

# Effect Provision of Addition Urea Molasses Multi-nutrient Moringa Block (UM3B) feed to Bali Cows on Follicular Dynamics Profile During Estrus Synchronization

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## Effect Provision of Addition Urea Molasses Multi-nutrient Moringa Block (UM3B) feed to Bali Cows on Follicular Dynamics Profile During Estrus Synchronization

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**Abstract** | The objective to investigate the effects of the addition of UM3B on follicular dynamics profile after the second injection of PGF<sub>2α</sub>. Methods: In this experiment. A total of 20 Bali cows were used for this arch. The average weights of the cow were 325–350±9.98 kg, cycling of estrus normally, and aged 3–5 years. All cows were divided into two treatment groups. The first group (n =10) was supplemented by UM3B dose of 350 g/head/day and second group (n =10) was not supplemented with UM3B. The parameters were evaluated include of locations and sizes of the follicles, corpus luteum (CL) regression, and dominant follicles were assessed by a Ultrasonography (USG scan). Profile of estrus response after second injection PGF<sub>2α</sub> was observed manually. Results: Diameter of follicle ovulation, speed of follicle growth, length of the follicle growth phase, and follicular wave were significantly different (P<0.05) among group 1 and group 2. Whereas, the diameter of the follicle during injection, ovulation time, and estrus cycle length was not significantly different (P>0.05) among group 1 and group 2. While, the diameter of the corpus luteum during injection, diameter of corpus luteum during estrus, and speed of corpus luteum regression were not significantly different (P>0.05) between group 1 (with UM3B) and group 2 (without UM3B). Conclusions: The addition of UM3B could be improved by the diameter of follicle ovulation, speed of follicle growth, length of the follicle growth phase, and follicular wave in Bali cows.

**Keywords** | UM3B, Bali cow, Follicular dynamic, Estrus synchronization.

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### INTRODUCTION

One strategy to raise productivity and reproduction in Bali cattle is the synchronization of estrus. Estrus synchronization, which is continued by Artificial insemination (IA) has become a regular procedure to improve the population of cattle. Furthermore, estrus synchronization is a good tool to facilitate a timely artificial insemination program (Kasimanickam et al., 2009). There are

several kinds of procedures that can be used to synchronize estrus in cattle, like usage of Prostaglandin F<sub>2α</sub> or PGF<sub>2α</sub> (Holm et al., 2008; de Araujo Berber et al., 2002). The use of PGF<sub>2α</sub> or its analogues to lyse the corpus luteum has become the most popular method for the estrus synchronization program (Jainudeen et al., 2000). There are several methods for using PGF<sub>2α</sub> for estrus synchronization program in cattle, one of these programs is the 2-shot prostaglandin protocol. Prostaglandin or its



analogues can cause regression of the corpus luteum (CL) in cows from day 5 until day 15 of the estrus cycle (Holm et al., 2008).

The main factor that influences the success of the estrus synchronization program followed by IA is the quality and number of feeds consumed. While Miah et al. (2000) revealed that the administration of urea molasses multi-nutrient block (UMMB) in crossbreed cattle could increase milk production and shorting calving intervals. A good feed is a balanced feed between nutritional needs with the feed provided. Urea molasses multi-nutrient moringa block (UM3B) is a complement of nutrition in cattle. UM3B, which contains of a lot of molasses, urea, minerals, and high moringa. It is a respectable additional feed to meet feed deficiencies in cattle. The moringa is a species of plant, comprising complete nutrients, which possesses anti-oxidant content, protein, fat, magnesium, calcium, selenium, potassium, vitamin C, vitamin E, and polyphenol of compounds (Ayodele et al., 2014), which can play a role in helping the growth of microbes in the rumen. Or it is increasing the population of microbial in the rumen may significantly improve the protein consumption (Malik et al., 2019). Furthermore, Lucy et al. (1992) revealed that the pattern of development of follicular was pretentious by the status of energy balance on the stage of lactating. Follicular dynamics were influenced by an energy balance, and by other factors such as the stage of lactation, level of product of milk, consumption of energy-rich nutrients such as calcium salts of long-chain fatty acids (Wolfenson et al., 1995).

