



## Effect Addition of Urea Molasses Multi-nutrient Moringa Block (UM3B) on the Ovarian Follicular Dynamics in Crossbred Cows

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**Abstract** | The purpose of this study was to examine the follicular wave, total of follicle dominant and diameter of the follicle during the estrous cycle in cross-breed (local breed x limousin) cows. A total of 40 crossbreeds cows, average body weights of 350-425 kg, aged 3-6 years were used for the present study. All samples were divided into two groups; each group was containing the 20 cows. Group 1 was given 350 gr/head/day of UM3B as long as one month, and group 2 was not given UM3B (control). Follicular dynamics during the estrous cycle were assessed using a portable ultrasound (USG) scan device. The parameters in the research were including the number of the follicular waves, follicle dominant and diameters of follicles. The results showed that the average number of follicular wave and dominant follicles in group one (with UM3B) were significantly different ( $P < 0.05$ ) compared to group two (control). Whereas, the average diameter follicle was no significant different ( $P > 0.05$ ) between group one and group two. The conclusion adding of urea molasses multi-nutrient moringa block (UM3B) on cross-breed cows could increase follicular dynamics.

**Keywords** | Crossbred cows, Ovaries, Follicular dynamics, Diameter of follicle, UM3B

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## INTRODUCTION

One of the problems in raising beef cattle in a tropical country like Indonesia is the existence of two long seasons. Consequently, the availability of forage cannot be produced sustainably. In the rainy season, abundant forage on the contrary through the dry period lacks good forage for its feeding of cattle. This phenomenon needs to get a solution so that the management of feeding both quantity and quality can be maintained in accordance with the needs of livestock, because if not there will be an imbalance of feed which results in low productivity of beef cattle.

Furthermore, Lucy *et al.* (2001) revealed that one of the essential aspects affecting reproductive efficiency is infertility, the main cause of these events is that there is

no nutritional balance. In addition, the lowly look of estrus and lowly responses for estrus synchronization might be related to inconsistent growth and growth of ovarian follicles caused by negative energy balance (Stevenson *et al.*, 1996). Meanwhile, Kamal *et al.* (2014) and Shamsudin *et al.* (2006) revealed that the main cause of the length of calving interval in cattle is the length of estrus post partus. Feeding and more complete nutritional supplement will affect the reproductive process of livestock (Nogueira *et al.*, 2012). The Urea molasses multi-nutrient moringa block (UM3B) feeding to cattle increases its digestibility and feed intake (Shatrughan, 2018; Malik *et al.*, 2019). Feed and adding of supplement high quality produce main effects on reproductive processes (Nogueira *et al.*, 2012).

One of the plants that have complete nutrition is moringa.

*Moringa oleifera* can grow well in a variety of climates, contains high nutrition, and contains balanced amino acids (Kaijage et al., 2014). The moringa can addition in complete nutrition in UMMB. While, the urea molasses mineral block (UMMB) can increase the use of low quality roughages because it satiates the supplies of the microorganisms of rumen and makes a good atmosphere for the fermentation of fibrous material. In ruminants molasses is the main basis of energy, which is ready to be fermented which contributes to the growth of microorganisms in the rumen. On the other hand, it is considered to be a good carrier for urea and a source of micro minerals (Wongnen, 2007). Furthermore, Perera et al. (2007) revealed that incorporation of molasses in the UMMB under field conditions tremendously enhanced the cattle performance finally became useful on the animal health. An efficient reproductive process is a prerequisite for profitable cows farming. However, estrus post-partum or ovarian activity were delayed, especially during dry seasons lead to prolonged calving intervals in crossbreed cows. Therefore, the objective of research was to evaluate the influence of the addition of urea molasses multi-nutrient moringa block (UM3B) on the follicular wave, follicle dominant and diameter of follicles in crossbred cows

## MATERIALS AND METHODS

### ANIMALS AND EXPERIMENTAL DESIGN

The location of the research was conducted at the district of Tanah Laut Province South Kalimantan, Indonesia. A total of 40 crossbreeds (*local breed* x limousin) cows were used for the present study. The average body weights were 350–425 kg, aged 3–6 years. All the cows were separated into two groups; each group was containing the 20 cows. Group 1 was given 350 gr/head/day of urea molasses multi-nutrient moringa block (UM3B), which content of Ingredient composition (Table 1), as long as one month, and group 2 was not given UM3B (control). Status of reproduction all cows was postpartum anestrus with the defined following by Kamal et al. (2014). The average body value of cows between 5–6 on a scale of 1 to 9, rating the body condition is done in a subjectively given to cows to describe overall condition including fat cover and flesh over the ribs, loin, and tail head adopted by Roche et al. (2009). The cows are placed in cages and graze on similar grasses. The feeding standard during the research was calculated based on the national research council standard (NRC). The adaptation period for the supplement of UM3B was 7 days, before take of data of the study. The addition feed of cows was given rice bran approximately 1.5 kg/day/head and maintained under a similar grazing system (various kinds of grass).

