EFFECTS OF FARMING SYSTEM AND BODY CONDITION SCORE ON FERTILITY PERFORMANCES IN SYNCHRONIZED CATTLE

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ABSTRACT

This study was designed to evaluate the influence of farming system and body condition score (BCS) on fertility performance in 82 synchronized cattle. The study was conducted between January 2007 to December 2008 in three private farms in Gua Musang, Kelantan. All cattle were subjected to estrus synchronization with controlled intravaginal drug release (CIDR). On day 8, the cattle were given 2 mg i.m injection of estradiol benzoate (EB), 24 hours after CIDR removal. Twenty four hour after EB injection (Day 9), a single insemination of frozen-thawed semen was carried out to each of the synchronized cattle using rectovaginal method. Pregnancy diagnosis was carried out on day 60 post-insemination using rectal palpation. The mean of body condition score (BCS) and percentage of pregnant cattle were significantly lower for integrated farm (3.42 ± 0.51 and 37.0±11.0%, respectively) as compared to intensive and semi-intensive farms. Present result showed that BCS affect the rate of pregnancy in synchronized cattle. There was no significantly different in the response of BCS to estrus. However, the highest BCS (<6) gave significantly higher percentage of pregnancy (73.0±12.0%) as compared to the lower BCS (3 and 4-5). Based on the present result, percentage of pregnancy had declined in association with body condition score which was related to farming system.

Key words: Farming system, Body condition score, Fertility performance, Cattle

INTRODUCTION

Malaysia has been importing beef from Australia, New Zealand, India and other countries due to the low productivity of local beef cattle. Farming systems that have been used by farmers and entrepreneur to rear cattle in Malaysia include intensive, semi-intensive and integration with plantation crops (Zainur and Wan Zahari, 2005). Intensive system is when the reared cattle are kept in the shed, constantly provided with feeds, clean water and minerals. Feeds are either cut grass or concentrates or a mixture of cut grass and concentrates are supplied daily in a form of dry weight in a ratio of 3 - 5% of the animal’s body weight. Semi-intensive farming system is more practical for Malaysian farmers. Cattle are allowed to graze freely either in a fenced pasture or in a public pasture for a fixed period. The cattle are then herded back to the cattle sheds for supplementary feeding and shelter. In integrated farm, the cattle are freely grazed in large areas which are cultivated with major crops like oil palm, rubber, coconut and fruit orchards. Normally, these plantations are covered with undergrowth that requires chemical control and integration with livestock will reduce the costs of herbicide as well as fertilizer (Zainur and Wan Zahari, 2005).

Body condition score (BCS) is a method for evaluating the adequacy of dietary energy inputs (Edmondson et al., 1989). It reflects the influence of feeding and acute changes in nutrition, stress or other factors could modify the ovarian activity (Lucy et al., 1992; Wright et al., 1987). Domínguez (1995) reported that cyclic cows with a BCS of 5 showed

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no detrimental effect on follicular phase or normal oocytes. Rhind et al. (1989) described that ewes in higher body condition tended to exhibit a higher ovulation rate and more follicles during the follicular phase, compared to ewes with a lower condition score. Body condition score is a practical and simple method that can be applied by farmers to identify the animals that require additional feeding before breeding and select the animals for breeding program (Maas, 1987; Spitzer, 1986). The objective of this study was to observe the association between farming system and body condition score on the estrus and pregnancy rate in synchronized cattle.

**MATERIAL AND METHODS**

This experiment was conducted in three private farms in Gua Musang, Kelantan from January 2007 to December 2008. Farm 1, is an intensive system; Farm 2 is a semi-intensive system and Farm 3 is an integrated farm with oil palm. A total of 82 cattle were included in this study; Charolaise and indigenous Malaysian cattle, Kedah-Kelantan with 41, 22 and 19 cattle in farm 1, 2 and 3, respectively (Table 1). The study was conducted with daily temperature ranged from 24 to 32°C.

All cattle were subjected to rectal examination to assess ovarian function. Only the non pregnant cattle with corpus luteum and BCS between 3 to 7 according to scale of 0 (most emaciated) to 9 (fattest) were chosen for this study (Spitzer, 1986). All cycling cattle (n = 82) received CIDR (controlled intravaginal drug release) insertion containing 1.38 g of P4 (Eazi-Bred™ CIDR®; Pfizer Inc., New Zealand; Day 0) which attached to estradiol benzoate capsule (Pfizer New Zealand Limited). The cattle were given 2 mg i.m injection of estradiol benzoate (Bomac Laboratories; Day 8) after 24 h of CIDR removal. Twenty four hour after EB injection (Day 9), a single insemination was carried out to each of the synchronized cattle using rectovaginal method. The frozen semen was provided by Kelantan Veterinary Services Department. Pregnancy diagnosis was carried out on day 60 post-insemination using rectal palpation.

**RESULTS AND DISCUSSION**

The means of body condition score (BCS) and percentage of pregnant cattle were significantly lower for integrated farm (3.42 ± 0.51 and 37.0±11.0%, respectively) as compared to intensive and semi-intensive farms (Table 1). Present result showed that BCS affect the rate of pregnancy in synchronized cattle. There was no significantly different in the response of BCS to estrus. However, highest BCS (>6) gave significantly higher percentage of pregnancy (73.0±12.0%) as compared to the lower BCS (3 and 4-5) (Table 2).