The success of Estrus Synchronization can be seen by the development of follicles in the ovaries. Changes in ovarian follicles in cattle are characterized by the development of follicular waves and regression of follicle during the cycle of estrus (Sinker et al., 1989). Regular cows usually show one, two, three, or four follicular waves during estrous cycle (Savio et al., 1988; Taylor and Rajamahendran, 1991). These follicular wave patterns look both in post-pubertal such as two or three waves until ovulation and pre-pubertal by nonstop growth of follicles (Adams, 1994).

Most studies of estrus synchronization with prostaglandin F2a only report the ability to produce estrus and its conception results after artificial insemination. Only a limited study has reported the development of ovulation follicles. The objective of the study was to evaluate effect of addition urea molasses multi-nutrient moringa block (UM3B) on follicular dynamic profile during estrus synchronization with PGF<sub>2</sub>α in Bali cows.

## MATERIALS AND METHODS

### ANIMALS

The experiments were conducted in district Tanah Laut and teaching farm Bentok - Lab. Animal production Faculty of Agriculture-Islamic University of Kalimantan, Banjarmasin Province of West Kalimantan. A total of 20 Bali cows were used for the research. The average body weights were 325-350±9.98 kg and aged 3-5 years. The mean ambient temperature during the study period were 32-35 °C, and deworming and vaccination was routine every year. All the cows were 90-120d postpartum and were cycling of estrus normally. Their body condition score was evaluated on a rule of 1 to 5 (1=thin; 5=obese) by (Yares et al., 2009). The score of the cow's body condition was subjectively given to describe overall body condition, fat cover, and flesh over the ribs, loin, and tail head. All cows were kept in the same pen and raised under a similar grazing system (various kinds local of grass) and added with a mixture of rice bran (byproduct of milling) at 1.5 kg/head/day (Malik et al., 2013). The approval of the animal ethics committee on the conduct of this study was number P01.12.19 from research institutions and community service- Islamic University of Kalimantan.

### EXPERIMENTAL DESIGN

All samples of Bali cows were divided into two treatment groups. The first group (n=10) was supplemented by UM3B dose of 350 g/head/day, and the second group (n=10) was no supplementation UM3B. Component configuration (%) of UM3B was adopted Malik et al. (2020). Estrus synchronization for all cows was injected by intramuscular PGF<sub>2</sub>α with a dose of 25 mg Dinoprost® (Glandins, Tad Pharmazeutisches Werk GmbH, West Germany). The second PGF<sub>2</sub> α injection was carried out 14 days later after the first injection with the same dose and manner. cows of estrus were observed visually to estrus like mounting, standing to be mounted, and number of mounts performed for a period of 2h. cows that are ready to be mount at least 3 times were considered to be estrus (Busch et al., 2008; Malik et al., 2011).

### ULTRASOUND EXAMINATIONS

The ovarian follicular growth was examined at 2-d intervals (n = 5 each group) through ultrasonography using an Aloka 500V ultrasound with a 7.5 MHz trans-rectal linear probe (Aloka, Wallingford, CT), trans-rectal linear transducer. Positions and sizes of the follicles and corpus luteum (CL) in the ovaries were drawn at each scanning, and the exact location of the follicles was recorded. Evaluate of dominant follicle was considered by the deviation of its growth rate when compared to the subordinate follicles of the similar wave, a dominant follicle was clear to be the biggest follicle (Sirois et al., 1988). The follicles wave was