**Table 1:** Ingredient composition (%) of Urea Molasses Multi-nutrient Moringa Block (UM3B) supplementary fed to crossbreeds cows.

No.	Ingredient UM3B blocks	Concentration (%)
1.	Moringa	15
2.	Sago palm	3
3.	Mineral	5
4.	Urea	5
5.	Salt	5
6.	chalk	7
7.	Maize	8.9
8.	Soy	6.3
9.	Rice Brand	9.8
10.	Molasses	35
	Total	100

### ULTRASOUND EXAMINATIONS

Follicular dynamics including follicular wave, diameter follicle (DF) and follicles dominant were measured every two days (n =10 in group 1 and n = 10 in group 2), by a portable ultrasound (USG) scan device SIUI-CTS 800 (Shantou Institute of Ultrasonic Instruments Co., Ltd) as long as one cycle of estrus. The dominant follicle (DF) was categorized by the deviation of its development rate when compared to the subordinate follicles of the similar wave, a dominant follicle was clear to be the biggest follicle that produced to a diameter of >10 mm (Sirois and Fortune, 1990). Besides that, the data got were graphically represented to characterize follicular waves of the number. The follicles wave was identified, measured and drawn in diagrams.

### STATISTICAL ANALYSIS

The data on follicular development dynamics including follicular wave, the diameter of follicle and follicle dominant, and data of distribution normality were analyzed by the least-square means analysis by the GLIMMIX procedure of SAS (Statistical Analysis System, version 9.1.3).

## RESULTS

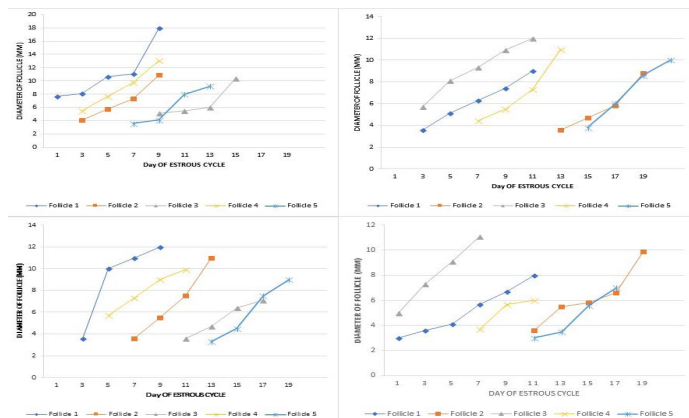
The results of the study about measurements of ovaries and follicles including the follicular wave, follicle dominant and diameter of follicles were shown in Table 2. The average of number follicular waves was significantly different ( $P < 0.05$ ) between group one (with UM3B) and group two (without UM3B). Furthermore, the average of dominant follicles was significantly different ( $P < 0.05$ ) between group one (with UM3B) and group two (without UM3B). Whereas, the average diameter of follicles was not significantly different ( $P > 0.05$ ) between group one and group two. The presence of a follicular wave was an important factor in determining ovaries' activity which will have an impact on estrus in female

cows. Base on the data in Figures 1, 2 was showed that follicle wave in group two (without UM3B) a follicular wave was started one follicular wave until three follicular waves (Figure 2). Whereas, group one (with UM3B) follicular wave was an average of five follicular waves per cow (Figure 1).

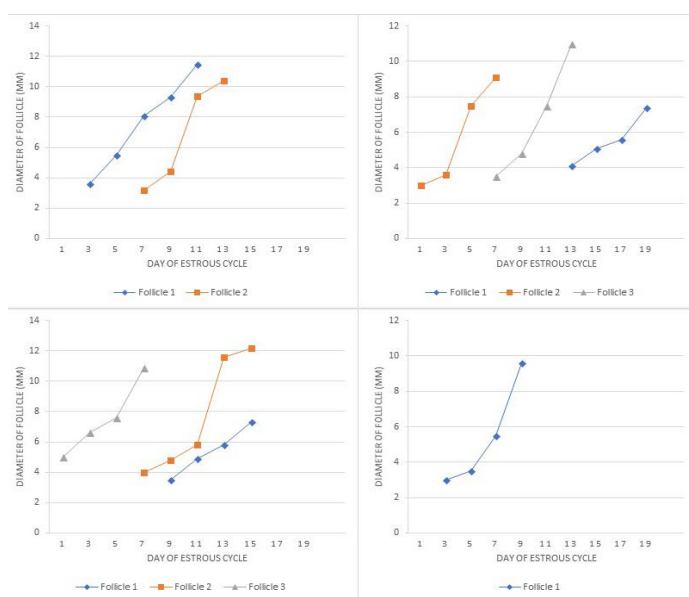
**Table 2:** The average of number follicular wave, total of dominant follicles, and diameter of follicles in each crossbred cow.

