The NDSU PregCard Project

C.R. Dahlen[1] and C.L. Stoltenow[2]

We developed a system to monitor reproductive performance on large numbers of producer operations in four states. Simple data collected at the time of pregnancy examination allow us to evaluate the impact of routine management strategies on reproductive performance, evaluate changes in management trends through time and establish benchmarks of reproductive performance.

Summary

During a two-year period, summary data from pregnancy examinations were collected to assess the impacts of routine management decisions on reproductive performance in beef herds. Upon completion of pregnancy examination, the PregCard was completed by indicating the number of females evaluated, the number of nonpregnant females and age (cows, heifers or both), the number and age of bulls used, breeding season dates and whether groups were exposed to artificial insemination (AI). Data were reported by eight veterinary clinics and included 242,967 females in 1,782 groups. Pregnancy rate, stocking rate (females/bull) and breeding season length (last day of bull exposure – first bull exposure or AI) were calculated for each group. Groups also were assigned to categories for the number of females per bull, group size, breeding season length and breeding bull age (yearling, mature or mixed ages). Groups of cows (90.1 percent) had greater (P < 0.01) reported pregnancy rates, compared with groups of heifers (86.6 percent). Groups with breeding seasons of less than 45 days had poorer (P < 0.01) reported pregnancy rates, compared with other breeding season lengths. Groups with breeding seasons that began in June had greater (P < 0.05) pregnancy rates (89.7 percent), compared with groups that had breeding season begin in April (87.3 percent) or May (87.9 percent), whereas groups with breeding seasons beginning in July were intermediate (88.4 percent). Groups with fewer than 50 females (86.1 percent) had poorer (P < 0.01) reported pregnancy rates, compared with groups containing 50 to 99 females (88.3 percent), which had poorer (P < 0.01) pregnancy rates than groups with 100 to 199 (90 percent) or 200-plus females (90.4 percent). The number of females per bull was greater (P < 0.01) for groups of females exposed to AI (39.2 females/bull) than for females only exposed to natural service breeding (24.8 females/bull). Reported pregnancy rates of groups bred by mature bulls (88.8 percent) were greater (P < 0.01) than those of groups bred by yearling bulls (86.6 percent). The PregCard system provided an excellent platform to assess the impacts of routine management practices on reported pregnancy rates and to establish reproductive benchmarks for North Dakota beef producers.

Introduction

Reproductive performance in beef herds is an area of management that is paramount to profitability. The greatest expense accrued for a beef cow per annum is the cost of winter feed, which accounts for more than 55 percent of all fixed costs (NDTCE, 2011). Therefore, the practice of pregnancy checking prior to the start of the winter feeding period to identify and remove nonpregnant females may result in significant cost savings. However, less than 20 percent of all beef herds in the U.S. incorporate this reproductive technology into their herd management system (NAHMS, 2009).

During the summer of 2011, several severe heat events were experience by cattle throughout the upper Great Plains. Many testimonials were collected from producers and veterinarians, who stated that herd reproductive rates were well below normal for cows being bred during the peak of environmental extremes. However, real-time data from sentinel herds that could be used to verify testimonial data were lacking.

The PregCard system was initiated in 2012 in an attempt to gather real-time data at the time of pregnancy checking regarding reproductive performance of North Dakota beef herds to provide veterinary clinics with benchmarking data and summary reports for their current clients, and to determine the impacts of several routine management practices on overall herd reproductive performance.

[1]Department of Animal Sciences, NDSU
[2]Extension Agriculture and Natural Resources, NDSU

Procedures

After extensive conversation with groups of veterinarians, producers and industry representatives, the PregCard emerged as a 4- by 5½-inch preprinted postage-paid post card that can be completed after conducting pregnancy examinations in groups of cattle. Cards were distributed to sentinel veterinary clinics for completion after pregnancy determinations occurring from the summer-winter of 2012 and 2013.