**Table 1:** Characteristics of ovulation follicular in Bali cows

Treatments	The maximum diameter of the follicle ovulation (mm)	Speed of follicle growth (mm/day)	Diameter of follicle during second injection of PGF <sub>2</sub> α (mm)	Length of growth phase (days)	Ovulation time (h)	Estrus cycle length (days)	Follicular wave (cycle)	SEM	P
Without UM3B (n=5)	10.18	1.02	5.79	5.20	90.13	21.01	2.08	0.04	p≤0.05
With UM3B (n=5)	13.24	1.97	5.01	7.40	89.56	20.80	4.82		

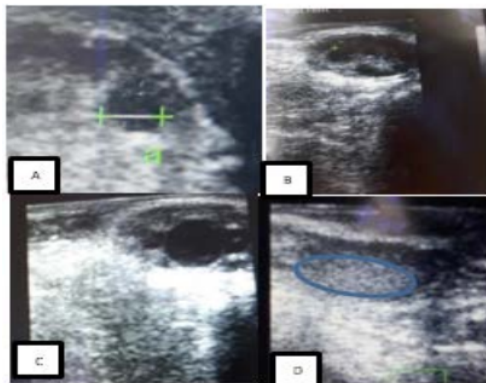
**Table 2:** Size of corpus luteum in Bali cows with UM3B and without UM3B

Treatments	Diameter corpus luteum during second injection of PGF <sub>2</sub> α (mm)	Diameter corpus luteum at Estrus (mm)	Speed of corpus luteum regression (mm/day)	SEM	P
Without UM3B (n=5)	12.01	4.63	3.02	0.06	p≤0.05
With UM3B (n=5)	12.90	4.01	2.92		

**Table 3:** Average diameter follicle of ovulatory follicle after second injection of PGF<sub>2</sub>α

Treatments	Day 14 (day of second PGF <sub>2</sub> α injection)	Day 15 after injection	Day 16 of estrus	Day 17 of estrus	SEM	P
Without UM3B (n=5)	3.38	7.92	10.58	12.90	0.03	p≤0.05
With UM3B (n=5)	3.81	11.38	14.16	15.08		

identified, measured, and drawn in diagrams, while, the size of the corpus luteum was measured by the average of the longest and shortest diameters (Figure 1). Furthermore, the time of ovulating was determined by the disappearance of the dominant follicle with a suddenly when the last diameter follicle (DF) was observed on the ultrasonography monitor (Azizah et al., 2013).



**Figure 1:** Ultrasound images of a cow's ovaries in this study. (A) This image shows to get diameter of follicle or corpus luteum, (B) these images show five follicles, (C) these images show one dominant follicle, and (D) these

images show of corpus luteum.

**DATA ANALYSIS**

The analysis of statistical was done using software SAS (Statistical Analysis System, version 9.2), through command Proc GLM. The data on follicular dynamics including number follicles, size of follicles, dominant follicles and performing of corpus luteum were assessed by analysis of variance, adopting α = 0.05 in a completely randomized design.

**RESULTS**

**PROFILE OF OVULATION FOLLICULAR**

The characteristics of the ovulation follicle of the cow in groups 1 (with UM3B) and group 2 (without UM3B) were shown in Table 1. The diameter of the maximum of the follicle ovulation was significantly different (P<0.05) between group with UM3B and group without UM3B. Furthermore, the speed of follicle growth and length of follicle growth phase were significantly different (P<0.05) between group with UM3B and group without UM3B. The follicular wave was significantly different (P<0.05) among group 1 and group 2 (Table 1).

### DIAMETER FOLLICLE AND CORPUS LUTEUM

Whereas, the diameter of follicle during injection of PGF<sub>2</sub>α, ovulation time, and estrus cycle length was not significantly different (P>0.05) among group 1 and group 2. On the other hand, the diameter of corpus luteum during injection of PGF<sub>2</sub>α, the diameter of corpus luteum during estrus, and speed of corpus luteum regression were not significantly different (P>0.05) between group 1 (with UM3B) and group 2 (without UM3B) see Table 2.

