Managing Dairy Cattle for Fertility

LOUIS J. BOYD
Department of Dairy, Michigan State University, East Lansing 48823

Abstract
High reproductive efficiency in dairy herds is dependent upon good management. Accurate records on the reproductive status of each cow are essential for efficient management and for diagnoses by veterinarians. No single nutrient is required specifically for reproduction alone. The nutritive requirements for reproduction should be adequately supplied. Current evidence fails to show any relationship between infertility and feeding urea at recommended levels.

Following parturition, rebreeding should be delayed until the reproductive tract has fully recovered from pregnancy. Without postpartum examinations to confirm that cows are ready to breed, higher fertility may be expected by waiting 60 days or more after calving before rebreeding. Cows and heifers should be observed carefully at least twice daily for standing estrus, and should be inseminated near the end of standing estrus. Faulty estrus detection and breeding at the wrong time during estrus constitute prime management errors that limit reproductive efficiency.

Current progress in hormone assays should provide clinical tests for future use in managing cattle reproduction and in diagnosis and treatment of infertility. It is possible that estrus and ovulation control may enable mass handling of cows at breeding time.

Introduction
Much progress has been made in the last three decades in the improvement of dairy cattle fertility. Artificial insemination has played an important role in reduction of various diseases, particularly those most often spread by contact of male with female (8,10). Based on current progress (11), it appears that we may soon expect some relief from another important source of infertility—endocrine imbalances. Practical laboratory assays for hormones involved in reproduction are currently being developed. When these tests become available clinically, they should prove to be extremely useful to veterinarians in the diagnosis and treatment of infertility.

Even with rapid developments in disease control and hormone analyses, we still must recognize management as a significant factor, if we are to achieve high fertility in our dairy herds. Regular reproduction of cows requires individual attention to each cow at parturition and at the time of breeding. Reproductive management does not appear to be as conducive to mass handling of cows in large herds as other management areas, such as feeding. Although in the future we may be able to group some of our cows for reproductive management, it is not likely that we can completely escape individual handling of cows insofar as reproduction is concerned.
The purpose of this paper is to discuss some management practices that relate to cattle fertility, some of which are directly applicable today and some that may become available in the future.

**Health Records**

Many authors have discussed the merits of herd health records, and it seems unnecessary to reiterate the advantages of records or the characteristics of a good record-keeping system (5,10). I emphasize that a simple, complete, and accurate record on the reproductive status of each cow in the herd is essential. Individual health records can prevent many cases of infertility, and they are worth their cost as a valuable record for the veterinarian in diagnosing infertility. In the future, more dairymen will probably utilize a computerized reproductive record system (Johnson et al., 15) to evaluate frequently herd reproductive status (IRS). This system provides a good reproductive management device, just as production testing enables dairymen to make management decisions on culling, feeding, and breeding. These two systems could be combined to furnish more complete information on which to base sound herd decisions.

**Nutrition and Reproduction**

Despite the numerous research efforts, the intricate relationships between nutrition and reproduction have not been clearly defined (6). There is probably as much uncertainty on this subject as in any aspect of fertility. Many products such as feed additives are marketed to aid fertility, catering to the first desire of most dairymen who wish to feed something that will cure infertility problems in their herds.

**Energy.** Perhaps lack of sufficient energy is one of the most common forms of nutritional infertility (6). There is ample evidence that puberty is delayed in underfed heifers (21) and that the reproductive performance of beef animals under range conditions is enhanced by increased energy intake (25). However, lactating dairy cows are usually fed more grain than range beef cattle and they do not share this fertility benefit from increased energy. Fuquay et al. (7) found that level of grain feeding during the first half of lactation did not significantly alter days to first estrus, days open, or total services for conception. Also, Lamb et al. (16) observed no difference in reproductive performance of dairy cows fed alfalfa hay plus grain and those fed alfalfa hay only during lactation.

**Phosphorus.** Limited phosphorus intake is probably the most prevalent mineral deficiency affecting reproduction (23). Hignett (12) reported that low phosphorus intake and wide calcium-to-phosphorus ratios led to reduced reproductive performance of cows. Other studies have drawn attention to the poor breeding record of cattle suffering from phosphorus deficiency, although it was generally accepted that fertility suffered only when other signs of phosphorus deficiency were present (13). In addition to studies on energy and minerals, the relationships between fertility in cattle and other nutrients such as protein and vitamins have been investigated. However, there appears to be no evidence that any single nutrient is required specifically for reproduction. In general, if the nutritive requirements for milk production and general health of the cow are met, then the cow’s nutritive requirements for reproduction should be adequate.