The PregCard was designed to take only a few minutes to complete with pertinent information, including the total number of females evaluated, total number of open females, date of first AI or bull turnout, and total number of yearling and mature bulls stocked with each group of females. In addition, fields defined the class of females (heifers, cows or both), whether the cattle were seedstock or commercial, whether females were exposed to AI, and the vaccination status of male and female breeding stock. The completed PregCards were mailed to NDSU and manually entered into the PregCard database.

Calculations made with the data include overall pregnancy rate (1 – [number of females open ÷ total number of females]), breeding season length (last day of breeding season – first day of breeding season) and stocking rate (number of females ÷ number of bulls). In addition, females were categorized by month of breeding season start, group size, body condition score, and whether females were exposed to bulls that were yearling only, mature only, or a mixture of yearling and mature bulls.

Groups also were assigned to categories for number of females per bull (less than 15, 15 to 25, 26 to 36 and more than 35 females per bull), group size (less than 50, 50 to 99, 100 to 199 and 200-plus females), breeding season length (less than 45 days, 45 to 65, 66 to 85, 86 to 105 and more than105 days), and breeding bull age (yearling, mature or mixed ages).

Effects of herd characteristics and management strategies on overall pregnancy rates were evaluated using the GLM procedure of SAS and effects were considered significant at $P < 0.05$.

Results and Discussion

The data fields on the PregCard allow us to evaluate several factors that may impact reproductive performance of beef herds. The current report is limited to reproductive implications of management-related decisions.

During the first two years of data collections, almost 1,800 PregCards representing nearly 243,000 females were submitted (Table 1). Practitioners in our sentinel clinics have submitted cards from four states representing 79.2 percent of counties in North Dakota (42 of 53 counties), 33.3 percent of counties in South Dakota (22 of 66), 12.5 percent of counties in Montana (seven of 56 counties) and 13 percent of counties in Wyoming (three of 23).

Pregnancy rates reported for groups consisting only of cows (90.1 percent) were greater than pregnancy rates reported for groups consisting of only heifers (86.6 percent). Groups with breeding seasons less than 45 days (81.9 ±1.1 percent) had poorer ($P < 0.01$) reported pregnancy rates, compared with other breeding season length categories (88.9, 89, 89.2 and 89.4 ± 0.5 percent for breeding season categories of 46 to 65, 66 to 85, 86 to 105 and more than 105 days, respectively). No additional advantage in reported pregnancy rate was observed in the current study by maintaining a breeding season longer than 45 to 65 days.

Groups with breeding seasons that began in June had greater (P < 0.05) pregnancy rates (89.7 percent), compared with groups that had breeding seasons begin in April (87.3 percent) or May (87.9 percent), whereas groups with breeding seasons beginning in July were intermediate (88.4 percent). Controlled research efforts are required to determine the impacts on overall pregnancy rates when moving to a later calving season.

When reported pregnancy rates were compared among herd sizes, pregnancy rates increased ($P < 0.05$) as the group size increased and plateaued when the group size reached 100 females (Figure 1). The exact reason for differences in pregnancy rates among group sizes is unknown. However, potential reasons include greater management level of operations with larger numbers of females or a greater number of bulls in larger groups reducing the impact

Table 1. Summary of data collected using the PregCard in participating sentinel veterinary clinics.

|	Year		
	1	2	Total
Total cards, n	742	1,040	1,782
No. of females	96,821	146,146	242,967
Females per group, n	131	141	--
Pregnancy rate, %	89.4	88.0	--
Females per bull, n	31.0	28.9	--

of individual bull injury.

Many studies have evaluated the impact of body condition score (BCS) of individual females at the time of breeding and the subsequent impact on reproduction. Typically, as BCS at breeding improves, a greater proportion of females become pregnant.

Our data are unique in that BCS was evaluated by veterinarians (year one only) at the time of pregnancy examination and as an average of a group of females rather than as individuals. Nevertheless, reported data indicate final pregnancy rates in groups of cows in lower BCS at the time of examination were poorer, compared with groups of females in greater body condition (Figure 2).

