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SHORT COMMUNICATOIN

The Estrus Synchronization Response Following $PGF_2\alpha$ Treatment in Indonesian Madura Cattle with Different Body Condition Scores

G. Ciptadi*, M. Nasich, A. Budiarto, Nuryadi and V. M. A. Nurgiartiningsih

Faculty of Animal Husbandry, Brawijaya University, Indonesia
Corresponding author: ciptadi@yahoo.com; ciptadi@ub.ac.id

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ABSTRACT

The present research aimed to study estrus synchronization response and reproductive performance of Madura cattle (i.e. native cattle in Madura Island of Indonesia) with different body condition score (BCS). Field research was conducted using 42 cows which were purposively selected from small holders farmers and grouped into 4 BCS ($\leq$2.5, 3.0, 3.5, and $\geq$4.0). Number of cows in each BCS was 9, 12, 12 and 9 heads, respectively, with the average open days of 156.76$\pm$79.19 days. Synchronization was performed by $PGF_2\alpha$ double injection (Glandin, GmB). Variables observed were estrus onset and Non Return Rate (NRR) after Artificial Insemination (AI) followed by pregnancy diagnosis**.** Result showed that Madura cows had significant problem of low body weight and BCS. The success values of estrus synchronization and NRR after AI for each BCS were 77.77, 66.67, 91.66, 66.67% and 66.67, 52.83, 75.0, 66.67%, respectively. Interval from PGF2α injection to estrus onset was 69.55$\pm$7.28, 64.36$\pm$8.09, 58.90$\pm$8.04 and 63.35$\pm$10.86 hours. All parameters showed non-significant differences.

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INTRODUCTION

East Java province is one of the main production regions of beef cattle with more than 3.4 million of cattle or about 30% total cattle population of Indonesia. This population is including 750.000 Madura cattle raised in this area by small holder farmer, mainly in Madura Island (Priyanti *et al*., 2012). This traditional farming system is reflected by low performance which is appeared in long calving interval, low fertility, high services per conception, low birth weight and average daily gain. Economic loss from reproductive inefficiency is related to failure of detection unexpressed estrus and low conception rates.

AI program has been implemented in Madura cattle population for improving genetic quality and population. In some areas of Madura Island of Indonesia, AI using exotic breed semen like Limousine has been performed for several years but estrus synchronization is practically not known yet because of very expensive hormonal cost.

Body condition score (BCS) may be used as management tool for assessing and analysing the nutritional or physiological states of Madura cattle. In traditional small farmer management, in the hard environment and poor nutrition state especially in the dry season in Madura Island, farmers face difficulties in availability and quality of feeds which bring about the poor physiologies state and low BCS cattle, this condition may lead to their low production and fertility. BCS has been reported to have relation with reproductive performance and population of cattle. Several research indicated that there was a strong relationship between BCS of a cow and reproductive performance, especially the percentage of open cows and calving interval (Berry *et al*., 2003; Suzuki *et al*., 2006). This study aimed to evaluate effects of BCS on the response of Madura cattle to estrus synchronization by double injection of PGF2α as reflected by the onset of estrus and Non Return rates (NRR).

MATERIALS AND METHODS

Location and animals: Research was done in small holder farmers in Sampang Regency, Madura Island of Indonesia using 42 cows purposively selected from 80 cows in 4 villages with criteria of non pregnant, poor reproductive performance but with normal reproduction cycles. The cows were grouped in four BCS i.e. $\leq$2.5,

3.0, 3.5, and ≥4.0. The BCS was estimated on 1-5 scale (Ferguson *et al.*,1994), score 1 indicated thin (poor) and score 5 indicated fat (good). Number of cows in each BCS was 9, 12, 12 and 9 heads respectively. These animals had initial body weight of 234.68±8.69 kg, with average age of 3.21±1.11 years and poor open days of 156.76±79.19 days. All the Madura cows selected were relatively under similar traditional management system of small scale livestock.

Estrus synchronization: Estrus synchronization was performed by double injection of $PGF_2\alpha$ (Glandin, 5 ml/cow). The 1st injection (day 0) was followed by 2nd injection (day 11) and then the cows were observed for their estrus onset. Insemination was done approximately 78 to 90 hours after 2nd injection of $PGF_2\alpha$. Variables observed were estrus onset and success rate of AI after estrus synchronization based on NRR at least within two cycles after the 2nd injection of $PGF_2\alpha$, followed by pregnancy diagnosis. The data were subjected to one-way ANOVA using GenStat Twelfth Edition, GenStat Procedure Library Release PL20.2

RESULTS AND DISCUSSION

BCS and reproductive performance of Madura cows: Madura cows used were generally of low body weight (234.68±8.69 kg) and mostly with low BCS 2.5 (56.24%). This low body weight was considered as critical condition mainly during the dry season. This because of hard environment and very poor nutritional condition where cows were raised in poor environments of climates and feeds condition. Yamada *et al*. (2003) reported that nutritional status of cows peripartum after estrus synchronization influenced conception rates and post partum ovarian cycles. Rae *et al*. (1993) reported that body condition, parity, and interaction of body condition and parity played important roles in the reproductive performance of commercial beef cows. Cows with a BCS of less than 2.25 expressed poor breeding performance (Patton *et al*., 2007). BCS is highly related to reproductive performance: thinner cows showed lower reproductive performance, whereas higher BCS had positive associations with days to first estrus, interval to first service, and conception rate at first service, and negative associations with calving interval and number of services per conception (Berry *et al*., 2003). BCS before calving affected reproductive parameters, the best performances were recorded in females with medium BCS 2.75 to 3.50 (Mouffok *et al*., 2011).