**Urea.** Some veterinarians and dairymen believe that feeding urea adversely affects conception rate. The relationship of dietary urea to fertility has not been adequately tested, as most studies reporting reproductive performance of animals fed urea were designed as nutritional experiments. However, the experimental evidence to date (1,2,14,18,22) fails to reveal any infertility associated with feeding urea at recommended levels. There are at least two long-term projects presently in progress (Purdue University and University of Illinois) to determine the effects of urea feeding on reproductive performance.

**Breeding Time**

For several years, the usual recommendation has been to rebreed cows no earlier than 60 days after calving (23). This is soundly based, as it is consistent with optimum milk production, calving interval, and fertility. Certainly, rebreeding should be delayed until the reproductive tract has fully recovered from pregnancy. However, there has been considerable emphasis recently on earlier breeding after calving to obtain calving intervals less than 12 months. A Kentucky study (20) showed that for each 10 days earlier that cows were rebred, the calving interval was reduced 8.8 days. Although increased number of services was required for cows bred less than 50 days after calving, earlier breeding may constitute a good practice in some well-managed herds. But, it seems advisable to give blanket recommendation to this practice.

Breeding after calving should be tied closely to the postpartum condition of each cow. Post-
partum reproductive examination and pregnancy diagnosis of all cows constitute good management practices used routinely in herds with a sound herd health program (19). Cows examined at 30 to 45 days after calving and pronounced "ready to breed" can be rebred before 60 days. Certainly, all cows will not fully recover from parturition by 40 to 50 days after calving. Without regular postpartum examinations, one may expect higher fertility from inseminations at 60 days or more after calving when most cows are recovered from parturition.

Estrus. Breeding at the wrong time during estrus undoubtedly accounts for considerable infertility in many herds. The data reported by Trimberger and Davis (24) prevail as the best information on time to breed during estrus. Fortunately, there is some flexibility in the time to breed, but indications are that fertility is highest when cows are bred near the end of standing estrus (10).

Estrus detection is a constant, time-consuming chore which may become a critical problem in larger herds. To do this job effectively requires accurate records and careful observation to detect cows in estrus. Cows and heifers should be observed carefully for standing estrus twice daily at times other than during milking or feeding. In many cases anestrus or silent estrus turns out to be "missed estrus." In one study (26) only 10% of the cows which failed to show estrus had abnormal reproductive tracts. Thus, approximately 90% of "infertility" in that study was caused by failure of the dairymen to detect the cows in estrus.

In my opinion, breeding at the wrong time during estrus and faulty estrus detection constitute the prime management problems that limit reproductive efficiency in cattle. Two possible scientific developments—a simple test to detect estrus and a reliable method of controlling the time of ovulation—will be important reproductive management techniques, especially in large herds. In addition, a simple early pregnancy test in cattle would improve reproductive efficiency.

Management System

Based upon research trends it seems reasonable to propose some future management practices with practical value for our dairy herds. There are good reasons for believing that estrus control could be a valuable management technique for dairy cows. In the first place, failure to detect cows in estrus is a major source of infertility, especially in large herds. Secondly, optimal estrus detection is expensive in terms of facilities and the labor required to give personal attention to individual cows.

A reproductive management system involving estrus could work in the following fashion: Progestin would be fed for 14 to 18 days monthly to synchronize estrus in cows that have been milking from 30 to 60 days. Advance arrangements would be made with the breeding technician to inseminate the cows within 3 to 5 days following withdrawal of the progestin from the feed. Cows that fail to conceive on first service would be fed the compound again the next month, along with other cows that have been fresh from 30 to 60 days. Dairy heifers of breeding size could be included with the cows each month. Among many practical advantages of such a system are:

1. Help eliminate "silent" or missed estrus.
2. Enable breeding technicians to work 5 or 6 days a week and service a much larger area than possible at present.
3. Enable dairymen to observe only treated cows for estrus, only 5 to 8 days each month rather than observing all open cows every day.

This kind of program is entirely possible today with lactating dairy cows (4). The major drawback to its practical use is subnormal fertility at the first service following estrus synchronization (17). However, fertility is normal on the second service, when the estrous cycles of treated animals are still synchronized. As a refinement to estrus control, ovulation control would be helpful, so that all cows could be inseminated at a predetermined time without observing for behavioral estrus. Moreover, inseminations could be timed from hormone treatment rather than from subjective symptoms of estrus. Furthermore, application of sex control (9) and ova transfer (3) might be proposed in conjunction with once-a-month breeding. In my opinion, these proposed management procedures are important research goals. They have the potential to reduce labor involved in breeding and should enhance conception rate. Some of these developments are within sight and could become an integral part of managing for fertility.

References

(2) Bond, James, R. R. Oltgen and R. R. Lehmann. 1967. Growth and reproduction of


