Reproduction Practices on U.S. Dairy Operations, 2007

Reproduction practices on dairy operations are crucial to maintaining consistent milk production and creating replacement heifers. The goals of a reproduction program should be to have heifers at a proper weight and height for the breed and calve at about 22 to 24 months of age (age at first calving) with healthy calves.[1] Subsequently, cows should produce a healthy calf every 12 to 13 months[2] (referred to as calving interval) or longer for higher-producing cows. The current industry averages for age at first calving (25.2 months) and calving interval (13.2 months) indicate that these goals are not easily achieved.[3] To achieve reproductive goals, breeding management programs must focus on multiple aspects of growth, health, and reproduction. Heifers must be monitored for growth and bred at the proper size; postpartum diseases must be minimized; and cows must be bred at the proper time of the estrous cycle, conceive, and produce a healthy calf.

This information sheet provides baseline information about reproduction practices on U.S. dairy operations collected during the Dairy 2007 study, conducted by the National Animal Health Monitoring System (NAHMS). The study was conducted in 17 of the Nation's major dairy States,* which represented 79.5 percent of U.S. dairy operations and 82.5 percent of U.S. dairy cows. The operations were divided into 3 herd-size categories based on the number of milk cows present: small (fewer than 100 cows), medium (100 to 499 cows), and large (500 or more cows).

Voluntary waiting period and estrus (heat) detection methods

The time between calving and subsequent rebreeding is referred to as the voluntary waiting period (VWP). This period of time allows uterine involution, including the clearing of material and bacteria associated with parturition and return of the uterus to its prepregnancy size. Normally, uterine involution occurs within 20 to 30 days of parturition.[4] In addition, it has been reported that 20 to 30 percent of cows are not cycling at 60 days in milk.[5] Increasing the VWP may increase fertility but can also result in increased days open. The Dairy 2007 study showed that the average VWP was 54.8 days and did not differ by herd size.

Decreasing the calving interval will result in more calves and greater milk production over a cow's lifetime. Detecting estrus or heat is a first step in breeding cows and can greatly affect the calving interval. Estrus detection is important in artificial insemination programs that do not rely on timed insemination. Research has shown that the duration of estrus in dairy cows decreases as milk production increases.[6] Additionally, cows that spend a majority of time on concrete flooring are less likely to display normal estrous behavior. Methods to monitor estrus include visual observation; electronic pedometers that measure increased activity, which is typical of cows in estrus; and electronic systems such as HeatWatch®, a device glued to the tailhead that detects the pressure of a mounting animal and transmits information about mounting activity.

Data from Dairy 2007 showed that 93.0 percent of operations used visual observation to detect heat, followed by bulls (40.3 percent); tail chalk or paint (34.7 percent); and pressure devices, such as Kamar® (14.4 percent) [figure 1].

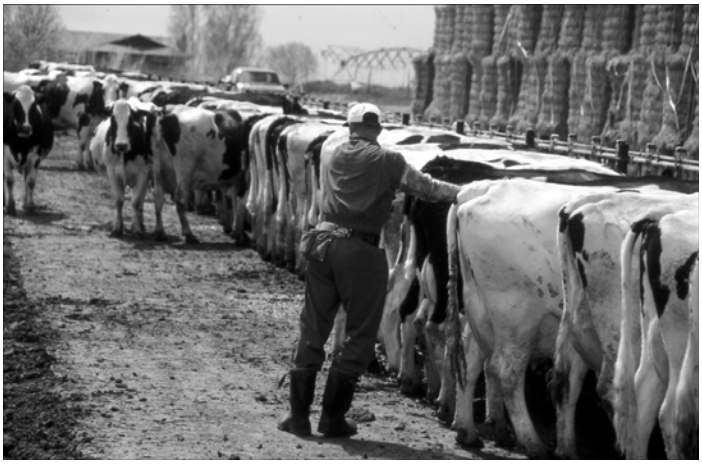
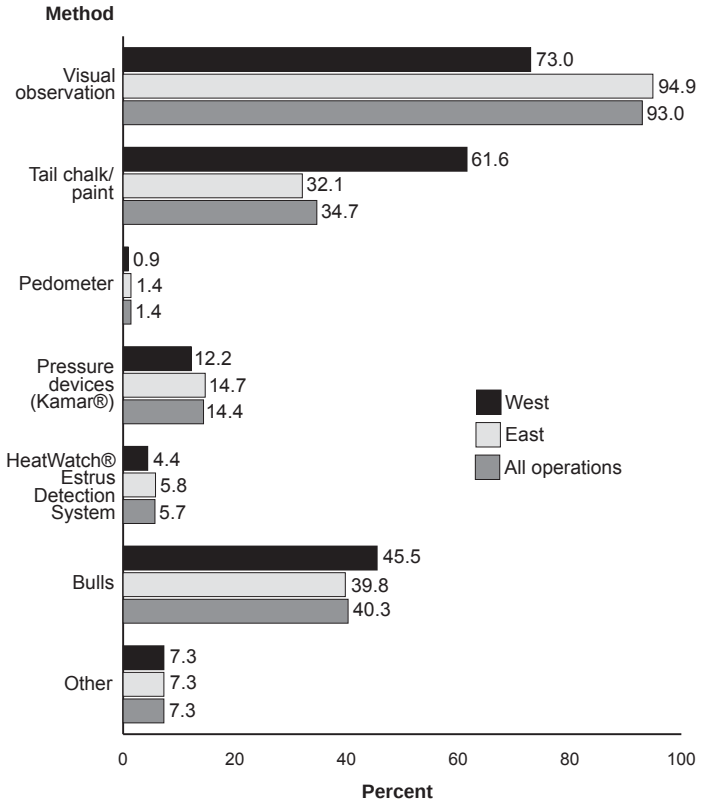