### DIAMETER FOLLICLES AND PROFILE OF ESTRUS AFTER SECOND INJECTION

Furthermore, the diameter of ovulatory follicles after the second injection of PGF<sub>2</sub>α including days 15, 16, and 17, respectively were significantly different (P<0.05) between group 1 and group 2 (Table 3). Whereas, the profile of estrus response after the second injection of PGF<sub>2</sub>α was not significantly different (P>0.05) among group 1 and group 2 see Figure 2.

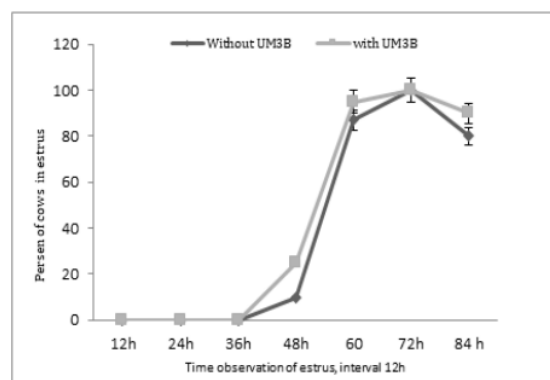
## DISCUSSIONS

The pattern of follicular growth was affected by the status of energy balance in cows. While, follicular dynamics were influenced by reasons affecting energy balance, such as the stage of lactation, level of production of milk, consumption of energy-rich nutrients such as calcium salts of long-chain fatty acids and a lot of minerals others. Supplementation with UM3B in feed was significantly (P<0.05) to increase the diameter of the follicle, follicular wave, and Length of growth phase as compared to control group 2 (without UM3B). In cattle, feeding is one of the main reasons of anestrus and other reproductive disorders (Kumar et al., 2014; Pradhan and Nakagoshi, 2008). Thus finding was strengthened by Docchio et al. (1990) who revealed that the bad effect of low body condition score (BCS) on ovarian cycle and pregnancy of rates in cows. Furthermore, Rasby et al. (1992) stated that nutrition restriction has a negative influence on LH release, to finally effect of the estrus cycle.

Supplementation of UM3B during less availability of nutrition could improve the body condition score and reproductive efficiency of anestrus on Bali cattle. The high content of urea, molasses, and moringa in UM3B can have a good impact in overcoming energy balance in Bali cows, so that it has an impact on increasing follicular dynamics including diameter follicle, follicular growth and the appearance of follicular waves compared to the control group without given UM3B (Table 1). The result of this research was strengthening by Lewelyn et al. (2007) and Zulu et al. (2002) who exposed that many researchers have claimed that energy shortage causes the incidence of functional disorders of the reproductive system, such as long-term ovarian dysfunction or a postponement in the onset of

normal ovarian activity. Furthermore, Diskin et al. (2003) reported that energy shortage in cows was significantly affect development of the diameter of the dominant follicle. On the other hand, a decrease in feed intake may donate to negative energy balance which may lead to an abnormality and irregular follicle growth (McDougall et al., 2007).

The other parameters in this study were evaluated of the diameter corpus luteum and size of corpus luteum during estrus synchronization with PGF<sub>2</sub>α. Based on the results of this study about corpus luteum (CL) diameter during injection, CL diameter during estrus, and speed regression of CL was no significant difference between cattle with UM3B and without UM3B. Whereas, the profile of the percentage response of estrus after the second injection of PGF<sub>2</sub>α was showed similar between group 1 and group 2 (Figure 1).



**Figure 2:** Percentage of estrus response after second injection of PGF<sub>2</sub>α in cows observed at 12h intervals (with UM3B or without UM3B).

The result of this research were strengthened by Malik et al. (2013); Cartmill et al. (2001); Pancarci et al. (2002) who stated that the higher percentage response of estrus among cows after the second PGF<sub>2</sub>α injection proposes that all of the cattle were in the same phase of luteal on the cycle. Furthermore, Smith et al. (2005) also revealed that PGF<sub>2</sub>α was real only on luteal phase in corpus luteum.

