The Effect of Parity and Calving Seasons on the Reproductive Performance of Korean Native Cows

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ABSTRACT

The purpose of this study was to determine the effect of cows parity and calving seasons on the subsequent reproductive performance of the herd of Korean native cows raised under the same condition. With the parity of the cows ranged 1 to 4 (mean: 1.9), significant associations were found between parity and calving interval ($p<0.05$). Calving interval of the primiparous cows group was 395.0 ± 16.5 days, which was the longest calving interval among the four groups. On the other hand, calving interval of the second parity group was 333.7 ± 3.6 days. The primiparous cows had tendencies that long interval from calving to conception and small number of service per conception relatively when compared with the multiparous cows. In the case of calving season, the interval from calving to first service was short in summer and winter relatively. The interval from calving to conception in summer was the shortest in four seasons. The number of service per conception was larger in spring and winter and smaller in summer and autumn. Calving in spring showed delayed reproductive performance and calving in summer showed desirable reproductive performance.

(Key words : Korean native cows, parity, calving season, reproductive performance)

INTRODUCTION

The high reproductive performance of the beef cattle industry is largely impacted by the rate of cows which can consistently maintain a 365-d calving interval (Asimwe and Kifaro, 2007; Houghton *et al.*, 2000). In order to keep the 12-month calving interval, the female beef cattle should be pregnant within 80~85 d.

As the postpartum anestrus interval (PPI) gets longer, the calving interval gets longer. Therefore, the subsequent reproductive performance of the herds falls down and the profitability would becomes worse (Morris *et al.*, 2006; Deutscher *et al.*, 1991). The prolonged PPI is correlated with a few factors, including the late involution of uterus (Short *et al.*, 1990), peripartum nutrition condition (Wettemann *et al.*, 2003; Morrison *et al.*, 1999; Spitzer *et al.*, 1995; Osoro and Wright, 1992), the short estrous cycle (Short *et al.*, 1990), suckling (Wettemann *et al.*, 2003), calving season (Ansari-Lari and Abbasi, 2008; Asimwe and Kifaro, 2007; Gebeyehu *et al.*, 2007), careless heating detection (Melendez *et al.*, 2008; Son *et al.*, 2001), high parity (Asimwe and Kifaro, 2007; Walsh *et al.*, 2007), and reproductive disorders (Deutscher *et al.*, 1991; Short *et al.*, 1990).

Pregnancy rates increased with the proportion of parity (Rae *et al.*, 1993) and calving interval had a significant relation with the number of service per conception (Gebeyehu *et al.*, 2007). Wiltbank *et al.* (1964) reported that the primiparous cows group had longer PPI than multiparous cows group. Loyacano *et al.* (1974) demonstrated that the calved cows during the winter had higher conception rates than the calved cows during the summer, even though the body weight loss in the winter was larger than in the summer.

However, the research on Korean native cows was not carried out adequately in terms of the correlation between parity, calving seasons and the reproductive traits. Therefore, this study examined the influence of parity and calving seasons on the reproductive performance of Korean native cows, using data collected over the approximately 3-year period.

MATERIALS AND METHODS

1. Experimental Animals

This study was performed from May 2005 through to November 2007 at a Korean native cattle farm located in Chungbuk province, Korea. Thirty two cows include this study. The animals were examined monthly by theriogenology team of

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Chungbuk National University. The cows in the farm were raised under the same conditions, and the stall was free-stall style.

2. Nutrition Program and Breeding Management

The nutrition program was based on BCS and was managed by 0.5 unit. The target BCS at parturition was 3.5~4.0. The cows were fed Total Mixed Ration, as a concentrated feed, by 3 kg per head, twice a day. Tall Fescue and Orchard Grass, as dry feeds, was fed by 4 kg per head, twice a day, and dry rice straw, as rough feeds were supplied freely. The ingredients of the concentrated feed were crude protein: 14% (minimum), crude fat: 2.0% (minimum), calcium: 0.7% (minimum), crude fiber: 15% (minimum), crude ash: 10% (maximum), P: 1.2% (maximum), and TDN: 70%.

In the case that peripartum BCS was over 4.0, feed supply was reduced 500 g per head, and in the case that peripartum BCS was below 3.0, feed supply was increased 200~300 g per head. Pregnant cows were fed by 3 kg per head regardless of BCS.

3. Data and Statistical Analysis

The reproductive performance items: interval from calving to first service, interval from calving to conception, the number of services per conception, conception rates and calving interval.

The research items of this study: parity and calving seasons.

SPSS ver.12 was used for statistics analysis of these data. Each result item was indicated as Mean ± SEM. *T*-test was performed for the analysis between parity, calving seasons and 1) interval from calving to first service, 2) interval from calving to conception, 3) number of services per conception and 4) calving interval.

RESULTS

1. Reproductive Performance as to Parity

In the four reproductive traits survey (interval from to first service, interval from calving to conception, number of service per conception and calving interval), which we conducted, only calving interval had a significant correlation with parity ($p< 0.05$). Calving interval of the primiparous cows group was 395.0 ± 16.5 days, which was the longest interval among the four groups (Table 1). On the other hand, the second parity group marked 333.67 ± 3.6 days. It means that the second parity group had the best reproductive performance. After that, calving interval decreased as parity grew. The primiparous cows had tendencies that long interval from calving to conception and small number of service per conception relatively when compared with the multiparous cows in this study.