Photo courtesy of "Dairy Herd Management"/"Bovine Veterinarian"

*States/Regions:
- **West:** California, Idaho, New Mexico, Texas, and Washington
- **East:** Indiana, Iowa, Kentucky, Michigan, Minnesota, Missouri, New York, Ohio, Pennsylvania, Vermont, Virginia, and Wisconsin

Electronic methods for heat detection, such as pedometers and Heatwatch, were used on only 1.4 and 5.7 percent of operations, respectively. A higher percentage of operations in the East region than in the West region (94.9 and 73.0 percent, respectively) used visual observation to detect heat. Conversely, tail chalk/paint was used by a higher percentage of operations in the West region than in the East region (61.6 and 32.1 percent, respectively).

Figure 1. Percentage of Operations by Method Used to Detect Heat (Estrus) During the Previous 12 Months, and by Region



Visual detection of heat can be accomplished in two general ways: the owner or employees, while performing other tasks, can observe cows for signs of heat, or a person(s) can be designated to watch the cows at a set time every day and for a specified amount of time.

Optimally, visual detection of heat requires observation of the cows for 30 minutes twice daily. The Dairy 2007 study indicated that 59.7 percent of operations using visual observation had a person designated to detect heat; there were no differences by herd size or region. Of operations that used visual observation for heat detection, 37.9 percent had a set number of times and duration per day for observing estrus. There were no regional or herd-size differences. The operation average total time dedicated to visually detecting estrus was 62.5 minutes per day. Almost one of four operations (22.9 percent) observed for estrus for 20 minutes or fewer per day, while a similar percentage (21.0 percent) observed for 81 minutes or more.

Breeding practices

Advances in technology and increases in knowledge of cattle reproductive biology have enabled development of new methods of breeding cattle. Better understanding of dairy cattle reproduction has made it possible to induce estrus and ovulation. These two advances have enabled operations to breed cows and heifers at specific times rather than waiting for the cows to show natural estrus.[7] Presynch protocols involve the administration of prostaglandins to induce heat by lysing the corpus luteum when present, and Ovsynch protocols use prostaglandins and gonadotropin-releasing hormone (GnRH) to induce ovulation.

Artificial insemination (AI) to natural estrus was used for first-service breeding for the majority of heifers on 57.1 percent of operations and the majority of cows on 54.7 percent of operations during the previous 12 months. Natural service (use of bulls for breeding) was the second most common practice used at first service for the majority of heifers and cows (33.2 and 21.7 percent of operations, respectively). Individual timed-AI protocols, such as Ovsynch or a combination of Presynch/Ovsynch, were used for first-service breeding on the majority of females by less than 7 percent of operations and were more frequently used on cows than on heifers.

For the second or greater service, AI to natural estrus was used to breed the majority of heifers on 46.5 percent of operations and the majority of cows on 39.6 percent of operations during the previous 12 months. Bulls were used for the second or greater service for heifers on 35.1 percent of operations and for cows on 22.2 percent of operations. A higher percentage of operations used AI to induced estrus after Ovsynch or Resynch (Ovsynch's first GnRH started 1 week prior to, or at, pregnancy diagnosis, followed by prostaglandin and second GnRH injection) or timed AI for the second or greater service in cows than in heifers.