Decisions about the number of females placed with each bull varied greatly among producers, ranging from five females to more than 100 females per bull. When artificial insemination is incorporated into a management system followed by turnout of a cleanup bull, a portion of females will be pregnant with AI (typically equal to or more than 50 percent in well-managed herds) at the time of bull turnout.

With a portion of cows already pregnant, the opportunity may exist to stock breeding bulls with a greater number of females after AI, compared with natural service breeding systems. Producers seem to be taking advantage of this opportunity because those incorporating AI placed more ($P < 0.01$) females per bull (38.2), compared with producers using only natural service (25).

Similar to results from controlled studies, reported pregnancy rates were greater ($P < 0.01$) in groups of females exposed to mature bulls (88.8 percent), compared with pasture stocked with only yearling bulls (86.6 percent). Interestingly, the participating veterinarians indicated the number and age of
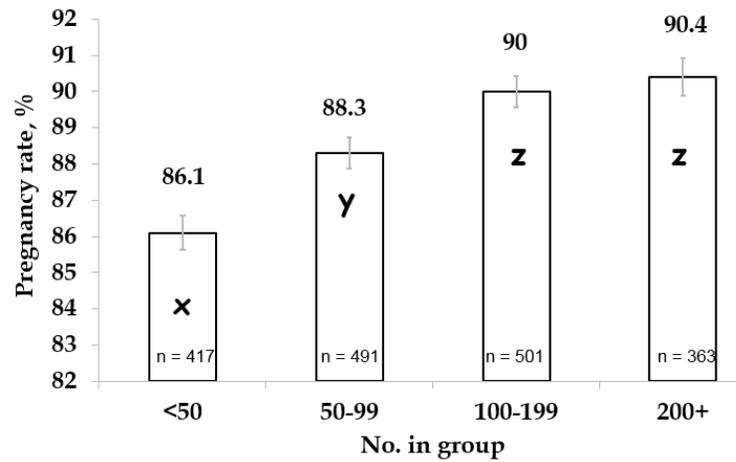
Figure 1. Impact of group size on pregnancy rate. x,yMeans lacking common superscript differ (P < 0.05).

x,y means differ $P < 0.05$
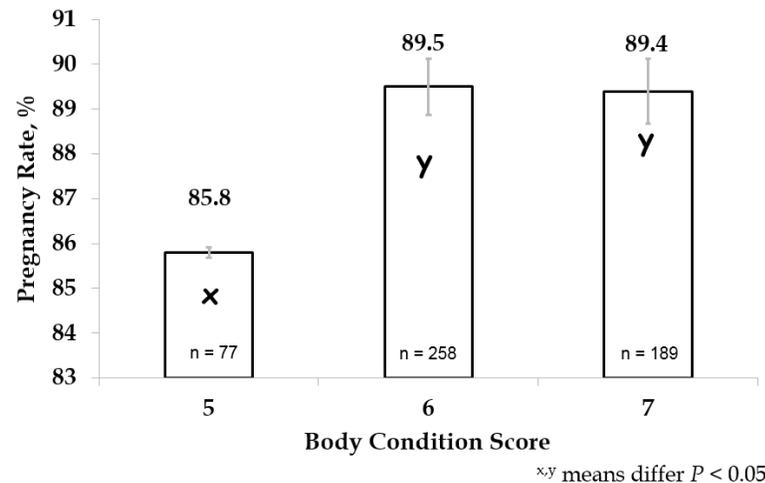
Figure 2. Impact of body condition score at the time of pregnancy examination on pregnancy rate.

breeding bulls placed with pasture groups were the data fields most often unknown by producers. In the current era of record prices of commercial and seedstock cattle, perhaps renewed emphasis is needed to underscore the true costs associated with breeding bulls (beyond purchase price).

The PregCard system established an effective platform for monitoring reproductive performance in beef herds in North Dakota and the region. Trends observed in reported data through the PregCard system provide clear direction for future controlled research efforts. Furthermore, data generated provide new tools and insight into areas of focus for educational programming that can have rapid adoption by producers and ultimately influence overall profitability