## CONFLICT OF INTEREST

All authors were declaration no conflict of interest

## CONCLUSION

Base on the result of this research was decided that adding of UM3B on Bali cows could be improve of the diameter of follicle ovulation, speed of follicle growth, length of follicle growth phase, and follicular wave in Bali cows.

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## AUTHORS' CONTRIBUTION

A.Malik was coordinator of the research and analyzed and interpreted the data. Siti Erlina, Aam gunwan, and Neni Widaningsih in the study were supervisor of data collection and wrote draft manuscripts, Riskie and Mawardi was assistants of the collection of data.

## REFERENCES

- Adams GP (1994). Control of ovarian follicular wave dynamics in cattle: implication for synchronization & superstimulation. *Theriogenology*. 41:19-24. [https://doi.org/10.1016/S0093-691X\(05\)80044-5](https://doi.org/10.1016/S0093-691X(05)80044-5)
- Ayodele AE, Adeola JR, Mayowa AT (2014). Reproductive performance of rabbit does feed graded levels of moringa oleifera leaf meal based diet. *Int. J. Sci.* (3): 49-53.
- Ayres H, Ferreira RM, Torres-Junior JR, Demétrio CGB, Lima CG, Baruselli PS (2009). Validation of body condition score as a predictor of subcutaneous fat in Nelore (*Bos indicus*) cows. *Liv. Sci.* 123:175-179. <https://doi.org/10.1016/j.livsci.2008.11.004>
- Azizah A, H Yaakub, Ahmad J (2013). Effects of Varying Energy Levels on Follicular Development and time of ovulation in Kedah-Kelantan Crossbred Cows. *Mal. J. Anim. Sci.* 16(2):21-28.
- Busch DC, Haden JK, Schafer DJ, Wilson DJ, Mallory DA, Eilersieck M R, Leitman NR, Smith MF, Patterson DJ (2008). Timing of Artificial Insemination in postpartum beef cows following administration of the CO Synch controlled internal drug-release protocol. *J. Anim. Sci.* 86: 1519-1525. <https://doi.org/10.2527/jas.2008-0925>
- Cartmill JA, El-Zarkouny SZ, Hensley BA, Lamb GC, Stevenson JS (2001). Stage of Cycle, Incidence and Timing of Ovulation and Pregnancy Rate in Dairy Cattle after Three Timed Breeding Protocols. *J. Dairy Sci.* 84:1051-1059. [https://doi.org/10.3168/jds.S0022-0302\(01\)74565-1](https://doi.org/10.3168/jds.S0022-0302(01)74565-1)
- de Araujo Berber RC, EH Madureira, PS Baruselli (2002). Comparison of two Ovsynch- protocols (GnRH versus LH) for fixed timed insemination in buffalo (*Bubalus bubalis*). *Theriogenology*. 57: 1421-1430. [https://doi.org/10.1016/S0093-691X\(02\)00639-8](https://doi.org/10.1016/S0093-691X(02)00639-8)
- Diskin MG, Mackey DR, Roche JF, Sreenan JM (2003). Effects of nutrition and metabolic status on circulating hormone and ovarian follicle development in cattle. *Anim. Reprod. Sci.* 78: 345-370. [https://doi.org/10.1016/S0378-4320\(03\)00099-X](https://doi.org/10.1016/S0378-4320(03)00099-X)
- Docchio MJ, Neish A, Broadhurst L (1990). Differences in gonadotrophin secretion postpartum between Zebu and European breed cattle. *Anim. Reprod. Sci.* 22: 311-317. [https://doi.org/10.1016/0378-4320\(90\)90023-9](https://doi.org/10.1016/0378-4320(90)90023-9)
- Ginther OJ, Kastelic JP, Knopf L (1989). Temporal Association Among Ovarian Events in Cattle during Oestrous cycles with two and three follicular waves. *J. Reprod. Fertil.* 87:223-230. <https://doi.org/10.1530/jrf.0.0870223>