Timed-AI programs were used to manage reproduction in at least some of the heifers and/or cows by 58.2 percent of operations, and a higher percentage of operations used timed AI for cows (57.6 percent) than heifers (25.4 percent). Timed-AI programs for cows and either heifers or cows were used on a higher percentage of operations in the East region (59.9 and 60.3 percent, respectively) than the West region (34.3 and 35.6 percent, respectively). More than 6 of 10 operations (61.0 percent) had used timed AI for 5 years or more. Regarding reasons for using timed AI, the highest percentage of operations (48.8 percent) used timed AI occasionally during the previous 12 months to catch up on nonpregnant cows, and the reason timed AI was used by the second highest percentage of operations was to control all first and subsequent services (27.7 percent).

Controlled internal drug release (CIDR) inserts are progesterone-containing products that are used to synchronize estrus in cattle. About one-third of operations (32.4 percent) had used CIDR inserts during the previous 12 months. The highest percentages of operations used CIDR inserts to treat anestrous females (65.7 percent of operations), to treat cystic females (43.5 percent), and to

synchronize estrus as part of a herd program (34.3 percent).

For operations with pregnancies conceived through AI during the previous 12 months, the majority of AI services were performed by the owner/operator on 51.0 percent of operations and by an AI service/technician on 40.7 percent of operations. A higher percentage of large operations (18.1 percent) had the herdsman perform AI compared with small operations (3.2 percent), while the owner/operator performed the majority of AI on a higher percentage of small and medium operations (53.2 and 52.8 percent, respectively) than large operations (19.9 percent). The person responsible for the majority of AI services was formally trained via lecture and/or laboratory exercises on almost all operations (95.9 percent).

For operations with pregnancies conceived via AI during the previous 12 months, sexed semen was used to inseminate 11.4 percent of heifers and 3.5 percent of cows. Because sexed semen costs more and contains fewer viable sperm per straw than unsexed semen, it is recommended that sexed semen be used only in heifers, which generally are more fertile than cows.

For operations with pregnancies conceived through AI during the previous 12 months, and for cows in which AI was unsuccessful, AI was attempted on a cow three to six times on 70.9 percent of operations before the cow was designated for a different strategy (e.g., moved to a bull pen, sold, etc.).

On average, 72.5 percent of pregnancies were conceived by AI—either after detected estrus or timed—during the previous 12 months (figure 2). About one-fourth of pregnancies (26.8 percent) were conceived through natural service. Embryo transfer was used on 11.5 percent of operations and accounted for 0.7 percent of pregnancies.

Pregnancy diagnosis

Pregnancy exams are important in evaluating the reproductive status of heifers and cows. The primary advantage of performing pregnancy exams is identifying animals that are not pregnant so that they can be managed for rebreeding in a short period of time.[8] Additional benefits of pregnancy exams include detection of uterine or ovarian disease, diagnosis of twins, and estimation of conception dates for animals in herds with unobserved natural service.

About two-thirds of all operations (67.0 percent) performed pregnancy exams monthly or more frequently (figure 3). The majority of large operations (75.0 percent) performed pregnancy exams weekly or every 2 weeks, while 50.2 percent of small operations performed exams on a monthly basis and 69.3 percent of medium operations performed exams once or twice a month.

For operations that had pregnancy exams performed during the previous 12 months, a private veterinarian performed the exams on 89.5 percent of operations. Nonveterinarian employees performed the exams on a higher percentage of large operations (10.3 percent) compared with small or medium operations (0.4 and

Figure 2. Operation Average Percentage of Cattle Pregnancies Conceived During the Previous 12 Months by Breeding Method, and by Herd Size

