

Supplementation of Moringga Olievera Leaf Powder (Mol) Block Increased the Estrous Intensity and Conception Rate in Bali Cows

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Abstract

Low estrus intensity might be caused by a low quality and quantity of ovum. This problem may adversely affect conception rate in Bali cows. This might be due to the insufficient of feed consumption of the animals. This study (the first step out of 2 steps proposed) aimed to evaluate estrus intensity, estrus cycle length and conception rate of Bali cows. Twenty (20) cows were used. They were injected with prostaglandin for estrus synchronization. All animals were not artificially inseminated (AI) after the onset of estrus. The estrus cows were divided into 2 groups of 10 cows. Group 1 (treatment group) was supplemented with moringa oleyfera leaf (MOL) block 0.5 kg/head/day. Group 2 (control group) was not supplemented. During estrus after the treatments. Estrus intensities were scored based on the secondary estrus signs (vaginal mucus, swollen of vulva and tail head position). The scores were ranging from 1 (low intensity), 2 (medium intensity) and 3 (high intensity). Length of estrus was noted and all estrus animals were inseminated. Pregnancy diagnosis were done 60 days after the AI. During the AI, blood samples were collected for vitamin A analysis. At the MOL block groups, estrus intensity and conception rate were significantly ($P < 0.01$) higher in compared to the non supplemented group (2.8 vs 1.9) and (80 vs 40%), respectively. Length of estrus cycle in the supplemented group tended ($P < 0.1$) to be shorter and less variation in compared to non-supplemented group. Length of estrus cycle in the treated group was 19.5 days (18-22 days) and in the non-supplemented group was 21.5 days (16-26 days). It can be concluded that the supplementation of MOL block could increase the estrus intensity and conception rate of Bali cows.

Key words: Bali cow, estrus intensity, conception rate, moringa oleyfera

Introduction

Low conception rate of beef cows mated with artificial insemination (AI) techniques were reported in many tropical countries. The application of AI in cows showed the conception rate of 30-50% in Srilangka (Abeygunawardana *et al.*, 2007), 18% in Malaysia (Malik *et al.*, 2012), 38.5% in Bangladesh (Haque *et al.*, 2015), 46.5 % in Nigeria (Mai *et al.* 2014), 30-55% in Suriname (Bastiansen, 1997), 25-35% in Ethiopia (Woldu *et al.*, 2011), and 23% and 39 % in Indonesia (Toleng *et al.*, 2001 and Toleng *et al.*, 2016). These reports were considered to be the low conception in compared to those reported in the temperate areas. Pifers & Ball (1987) reported conception rate of 60-70 % in cows bred by AI techniques. The conception rate less than 43% was classified as low conception rate (Moran, 2005).

The low conception rate of cows mated with AI techniques related to some factors. These factors were nutrition, body condition scores and time of AI (Haque *et al.*, 2015). In Srilangka (Abeygunawardana *et al.*, 2001), showed that the failure in detecting estrus adversely affect the successful of AI. Artificial insemination (AI) performed at a wrong time caused a low conception rate (Foote, 1979). Conception rate were also lower if the

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AI performed after the ovulation (Pursley *et al.*, 1989) and very early after onset of estrous and very of late more than 18 hours of estrous (Howlader *et al.*, 1989). Roelofsa (2020) stated that the time of ovulation and the age of the egg at sperm penetration is critical for conception. Therefore, emphasis in research needs to be on the timing of insemination relative to ovulation, and thus on the detection of ovulation. Low estrus intensity and silent estrus are the main factors that caused the AI performed not at the optimal time for AI. High estrus intensity correlated with the conception rate (Nyman, 2016)

High intensity estrus expression correlated with the the large ovulatory diameter and conception rate in Nellore cows (*Bos Taurus indicus*) (Ferraz *et al.*, 2017). High correlation between estradiol concentration and estrus behaviour (Lyimo *et al.*, 2000, Lopes 2007). Several factors that affect follicle and oocyte quality such as temperature stress, energy balance and vitamins (Britt, 2008). He have reviewed that heifers fed diets 200% of their maintenance to promote higher energy balance had higher blood concentration of of insulin, more preovulatory antral follicle and twice as many ovulation in response to exogenous gonadotropin as heifer fed control 100% of maintenance. Treatment of gilts with vitamin A increased litter size (Coffey and Britt, 1993), this was due to an effect of vitamin A on oocyte quality (Whaley, 2000). Vitamin A apparently works directly on oocyte, because incubation oh heat stressed with retinol prevented the adverse effect of heat stress on development of oocytes to blastocyst stage (Lawrence *et al.*, 2004).

Supplementation of high quality food for 4 months could increase cows' conception rate at Ethiopia (Woldu *et al.*, 2011). Toleng *et al.* (2014) have reported that the supplementation of moringa oleifera leaf could shorten the postpartum anestrus in Bali cows. In the tropics, moringa oleifera could be used as an animal food (Nouman *et al.*, 2013) due to the high nutritive content such as protein, vitamin C, vitamin A, Calcium, dan Potassium (Fuglie, 1999).

Therefore, the purpose of this study was to evaluate the effects moringa oleifera leaf block on the estrus intensity and conception rate of Bali cows.

