How to Cite:
Udin, Z., Hendri, H., & Masrizal, M. (2022). Increasing the success of artificial insemination through control of local cattle estrus as a genetic resource. *International Journal of Health Sciences*, *6*(S4), 2117–2132. https://doi.org/10.53730/ijhs.v6nS4.6713

Increasing the success of artificial insemination through control of local cattle estrus as a genetic resource

Zaituni Udin
Universitas Andalas, Indonesia
Email: zaituni@ansci.unand.ac.id

Hendri
Universitas Andalas, Indonesia
Email: hendri@ansci.unand.ac.id

Masrizal Masrizal
Universitas Andalas, Indonesia
Email: mmasrizal@ansci.unand.ac.id

***Abstract*---**This paper aims to find out the application of I.B. in cows and the control of estrus to determine fertility and conception rate in cows. The research was conducted in two stages: field research to determine the influence of I.B. time on conception rate. Local cows in I.B. amounted to 62 heads, and crossbred cows with as many as 100 heads were grouped based on I.B. time and parity and analysed with the Z test. Fertility is determined by the size of the dominant follicle using ultrasonography, and the number of gardenings is determined 30 days after I.B. and 60 days of rectal palpation. Average conception rate at the beginning of estrus (45.70%), middle estrus (60.59%), end of estrus (68.91%), and six hours after estrus (61.55%). I.B. time had a significant effect (P<0.05) on the conception rate. Based on the results of this study, it was revealed that parity-3 had the highest pregnancy rate for local cattle (70.34%), while crossbreed cattle had the highest pregnancy rate at parity-2 (56.79%). The follicle size in Bali cattle was the same as that of local south coast cattle, including the small follicle size category. And the conception rate in the ovsynch protocol was 72.0% higher (P>0.05) than in the cosy inch protocol, which was 68.44%, while the progesterone hormone pattern during the study was regular. This study concludes that the timing of the I.B. determines the pregnancy rate of the I.B. cows, and the Fertility of the cows is determined by the size of the ovulatory follicle with the normal progesterone hormone.

Keywords---Estrus, Artificial insemination, Local cow, Synchronization.

Introduction

Artificial Insemination (I.B.) is the first reproductive technology in animal husbandry that initially aimed to improve the genetic quality of local cows, further increasing the population. Currently, I.B. is already one of the mating systems on people's cattle farms and natural mating. In 1984, embryo transfer (T.E.) was introduced as the second reproductive technology that began with the importation of frozen embryos and established an Embryo Transfer Center (B.E.T.) in Cipelang to increase the birth rate calves. Furthermore, cloning technology and gene transfer have also been carried out, which is the third and fourth reproductive technology in animal husbandry, but still at the laboratory or research level. However, there are still many obstacles in ib service in both temporary and permanent cows.

Nevertheless the successful application of I.B. in cows, there must be a mix of breeders in detecting the estrus of the mother cow that is ready for insemination. A frequent obstacle to the I.B. program is the observation of estrus, which is less accurate because of limited time and lack of careful eye for signs of estrus in cows. I.B. time and estrus detection are the determining factors for the occurrence of cultivation in IB-di-di-ib cows. According to (Supriatna;2013) accurate estrus detection is characterised by cows' gardening after I.B. The more frequent observations of estrus, the more cows, are detected, to be sure.

Optimisation of the application of I.B. requires that the heifers are ready to mate at the right time. Thus there must be estrus cows available and ready for insemination, which requires time and effort to detect estrus. For this reason, it is time to adopt companion technologies on I.B. programs such as estrus Synchronization and ovulation to determine F.T.A.I. to increase the conception rate. The number of gardening is the primary variable related to the success of I.B. The success of I.B. on people's farms is obtained that real I.B. time affects the number of plantations. (U. Zaituni;2016) The implementation of I.B. is still very varied and has not taken into account fix-time insemination (F.T.A.I.), so the success rate of I.B. has not been optimal.