Estrus onset and AI success rate: The success rate of estrus synchronization was in the range of 66.67 to 91.66%, while NRR was in the range of 66.67 to 75.0%. The highest succes rate of parameters were achieved after double injection of PGF2α by cows with BCS 3.5 (Table 1). Meanwhile, interval from PGF2α injection to onset of estrus was not significantly different, but cows with BCS 3.5 tended to be on estrus onset earlier. Meanwhile, cows with BCS≥4.0 or BCS ≤2.5 tended to show longer estrus interval. Cows at BCS ≤2.5 might need immediate attention, meanwhile cows with BCS ≥4.0 might encounter dystocia (calving difficulty). An optimum BCS of cows may be associated with estrus onset.

Based on these results, it is necessary to increase or adjust BCS of Madura cows in order to improve reproductive performance particularly for Madura cows raised in small holder farms. It is well known that cows with BCS of less than 2.25 showed poor breeding and reproductive performance because lower BSC is generally related to the lower progesteron level in the blood. However, over conditioned cows have been reproted to have a higher risk of dystocia and metabolic disorder (Schroeder and Staufenbiel, 2006). Ohtsuka *et al*. (2009) stated that progesterone is important for fertility as demonstrated by the positive correlation between serum progesteron level at the time of artificial insemination and the subsequent conception rate.

In addition to low nutritional status, the low BCS of Madura cows was also due to non strict separation of lactating cows from their calves. The farmers allowed the calf to suckle the mother until it was naturally weaned. It is almost practically imposible to ask the farmers to separate calves from their lactating cows as the farmers traditionally prefer to let the calves suckle the cows untill naturally weaning is reached. During the dry season, this practice is harder for the cows as they do not get enough nutrient supply for milk synthesis. As a consequence, nutrients reserve in the body is mobilized to compensate nutrient required for milk production, so that the cows lost their body weight or BCS during laction. In the poor nutritional status, BCS changes throughout the lactation period and corresponds to changes in the cow's energy balance. The highest AI succes was achieved in cows with BCS 3.5 (75.0%). The conception rates decreased in cows with decreased BCS after calving or during lactation period. In this study, differences in BCS accounted for the variation in interval of $PGF_2\alpha$ injection to estrus onset, percent of cows showing estrus and AI success rate (NRR). For the near future, it is neccesary to increase both liveweight and BCS of cows to improve the reproductive performance. In order to optimize reproductivity of Madura cattle, farmer should pay attention to maintain optimum BCS.

Result from nutritional studies showed that BCS affected certain reproductive parameters such as postpartum return to estrus, services per conception, pregnancy rate, and calving interval. It was shown that

Table 1: Response to estrus synchronization and AI success rate of Madura cow in Sampang Regency during the dry season after 1st AI performed (n=42)

BCS	Number of cows	Interval of $PGF_2\alpha$ injection to estrus onset (hours)*	Cows showing estrus onset after PGF2α		AI success rate, NRR
			1st injection	2nd injection	
≤ 2.5	9	69.55±7.28	2 (22.23)	7 (77.77)	6 (66.67)
3.0	12	64.36±8.09	4 (33.34)	8 (66.67)	7 (58.83)
3.5	12	58.90±8.40	6 (50.00)	11 (91.66)	9 (75.00)
≥4.0	9	63.33±10.8	4 (44.49)	6 (66.67)	6 (66.67)
	Average	-	4 (37.62)	8 (75.69)	7 (66.83)

Statistic analysis resulted non-significant (P>0.05) differences. Values in parenthesis indicate percentage.

cows wich maintained optimal body condition after parturition, regardless of the calculated nutrient requirements, had enhanced pituitary function and reproductive performance compared with cows that lost body condition (Tucker *et al*., 2007). Yildiz *et al.* (2011) reported that optimum BCS must be maintained to ensure an easy calving and to avoid dystocia. Thus, in cow-calf production system, the farmer should focus on avoiding BCS loss around breeding to most effectively improve herd performance (Renquist *et al*., 2006).

Madura cattle production is characterized by relatively low performance, followed by low cost of production with traditional management system. Madura cattle have function to the farmers including generating income or saving, traction power and producing dung for use as fertilizer. In addition, this beef cattle breed has other specific social functions such as racing bull (Karapan) as well as an animal contest-entertainment for females (Sonok). Madura cattle for the last two functions must have better BCS, as they get much better feed and management.

It was concluded that BCS did not affect reproductive performance of Madura cows, especially on interval estrus onset after $PGF_2\alpha$ injection. It is important to check regularly the BCS, early nutritional states or body weight loss in order to increase reproductive performance. It was suggested to improve the BCS of Madura cattle to >3.5 in order to improve the reproduction performance particularly for those which are raised in small holder farms.

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