Item	Treatment	
	Group 1 (With UM3B)	Group 2 (Without UM3B)
Number of follicular wave (average/head) (n = 5)	4.80±0.40 <sup>b</sup>	2.00±0.89 <sup>a</sup>
Total of dominant follicle (> 10 mm)/head (n = 5)	4.81±0.82 <sup>b</sup>	2.64 ±0.79 <sup>a</sup>
Diameter of follicle dominant (average/head) (n = 5)	12.09± 0.91	11.06±1.02

Different superscripts along the row indicate the significant differences (P < 0.05) among groups.



**Figure 1:** Profiles number of follicular wave in crossbred cow with supplementation of UM3B.



**Figure 2:** Profile number of follicular wave in crossbred cow without supplementation of UM3B.

## DISCUSSION

The reproductive performance demonstrated that delayed timing of estrus and first Artificial Insemination (AI) in cows is one of the essential to the success of the breeding farms. The state of energy nutrition in the transition period is commonly considered a major factor affecting the development of follicle waves after calving, the time of ovulation and fertility in cows. Base on the result of this study was showed that follicular wave in group one treatment with urea molasses multi-nutrient moringa block (UM3B) increase frequents of the number of follicular waves compared to group two (without UM3B). The result of this study was strengthened than the previous study by Taylor and Rajamahendran (1991); Ginther et al. (1996) who revealed that bovine usually shows two, or three (Savio et al., 1988; Sirois and Fortune, 1988) or four (Sirois and Fortune, 1988) follicular waves during the estrus cycle. That is indicated that UM3B was containing nutrition complete would give the effect of development follicular in the ovary. This was supported by Mengistu and Hassen (2018); Tekeba et al. (2014), Misra et al. (2006), Salman (2007) who reported that supplementation urea molasses multi-nutrient block was exposed positive effects on production and reproduction performance in cattle.

The urea molasses multi-nutrient moringa block (UM3B) was containing 35% of moringa. The moringa was a source of protein in nutrition, it improves feed intake, increases nutrient digestibility and ruminant fermentation, foremost to an increase in the growth of follicles and improvement of the follicular wave. This result was supported by Raman et al. (2018) who revealed that the adding of moringa to feed for animal diet increases weight gain. Increased weight gain in female cows will have an impact on body condition score (BCS) which correlates with the reproducibility of cows. Furthermore, Foidl et al. (2001) and Sarwatt et al. (2004) reported that substitution of moringa leaves as an additional feed in cattle increases total feed consumption and increases weight gain. On the other hand, the content of UM3B was also urea, the urea concentrations were indicators of protein intake and, as expected, have a positive correlation with the diet. The average values of plasma urea were found of plasma urea nitrogen, so these levels were considered adequate (Butler et al., 2003). Furthermore, Adamiaki et al. (2005) revealed that increased energy was beneficial to oocyte quality only in animals of moderate BCS and was harmful to animals with a high BCS or bad. Ovarian follicular dynamics on cows were characterized by follicular waves of growth and regression during the estrous cycle. In this study, the mean follicular diameter in group one was higher (12.09 ± 0.91) compared to group two (11.06 ± 1.02) but did not showed a significant difference. While the average number of dominant follicles in group one was



( $4.81 \pm 0.82$ ) higher than in group two ( $2.64 \pm 0.7$ ). The number of dominant follicles and the high diameter of the follicles was suspected because there was additional feed in the form of UM3B in group one, feeds addition were containing urea, molasses, multi nutrients, and moringa contain complete nutrients to meet nutrient deficiencies in the basal feed. The statement was supported by Llewelyn et al. (2007) and Zulu et al. (2002) who reported that many researchers have claimed that energy deficit reasons the incidence of functional disorders of the reproductive system, such as long-term ovarian dysfunction or a delay in the onset of normal ovarian activity.

## CONCLUSION

Base on the result of this study was concluded that supplementation of Urea Molasses Multi-nutrient Moringa Block (UM3B) on cross-breed cows could increase follicular wave, the diameter of follicles and total follicle dominant.

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## AUTHOR CONTRIBUTION

Aam, Erlina, Neni, Rizkie and Ana in the research were supervisor and wrote draft manuscript. Kholik, Suyanto and Mawardi was assistant of the collection of data.

## CONFLICT OF INTEREST

The authors state was no conflict of interest of all data and financial of the research

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