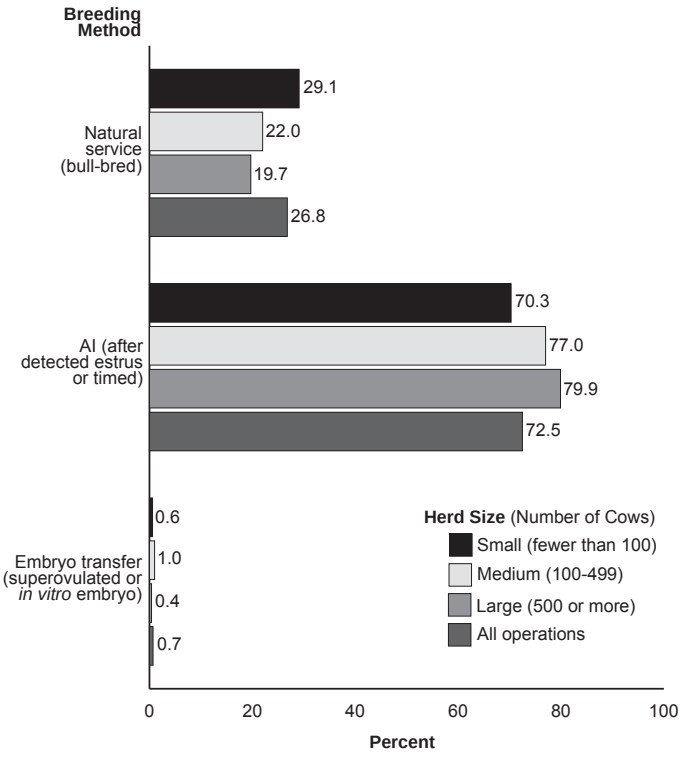
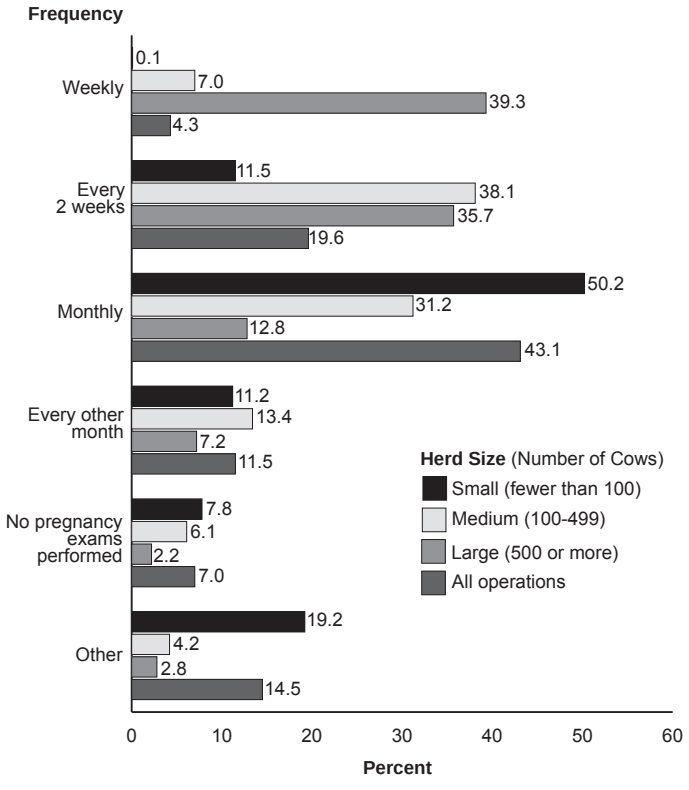


Figure 3. Percentage of Operations by Frequency with Which Pregnancy Exams Were Performed During the Previous 12 Months, and by Herd Size



0.0 percent, respectively). A higher percentage of operations in the East region than in the West region (91.5 percent and 68.6 percent, respectively) had a veterinarian perform pregnancy exams.

Rectal palpation was the method used routinely to determine pregnancy status by 85.7 percent of operations (table 1). Rectal palpation was used to detect pregnancy on 96.3 percent of operations in the West region and 84.7 percent of operations in the East region. Ultrasound was used to evaluate pregnancy status on about one-fourth of operations (27.4 percent). A higher percentage of operations in the East region than in the West region (28.6 percent and 14.0 percent, respectively) used ultrasound to detect pregnancy.

Table 1. For Operations That Had Pregnancy Exams Performed, Percentage of Operations by Method Used to Detect Pregnancy During the Previous 12 Months, and by Region:

	Percent Operations		
Method	**West**	**East**	**All Operations**
Rectal palpation	96.3	84.7	85.7
Ultrasound	14.0	28.6	27.4
Blood test	2.6	4.3	4.1

The reproductive performance of a herd is typically evaluated by use of interrelated reproductive parameters.[9] Conception rate (percentage of pregnant cows divided by percentage of cows naturally or artificially bred) and pregnancy rate (product of conception rate times heat detection rate) were the reproductive parameters that 56.9 and 52.9 percent of operations, respectively, considered to be very important in evaluating reproductive performance.

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