2. Reproductive Performance on Calving Seasons

The reproductive performance on calving seasons are revealed in Table 2. The interval from calving to first service was short in summer and winter relatively. The interval from calving to conception in summer was the shortest in four seasons. The number of service per conception was larger in spring and winter and smaller in summer and autumn. Calving in spring showed delayed reproductive performance and calving in summer showed desirable reproductive performance in the present results.

DISCUSSION

This study was investigated to demonstrate the correlation between parity and reproductive traits and the association between calving seasons and reproductive performance in Ko-

Table 1. Effect of cow parity on the reproductive performance in Korean native cows

Parity	Interval from to first service	Interval from calving to conception	Number of service per conception	Calving interval
First	66.4 ± 6.2	92.2 ± 11.3	1.6 ± 0.2	395.0 ± 16.5*
Second	61.3 ± 9.0	68.8 ± 11.2	1.3 ± 0.1	333.67 ± 3.6
Third	47.6 ± 6.7	50.0 ± 6.6	1.3 ± 0.1	341.0 ± 9.6
Fourth	54.5 ± 4.3	54.5 ± 4.6	1.3 ± 0.2	344.3 ± 3.4

Values are Means ± SEM.
*$p<0.05$.

Table 2. Effect of calving seasons on the reproductive performance in Korean native cows

Season	Interval from calving to first service	Interval from calving to conception	Number of service per conception	Calving interval
Spring	73.3 ± 33.4	97.3 ± 61.0	1.6 ± 1.1	416.0 ± 67.6
Summer	49.7 ± 17.2	50.3 ± 16.8	1.3 ± 0.6	343.4 ± 16.4
Autumn	69.7 ± 49.1	75.4 ± 59.3	1.2 ± 0.5	354.9 ± 48.6
Winter	46.2 ± 17.5	86.7 ± 71.5	1.8 ± 1.0	362.9 ± 68.0

Values are Means ± SEM.

rean native cows. Considering the impact of parity on fertility of cows, only calving interval had a significant association with fertility of cows among four categorized reproductive traits (interval from calving to first service, interval from calving to conception, number of services per conception and calving interval).

Han *et al.* (1989) reported that second parity cows had 379.4 d calving interval, it was the shortest period among other parity groups. Similarly, Baek *et al.* (1998) found second parity showed 378.8 d calving interval, and it was the shortest period among multiparous cows groups. In this study, calving interval of the multiparous groups decreased gradually from second parity, as the parity grew. Calving interval of primiparous groups exceeded 365 d, while that of multiparous groups did not exceeded 365 d. It indicates that primiparous group has relatively lower fertility than that of the multiparous groups, and second parity group marked the best reproductive performance among the 4 groups.

In the other way, Bellows *et al.* (1978) observed the primiparous cows had longer period of PPI than the multiparous cows groups, it caused prolonged calving interval in the primiparous group. Mahadevan *et al.* (1951) explained that primiparous groups spent more time to replenish their body fat during the lactating period compared to the multiparous. And Gebeyehu *et al.* (2007) reported that the first parity group had more 35 d than the multiparous groups, and it was shown the results of the present study.

Moreover, Animwe and Kifaro (2007) cited the another factor causing prolonged calving interval was the negligence of heat detection. In the case of this farm, calving interval of the multiparous groups had relatively short calving interval, and all of them were below 365 d. This farm have been gotten a monthly regular theriogenological examination by a skilled veterinarian. And the stall of cattle was near owner's house to be easy to check heat and the lactating cattle was managed well. In these aspects, the raising management of the present farm was thought to be excellent, they seemed to take a good observation for heat detection. However, the management of the primiparous groups was thought to be insufficient in terms of nutrition program.

And the significant correlation was not shown between calving season and the reproductive traits of cows in this study ($p>0.05$). Even though the figures showed that the reproductive traits (interval from calving to first service, interval from calving to conception, and calving interval) of the spring calved cows were longer than those of other seasons in this study. A few reseachers (Deuscher *et al.*, 1991; Loyacano *et al.*, 1974; Fallon, 1962) demonstrated that the calving seasons is closely related with the subsequent reproductive performance of cows. Deuscher *et al.* (1991) reported that the spring calved cows recovered their reproductive cycles earlier than the winter calved cows. In terms of pregnancy rates, Fallon (1962) found that pregnancy rates of the cows in the hot area were higher than those of the cows in the cold area. Loyacano *et al.* (1974) reported that the winter calved cows had lost their body weights, but pregnancy rates were higher than the spring calved cows.

However, the results of this study didn't accord to those reports. It was thought that the present farm's cows couldn't experience the extreme climate change because of the well-developed raising management facilities and the temperate climate of Korea. And the other factors are small numbers of cows (n=32) and farm (n=1). In this farm, calving seasons didn't influence on the subsequent reproductive performance.

The reproductive performance of primiparous cows was relatively unfavorable in this study. The inappropriate management of rearing cattle may lead poor reproductive performance. Therefore, the effect of the reproductive performance of primiparous

cows as managements needs to be investigated in further study.

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