, (as well as bees, mice, rats, sheep, and yes, even humans!) that results from introducing the males to novel females.

If the dairy under consideration is a dry lot dairy, the rotational plan can be modified to reduce the number of bulls required. In this scenario, rotations are done from one breeding pen to the next every 21 days. After moving through each breeding pen, the bulls rotate through a resting pen. In this manner, bulls are exposed to novel females, but lose out on the benefits of time away from concrete and the lactating ration.

Many dairy rations contain 8-15% of the diet as whole or cracked cottonseed or cottonseed meal, depending upon the type of seed being utilized. Cottonseed and cottonseed byproducts contain variable levels of gossypol, a toxic component found naturally in nearly all varieties of cotton that has been shown to cause sperm abnormalities in bulls when fed at sufficient levels. These toxic levels are achievable in lactating diets, depending upon the type of cotton product being fed, the form of processing that was used, and the level of feed intake. Risco et al. reported that Brahman bulls fed a ration including 2.75 kg of cottonseed meal (8.2 g of free gossypol per day) had more abnormal spermatozoa as compared with controls ($49 \pm 8\%$ vs. $83 \pm 3.2\%$) by week five of the study.⁶ Extreme care should be exercised when bulls are eating the lactating ration and the level of cottonseed or cottonseed meal should probably be maintained at less than 8% of the total ration.

Dairy producers are usually aware of the need for proper vaccination, deworming, and disease screening for the cow herd, but bulls are often forgotten when it comes to preventive medicine. In general, bulls should receive the same respiratory and leptospira combinations as well as clostridium vaccines that the cow herd receives. In addition, bulls should be vaccinated for vibriosis with an oil-adjuvant vaccine using a double dose and repeating it in three week.⁷ In areas with internal or external parasites, bulls should be treated similarly to the cow herd.

(Caution: in herds that use Brahman-type bulls for clean-up purposes, cholinesterase-inhibiting insecticides should be used with extreme caution due to increased sensitivity.) Bulls should be monitored daily for attitude and lameness. Promptly cull any bull that becomes aggressive or difficult to handle. Bulls should also be included in the routine hoof trimming schedule to help decrease the risk for future lameness.

Proper routine preventive health management of bulls is a critical component of the herd health program of dairies that use natural service. Bulls should receive the same routine screening, vaccination and deworming programs as cows (except of course, brucellosis and trichomoniasis). Bulls should be screened for BVD status and not utilized if persistently infected. A common recommendation is that cows be vaccinated for vibriosis at least 3 weeks prior to bull exposure and should receive a booster at 6 month intervals. However, success has also been reported with vaccinating only the bulls using a double dose of the oil-adjuvant Vibrio vaccine (Vibrin®, Pfizer Animal Health) and repeating it in 3-4 weeks.⁷ All bulls should be tested for trichomoniasis during the BSE and culled if positive.

Lameness is the most common health problem in dairy bulls and can affect herd fertility by affecting the ability of the bull to follow and mount cows that are in estrus. Predisposing factors for lameness include conformation, diet, and housing (standing on concrete). Most dairies neglect bulls or try their best to avoid disturbing them. However, just as with cows, to prevent lameness in bulls, it is imperative to include them in the herd hoof trimming program and periodically rest them to provide relief from hard surfaces.

An example of an efficient and practical bull management program is shown below.

All new bulls:

1. All purchased bulls should be evaluated for age and bulls that are less than 13 months of age or less than 700-800 lbs should be rejected.
2. Perform a Breeding Soundness Examination, including a complete physical exam, and test for *Trichomonas foetus*.
3. Test for persistently infected BVD.
4. Vaccinations:
 - IBR/BVD/PI3 & BRSV (Modified Live Vaccine) + 5-way Lepto. Repeat initial vaccination in 3 weeks.
 - Clostridium 8-way
 - Vibrio (Oil adjuvant): Double dose, repeated in 3-4 weeks and again in 4-6 months.
5. Parasite Control:
 - Deworm and delouse if required: repeat 3 weeks after first application

Current breeding bulls (exposed to lactating cows)

1. No bull is to be used in service for more than 12 months.
2. Bulls must be checked daily for lameness and other health disorders. If a bull is lame, he should be removed from the cow pen and treated accordingly. Lame bulls should be replaced immediately by a sound bull.
3. Keep a few additional bulls (above the normal number required for breeding management) in the resting pen ready to replace any lame or sick bulls.
4. Monitor attitude daily. Any bull that becomes aggressive or difficult to handle must be culled as soon as possible.

5. Check daily to make sure that bull-to-cow ratios are correct. Bulls should be rotated after 21 days. Maintain 1 bull for every 18 open cows in each pen. After each palpation week, re-evaluate these ratios and adjust accordingly
6. Resting bulls receive the lactating cow TMR refusals with additional grass hay mixed with it.

The use of natural service sires for reproductive management continues to be a popular option for many dairies. In order for bulls to be successful, they must be in good general health, maintain a strong libido, and have a healthy, normally functioning reproductive system producing and delivering semen of good morphology and motility. The selection of bulls for use in dairy herds should focus on these areas, and once on the dairy, bulls should be properly managed to ensure adequate breeding performance.

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