- Holm DE, Thompson PN, PC Irons (2008). The economic effects of an estrus synchronization protocol using PGF<sub>2α</sub> in beef heifers. *Theriogenology*. 70: 1507-1515. <https://doi.org/10.1016/j.theriogenology.2008.06.098>
- Jainudeen MR, H Wahid, Hafez ESE (2000). Ovulation Induction, embryo Production and Transfer. In: *Reproduction in Farm Animals*. 7 Ed, Lippincott, Williams and Wilkins, New York, USA 2000: 405-430. <https://doi.org/10.1002/9781119265306.ch29>
- Kasimanickam R, Day ML, JS Rudolph, Hall JB, Whittier WD (2009). Two doses of PGF<sub>2α</sub> improve pregnancy rates to timed-AI in a 5-day progesterone-based synchronization protocol in beef cows. *Theriogenology*. 71:762-767. <https://doi.org/10.1016/j.theriogenology.2008.09.049>
- Knopf L, Schallenberger E, Kastelic JP, Ginther OJ (1989). Ovarian follicular dynamics in heifers: test of two wave hypothesis by ultrasonically monitoring individual follicle. *Domest. Anim. Endocrin.* 6(2):111-119. [https://doi.org/10.1016/0739-7240\(89\)90040-4](https://doi.org/10.1016/0739-7240(89)90040-4)
- Kumar PR, Singh SK, Kharche SD, Behera BK, Chethan Sharma G, Shukla SN, Kumar H, Agarwal SK (2014). Anestrus in cattle and buffalo: Indian perspective. *Adv. Anim. Vet. Sci.* 2 (3):124-138. <https://doi.org/10.14737/journal.aavs/2014/2.3.124.138>
- Llewelyn S, Fritzpatrick R, Kenny DA, Murphy JJ, Scaramuzzi RJ, Wathes DC (2007). Effect of negative energy balances on the insulinlike growth factor system in prerecruitment ovarian follicle of postpartum dairy cows. *Reproduction*. 133: 627-639. <https://doi.org/10.1530/REP-06-0122>
- Lucy MC, Savio JD, De La Sota RL, Badinga L, Thatcher WW (1992). Factors that affect ovarian follicular dynamics in cattle. *J. Anim. Sci.* 70:3615-3626. <https://doi.org/10.2527/1992.70113615x>
- Malik A, Gunawan A, Erlina S, Widaningsih, Rizkie E (2019). Effect of moringa supplementation via Urea Molasses Multi-nutrient Moringa Block (UM3B) on nutrient intake and utilization in Bali cattle. *J. Anim. Health Prod.* 7(2): 70-74. <https://doi.org/10.17582/journal.jahp/2019/7.2.70.74>
- Malik A, Gunawan A, Erlina S, Widaningsih N, Elyania R, Zuraidah A, Kholik, Suyanto and Mawardi (2020). Effect addition of urea molasses multi-nutrient moringa block (UM3B) on the ovarian follicular dynamics in crossbred cows. *Adv. Anim. Vet. Sci.* 8(5): 458-462. <https://doi.org/10.17582/journal.aavs/2020/8.5.458.462>
- Malik A, A Wahid, Y Rosnina, M. Bukar, Yimer, A Kasim and M. Sabri (2011). Effects of resynchronization with progesterone and PGF<sub>2α</sub> on estrus response and pregnancy rate in beef cattle. *Anim. Vet. Adv.* 10(18):2474-2478.
- Malik A, Gunawan A, A Jaelani, R Budirahman, Erlina S (2013). Comparison of estrus synchronization with application of prostaglandin F<sub>2α</sub> intrauterine and intramuscular in Bali and crossbred-Ongole cattle. *Pak. Vet. J.* 33(4): 446-449.
- McDougall S, Blache D, Rhodes FM (2005). Factors affecting conception and expression of oestrous in an oestrous cows treated with progesterone and estradiol benzoate. *Anim. Reprod. Sci.* 88: 203-214. <https://doi.org/10.1016/j.anireprosci.2005.01.003>
- Miah A G, Salma U, Khan M A S and Ali M L (2000). Effects of urea molasses multi-nutrient blocks on the reproductive performance of indigenous (Zebu) cows. *Bangladesh J Animal Science.* 29(1-2):11-19.
- Pancarci S M, Jordan E R, Risco C A, Shouten M J and Thatcher W W (2002). Use of Estradiol Cypionate in a