Estrus synchronization technology is the most effective way to reduce the time and effort required for estrus detection in cows in I.B. The application of the ovsynch protocol is a method of synchronization not only for synchronization of estrus and ovulation but also to increase the Fertility of the postpartum mother cow. According to (U. Zaitun;2017) postpartum Simmental cows can accelerate postpartum estrus, thereby shortening the intervals of postpartum anestrus and I.B. without detection of estrus. Besides, it can also increase the Fertility of cows. Synchronization programs with the synch /co-synch protocol have been extensively developed in beef and dairy cows. Several Synchronization programs have been developed recently based on the timing of insemination and Synchronization of ovulation. According to (D.Z. Caraviello; 2006) that the low conception rate and high re-breeding are caused by poor control by breeders and

inseminators, as well as the quality of the cement used in the breed of cattle and the management of semen, including the techniques and materials used in semen cryopreservation Synchronization program using GnRH and PGF2α (or synch) to control follicular development, corpus luteum regression and stimulate ovulation, thus F.T.A.I. occurs. Ovulation can be synchronised by administering PGF2α and GnRH (or synch) to control corpus luteum regression and stimulate ovulation. (M.C.Wiltban; 2014) Several studies have been carried out that are relevant to the research that the researcher is doing, namely: "Likelihood of pregnancy in cows identified with different amounts of anechoic intrauterine fluid at the time of insemination" by Hany Abdalla, who said that Follicle size was determined. The amount of I.U.F. in the largest uterine segment was categorized as containing no fluid, ≤10, >10–20, and >20 mm using the ultrasonic monitor grid in 735 cows at insemination. Multivariable regression models were constructed to evaluate the effects of different variables on P/ AI percentage and variables associated with the I.U.F. score and follicle size. On day 30 post insemination, the P/AI percentage was more significant in cows that had >10 to 20 mm I.U.F. than cows with no I.U.F. (OR = 1.9, P = 0.01), but on day 70 post-insemination, the P/AI percentage was similar in cows with different amounts of I.U.F. Follicle size was not associated with P/AI percentage on days 30 and 70 post-insemination. Cows in spontaneous estrus, multiparous cows, cows with a cystic structure and a typically functional follicle, and Holstein cows had a greater likelihood of a more considerable I.U.F. value. Primiparous cows, cows on which a hormonal-ovulation-Synchronization regimen was imposed, and crossbred cows were more likely to have smaller follicles. In conclusion, the amount of I.U.F. at the time of insemination and the size of the follicle was not associated with P/AI percentage, and several variables were associated with the amount of I.U.F. or follicle size.

This paper focuses on optimising the application of I.B. on people's farms to increase the conception rate by implementing ovsynch Synchronization programs and cosy inch protocols). The program uses protocols for ovulation Synchronization and fix-timed artificial. As for the research to: 1). Knowing the ib time of the plantation number; 2). To find out the Fertility of local cows on the south coast as nusfah plasma; 3). To know the influence of the synch protocol on the number of cattle farming in I.B.; 4). To find out the Effect of cow parity on conception rate; 5). To determine the pattern of the cow's progesterone hormone in IB

Research Methods

This research consists of two stages: field research on the application of I.B. technology to people's farms to conception rate, while the second phase of the experiment with the title of the Effect of Synchronization protocol on fertility and conception rate in local cows of the south coast.

Stage One: Field Research

This study is observational (Akbar Dhani; 2020), in the field of beef cattle in I.B. on People's Farms in West Sumatra. The research site was conducted on 4 I.B. posts consisting of 60 local cows and 162 crossbred cows on people's farms. Cows in I.B. consist of parity-0 to parity-4. The insemination time is determined based

on the estrus interval until ib service is received. Each I.B. service by the inseminator recorded the first estrus observed by the breeder until service by the inseminator. On people's farms, the nation of cows in I.B. consists of local cattle and crossbred cows. The number of cows for each nation is 62 local cows and 100 crossbreed cows, with a total of 162 cows in I.B. Rectal palpation is carried out after 60 days of insemination to determine the breeding of cows that have been in I.B. Calculation of the number of plantations using the formula by (M.R. Toelihere;1993) that is, the number of cows that bunting ib first divided by the number of cows in I.B. multiplied by 100%. Data analysis is performed with the Z test.

Data Collection
Determination of conception rate based on I.B. time

I.B. service time based on those carried out by the inseminator consists of 4 groups, namely:

1. Beginning of estrus (0 – 6 hours)
2. Mid estrus (7 – 12 hours)
3. End of estrus (13 – 18 hours)
4. 6 hours after the end of estrus (19 – 24 hours)

Determination of crop numbers based on the parity of cows in I.B.

The parity of cows in I.B. is determined based on the number of children born. Parity criteria consist of:

1) The class of cows that have never given birth (P0)
2) The group of cows that have given birth once (P1)
3) The group of cows that have given birth twice (P2)
4) The class of cows that have given birth three times (P3)
5) The category of cows that have given birth four times (P4)

Determination of parity based on reports of farmers and cattle whose parity is unknown or there are doubts is not used as research material. The number of cows for each parity depends on the cows in I.B. at the study time.