Materials and methods

Twenty (20) multiparous Bali cows, 3-4 years old, were used in this study. They were kept individually under small farms (1-3 cows/farm) and fed with natural grasses and rice bran. In all animals, estrus was synchronized by a single injection of prostaglandin (PGF 2 α) 7.5 mg/head. After detecting the estrus behavior, the animals were divided into 2 groups of ten cows. Group 1 as a control group (CG) and Group 2 as a treatment group (TG). All animals in the TG were supplemented with Moringa oleifera leaf (MOL) block 500g/head/day from the first estrus (after PGF injection) until the animal detected for the next estrus (for one estrus cycle). The MOL block consist of 50 % dried moringa oleifera leaf, 35 % molasses, 5 % salt, 5 % urea, 2 % mineral mix and 3 % cement.

Estrus behavior were visually detected at least twice a day for about 15 minutes in each detection. Length of estrus cycle and estrus intensity were recorded. The intervals between the day of estrus after the PGF injection and the day of the next successive estrus was considered as the length of estrus cycle (days). Since the animals were kept individually, the first estrus sign (standing estrus and mounting activity) could not detected. Therefore other subtle symptoms of estrus (clear mucus stringing from vulva, general appearance of vulva and excessive vocalization) were evaluated for scoring the estrus intensity. The score for the estrus intensity ranging from high (3), medium (2) and low intensity (1) depend on the characteristics of the symptoms. All animals were artificially inseminated by using frozen semen. Pregnancy diagnosis were performed 60 days after the insemination.

The different means of estrus cycle length and estrus intensity between the two groups were analyzed by student's t-test. The conception rate was analysed by Chi-square analysis.

Results and discussion

Length of estrus cycle, estrus intensity and conception rate of Bali cows with and without MOL block supplementation are shown in Table 1.

Table 1. Length of estrus cycle, score of estrus intensity and conception rate in the control and treatment groups

Groups	Estrus Intensity	Length of estrus cycle (days)	Conception Rate (%)
Treatment	2.9 ± 0.3**	19.5 ± 1.4	80**
Control	1.8 ± 0.4	21.5 ± 2.8	40

** : Significantly different ($P < 0.01$) to the same column

Supplementation of MOL block (treatment group) significantly increased ($P < 0.01$) the estrus intensity in compared to that in control group (2.9 vs 1.8). This length of estrus cycle in the treatment group (19.5 days with the variation of 18 - 22 days) tended ($P < 0.1$) to be shorter than that in control group (21.5 days, with the variation of 16-26 days). Conception rate in the treatment group was significantly ($P < 0.01$) higher in compared to that in control group (80 vs 40 %).

By detecting cervical mucus, the qualities of estrus intensity (high, medium and low) were identified. Although standing heat is the primary method in detecting estrus in cows. However, the cervical mucus can also be used as another tool to be considered in order to improve estrus detection (Bernardi *et al.*, 2016, Jaenuddin & Hafez, 2000). The present of clear mucus at AI significantly increased conception rate in Holstein cows (Stevenson *et al.*, 1983).

Estradiol is a main hormone responsible for estrus behavior (Hafez *et al.*, 2000), therefore, the high estrus intensity in the treatment group (animals supplemented with MOL block) in this study might be due to the high level of estradiol. High intensity of estrus is significantly correlated with ovulatory follicle diameter (Ferraz *et al.*, 2016). In dairy cows, high correlation between the visual symptoms of estrus and estradiol concentration (Lyimo *et al.*, 2000).

The high estradiol concentration in the greater estrus intensity might be correlated with the size of preovulatory follicle. The pre-ovulatory follicle size was larger and the plasma estradiol concentrations greater in the day of AI in cows diagnosed pregnant (Lopes, 2007 and Madureira *et al.*, 2015). Greater estrus expression at timed AI improved ovulation rates and pregnancy per AI (Madureira *et al.*, 2018), and increased the chance of conception (Nyman *et al.*, 2016).

There are several factors that affect follicle and oocyte quality such as: temperature stress, energy balance and vitamin (Britt, 2008). He reported, that heifers fed diets (200% of maintenance to promote higher energy balance had higher blood concentration of insulin, more preovulatory antral follicles and twice as many ovulation in response to exogenous gonadotropins as heifers fed control 100% of maintenance. He discovered also that treatment of gilts or sows with vitamin-A increased litter size. The increase of litter size was due to an effect of vitamin-A on oocyte quality (Whaley 2000). Vitamin-A apparently works directly on the oocyte, because incubation of heat stressed oocytes with retinol prevented the adverse effect of heat stress on development in oocytes to the blastocyst stage (Lawrence *et al.*, 2004). This was supported by figure that showing the pathways of Beta carotene from forages and retinol ester from formula feed pass through the intestine of the cows until oocyte or cumulus Granulosa cell (Ikeda *et al.*, 2005).

Since moringa oleifera leaves contains high level Vitamin A, 80 µg/100g (Abbas, 2018), the significant increase of estrus sensitivity and conception rate found in this study might be assumed mainly as a result of moringa oleifera leaf.

This study showed that supplementation of moringa oleifera leaf (MOL) block significantly shortened the estrus cycle and increased the estrus intensity in Bali cows. Mean normal length of estrus cycle in cows is 21

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days with a range of 14-29 days (Jaenuddin & Hafez, 2000), 18-24 days in Bos Taurus cattle (Forde *et al.*, 2000, and 20-21 days in cross breed cows (Islam *et al.*, 2019). High variation of estrus length might be due the delete of follicle development in the control group.

In this study, the higher conception rate was detected in the higher estrus intensity. Therefore, estrus intensity might be a good indication for the conception rate. This was supported by results that were found in dairy cows. Cows that had measurements of high intensity estrus were significantly more fertile than low-intensity estrus (Madureira *et al.*, 2015).

It can be concluded that supplementation of moringan oleifera leaf block could increase the estrus intensity and conception rate in Bali cows.

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