- Presynchronized Timed Artificial Insemination Program for Lactating Dairy Cattle. *J. Dairy Sci.* 85: 122-131. [https://doi.org/10.3168/jds.S0022-0302\(02\)74060-5](https://doi.org/10.3168/jds.S0022-0302(02)74060-5)
- Pradhan R, Nakagoshi N (2008). Reproductive disorders in cattle due to nutritional status. *J Inter Develop and Coop.* 14:45-66.
  - Rasby RJ, Wetteman RP, Harms PG, Lusby, Wagner JJ (1992). GnRH in the infundibular stalk-median eminence is related to percentage body fat in carcasses of beef cows. *Dom Anim. Endocr.* 9:71-76. [https://doi.org/10.1016/0739-7240\(92\)90010](https://doi.org/10.1016/0739-7240(92)90010)
  - Savio JD, Roche JF, Boland MP, Keenan L (1988). Pattern of growth of dominant follicles (DF) during the estrous cycle of heifers. *J. Reprod. Fertil.* 83(2):663-671. <https://doi.org/10.1530/jrf.0.0830663>
  - Sirois J, Fortune JE (1988). Ovarian follicular dynamics during the estrous cycle in heifers monitored by real time ultrasonography. *Biol. Reprod.* 39 (2):308-317. <https://doi.org/10.1095/biolreprod39.2.308>
  - Smith MF, GA Perry, JA Atkins, DC Busch, DJ Oatterson (2005). Physiological principles underlying synchronization of estrus. In *Proc. Appl. Reprod. Strategis Beef Cattle.* 5: 1-24.
  - Taylor C, Rajamahendran R (1991). Follicular dynamics, corpus luteum growth, and regression in lactating dairy Cattle. *Canadian J. Anim. Sci.* 71(1):61-68. <https://doi.org/10.4141/cjas91-007>
  - Wahjuningsih S, Ciptadi G, Nur Ihsan M, Isnaini N, Rahayu S (2019). Supplementation of *Moringa oleifera* leaves' extract in Tris-egg yolk extender on the quality and fertility of cryopreserved Senduro goat sperm. *Livest. Res. Rural Develop.* 31(12:1-4.
  - Wolfenson D, Badinga JD, Thatcher WW, Savi R, Meidan BJ, Lew R Braw-Tal, Berman A (1995). Effect of heat stress on follicular development during the estrous cycle in lactating dairy cattle. *Biol. Reprod.* 52:1106-1113. <https://doi.org/10.1095/biolreprod52.5.1106>
  - Zulu VC, Kida K, Sawamukai Y, Nakada K, Moriyoshi M (2002). Relationship between insulin-like growth factor I, blood metabolites and postpartum ovary function in dairy cows. *J. Vet. Med. Sci.* 64: 879-885. <https://doi.org/10.1292/jvms.64.879>

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L. Bungartz. "Assessment of the presence of a dominant follicle and selection of dairy cows

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suitable for superovulation by a single ultrasound examination", *Reproduction*, 08/01/1994

Publication

---

16

R. Bialek, S. Willemer, R. Arnold, G. Adler. "Evidence of Intracellular Activation of Serine Proteases in Acute Cerulein-Induced Pancreatitis in Rats", *Scandinavian Journal of Gastroenterology*, 2009