The present study showed that integrated farm had the lowest BCS as compared to intensive and semi-intensive farms. Probably this was due to the small grazing area with large number of cattle. According to Zainur and Wan Zahari (2005), one hectare of oil palm could support only one head of cattle. In the semi-intensive and intensive farms, cattle were supplied with cut grass (Napier) or cut oil palm trees and palm kernel cake (PKC) or other concentrates. Probably, grazing area and supplements are the factors that affect BCS in cattle.

**Table 1:** Effects of farming system on the body condition score, percentage of estrus and pregnancy in synchronized cattle

<table>
<thead>
<tr>
<th>Fertility responses</th>
<th>Intensive</th>
<th>Semi-intensive</th>
<th>Integration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of cattle treated with CIDR</td>
<td>41</td>
<td>22</td>
<td>19</td>
</tr>
<tr>
<td>Body condition score at CIDR insertion (Means ± SEM)</td>
<td>4.58±1.43&lt;sup&gt;b&lt;/sup&gt;</td>
<td>4.14±1.04&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.42±0.51&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Percentage of cattle showed estrus (Means ± SEM)</td>
<td>68.0±7.0&lt;sup&gt;a&lt;/sup&gt;</td>
<td>64.0±11.0&lt;sup&gt;a&lt;/sup&gt;</td>
<td>58.0±12.0&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Percentage of pregnant cattle (Means ± SEM)</td>
<td>59.0±8.0&lt;sup&gt;a&lt;/sup&gt;</td>
<td>59.0±11.0&lt;sup&gt;a&lt;/sup&gt;</td>
<td>37.0±11.0&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>ab</sup>Means with different superscript in the same row shows significantly different (Pd<0.05).
Table 2: The effect of body condition score on the percentage of estrus and pregnancy in synchronized cattle

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Body condition score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of cattle showed estrus (Means ± SEM)</td>
<td>3(n=30) 4-5(n=37) &gt;6(n=15)</td>
</tr>
<tr>
<td>Percentage of pregnant cattle (Means ± SEM)</td>
<td>40.0±9.1a 57.0±8.3ab 73.0±12.0b</td>
</tr>
</tbody>
</table>

*a,b Means with different superscript in the same row shows significantly different (P≤0.05).

Ferguson and Chalupa (1989) reported that, deficiency in nutrient intake was a common problem in grazing herds, where supplement was frequently absent. Improper feed ratio or handling might also lead to insufficient nutrient intake. On the other hand, excessive amounts of feed or of certain feed components, such as protein, might reduce fertility (Ferguson and Chalupa, 1989).

Integrated farm in the current study also indicated lower percentage of pregnancy, compared to intensive and semi-intensive farms. Probably, this was due to the deficiency in nutrient intake which affected the fertility performance. Beever et al. (2001) reported that the nutritional status of the cow had a significant effect on fertility which influenced both the interval from calving to first ovulation and conception. Poor nutritional status of cows after calving was the most important cause for the delay of first ovulation and prolonged the commencement of luteal activity (Shrestha et al., 2005). Nutritional factors had been studied primarily concerning their effects on fertility and reproductive parameters (Makarechian and Arthur, 1990). However, information on their role within the ovary was scarce.

The present result showed that as BCS increased, percentage of pregnancy also increased. This result was in agreement to that reported by Rae et al. (1993). Cows with BCS ≤"4 had a lower pregnancy rate as compared to BCS ≥"5 (59 and 90%, respectively) (Rae et al. 1993). Ambrose et al. (1999) observed a 13 percentage unit increase in pregnancy rates for every unit increase in BCS. Previous results indicated that embryonic lost due to low BCS was associated with the failure to sustain an antiluteolytic mechanism. This might be related to either impairment in conceptus ability to secrete interferon α, reduced ability of the maternal endometrium to respond to interferon α, or both (Thatcher et al., 1997).

The current result indicated no significant difference between BCS and percentage of cattle that showed estrus. According to Ambrose et al. (1999), as BCS increased, signs of behavioral estrus were stronger and fertility was improved. Suriyasathaporn et al. (1988) reported that cows with a low BCS at parturition had poor reproductive performance. Probably this was due to a delay in onset of cyclicity (Butler and Smith, 1989; Markusfeld et al., 1997). Crane et al. (2006) reported that a low BCS had been associated with increased risk for cystic ovarian disease and an increased in the percentage of anovular cattle.

Farming system and body condition score are among the external factors that are known to affect reproduction in cattle. It is important to increase our understanding of these factors to improve the efficiency of reproductive management systems so that fertility may be enhanced.

CONCLUSION

Cattle with a higher BCS will give better response to estrus after CIDR treatment and more likely to become pregnant than cattle with a lower BCS. Proper farming system will improve nutritional management thus; increase the reproductive efficiency in cattle. Based on the result, farming system and body condition score, are likely contributed to the reproductive performance in cattle.

REFERENCES