Publication

---

17

Sales, J.N.S.. "Fixed-time AI protocols replacing eCG with a single dose of FSH were less effective in stimulating follicular growth, ovulation, and fertility in suckled-anestrus Nelore beef cows", *Animal Reproduction Science*, 201103

Publication

---

18

Starbuck, M.J.. "Factors affecting retention of early pregnancy in dairy cattle", *Animal Reproduction Science*, 200408

Publication

---

19

Abdul Malik. "Effects of Honey Supplementation into the Extender on the Motility, Abnormality and Viability of Frozen Thawed Of Bali Bull Spermatozoa", *Asian Journal of Animal and Veterinary Advances*, 2018

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---

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Amanda Guimarães da Silva, Thiago Kan Nishimura, Cecília Constantino Rocha, Igor Garcia Motta et al. "Comparison of estradiol benzoate doses for resynchronization of ovulation at 14 days after timed-AI in suckled beef cows", *Theriogenology*, 2022

Publication

---

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Hassan, Mubbashar, Ali Husnain, Muhammad Ilyas Naveed, Umair Riaz, and Nasim Ahmad. "Effect of ovsynch versus prostaglandin F2 $\alpha$  protocol on estrus response, ovulation rate, timing of ovulation and pregnancy per artificial insemination in Sahiwal cows : Ovsynch, Prostaglandins, Synchronization", *Animal Science Journal*, 2016.

Publication

---

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22

K. N. Galvão, J. E. P. Santos, S. O. Juchem, R. L. A. Cerri, A. C. Coscioni, M. Villaseñor. "Effect of addition of a progesterone intravaginal insert to a timed insemination protocol using estradiol cypionate on ovulation rate, pregnancy rate, and late embryonic loss in lactating dairy cows", *Journal of Animal Science*, 2004

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---

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23

Abdulkarim Abdulmageed Amad, Jürgen Zentek. "The use of *Moringa oleifera* in ruminant feeding and its contribution to

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climate change mitigation", *Frontiers in Animal Science*, 2023

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---

24

J. R. Roche. "Nutrition  $\diamond$  reproduction interaction in pasture-based systems: is nutrition a factor in reproductive failure?", *Animal Production Science*, 2011

Publication

---

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Kanokwan Srirattana, Danilda Hufana - Duran, Eufrocina P. Atabay, Peregrino G. Duran et al. "Current status of assisted reproductive technologies in buffaloes", *Animal Science Journal*, 2022

Publication

---

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26

MA Animer. "The Effect of Progesterone and Oestradiol Benzoate on Fertility of Artificially Inseminated Repeat-breeder Dairy Cows during Summer", *Reproduction in Domestic Animals*, 8/2007

Publication

---

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27

Margarida Maria Nascimento Figueirêdo de Oliveira, Ciro Alexandre Alves Torres, Sebastião de Campos Valadares Filho, Anselmo Domingos Ferreira Santos et al. "Uréia para vacas leiteiras no pós-parto: desempenhos produtivo e reprodutivo", *Revista Brasileira de Zootecnia*, 2004

Publication

---

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28

Obese, FY, TE Stirling, RC Stockdale, KL Macmillan, AR Egan, and S Humphrys. "Effect of concentrate supplementation during early lactation on plasma IGF-I concentrations and reproductive performance of dairy cows", *South African Journal of Animal Science*, 2011.

Publication

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29

M'foumou W'otari Marcel Okouyi, Pierre-Vincent Drion, Christian Hanzen. "Preovulatory follicle diameter, growth rate and time of ovulation during induced oestrus using a CIDR® in trypanotolerant female *Bos taurus* N'Dama cattle", *Tropical Animal Health and Production*, 2015

Publication

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Bo, G.A.. "Effect of estradiol valerate on ovarian follicles, emergence of follicular waves and circulating gonadotropins in heifers", *Theriogenology*, 199308

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M.M. Domínguez. "Effects of body condition, reproductive status and breed on follicular population and oocyte quality in cows", *Theriogenology*, 1995

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