Second Stage

This research is an experimental study titled strategies for increasing fertility and conception rate through estrus control in local cows. This study used local south coast cattle and Bali cows in 3 locations with 100 cows used. The Synchronization programs used are the Ovsynch protocol and Co-Synch protocol.
Research Procedures

Selection of coastal cattle based on the criteria of not pregnant and having given birth and B.C.S. 2-3. The cows designated as research samples were housed for an estrus Synchronization program, namely Ovsynch and Co-Synch, 62 coastal cattle at B.P.T.U.H.P.T., Padang Atas. The Ovsynch protocol program consisted of the First injection of GnRH 2ml/head in all local cattle with different cycle phases designated as day 1. Then blood collection and ultrascanned ovaries determine

follicle size PGF2α injection on day seven as much as 5 ml/head, blood collection and ovarian ultrascan to determine follicle size.

Second GnRH injection on the 9th day, blood collection, and ultrascanned ovaries to determine follicle size and the observation of estrus. On the 10th day, I placed bulls for natural mating (K.A.) for coastal cattle at BPTU-HPT Padang Atas and I.B. for Bali cattle and IB Pariaman post location. On days 21 and 42, the diagnosis of pregnancy by ultrasonography. The Ovsynch protocol requires three injections and one insemination, if with I.B.

Figure 1. Ovsynch Protocol

Co-Synch protocol program

On the 21st and 42nd days of diagnosis, I was gardening with ultrasonography to determine embryonic development. The co-synch protocol is a variation of the Ovsynch protocol, with the time of insemination or mating equal to the granting of the second GnRH.

Figure 2. Ovsynch Protocol

Hormone analysis

It was done by the R.I.A. method at B.A.T.A.N. Jakarta to determine progesterone hormone levels. Blood collected as much as 10 ml, then silenced for 2-4 hours to get the serum. Then put in the efendof and stored in the freezer before analysing progesterone levels.

Observed changes

Ovarian activity includes follicle diameter, conception rate and progesterone hormone levels.

Data Analysis

To compare the Ovsynch and Co-Synch Synchronization programs with the use of different cow races, the T test was used.

Theoretical Concepts

IB timing

Real I.B. time affects the number of breeding in cows. The fertilisation rate will decrease if I.B. is done very close to the time of ovulation which is less than 12 and 6 hours before ovulation. (J.B. Roelofs; 2006) It was added by that the high number of orchards in cows with intervals of insemination until ovulation time of

15 hours compared to the interval of time of insemination until ovulation of 5 hours.

I.B. must be performed between 6–12 hours after estrus to obtain a high crop number. According to (R. A. Cushman; 2007), the length of the estrus cycle in the mating season to the conception rate is due to persistent follicles that cause low oocyte quality.

Synchronization program and F.T.A.I.

Synchronization of ovulation with the ovsynch protocol is more effective for improving reproductive management in beef cattle and dairy cows without estrus detection (M.A. Alnimer; 2011). F.T.A.I. can stimulate the Synchronization of estrus and ovulation in the mother cow. Further, lower postpartum anestrus and removal of ovarian cysts and GnRH administration related to F.T.A.I. and oral administration of M.G.A. after F.T.A.I. increases the number of breeding in non-lactation before cows. According to J.R. Pursley, the F.T.A.I. program with the ovsynch protocol is a Synchronization method that uses a combination of GnRH and PGF2α.

According to (G.A. Perry;2007) that the optimum time of insemination can be determined by administering GnRH on the 9th day of the estrus cycle, and GnRH serves to stimulate ovulation but will decrease the number of inflammations when given on the 0th day of the estrus cycle or when the follicle is not yet developing.

Fertility

According to (G.A. Perry; 2006), the low number of plantations in dairy cows after PGF administration and the exact time of insemination is due to abnormal ovarian function. According to (G.A. Perry; 2005), the size of the follicle during ovulation affects the Fertility of cows aroused with Ovsynch. GnRH stimulates ovulation in follicles with a size of ≤ 11mm, obtaining a low conception rate (18 – 29%) and high embryo death (39%) on days 27 and 68 after I.B. An increase in E2 concentration is associated with an increase in follicle size. Levels of the hormones estrogen and progesterone function to maintain the pH of the uterus that corresponds to the growth and development of the embryo. It is added by D.C. Busch that the percentage of ovulation rate and conception rate is related to the size of the follicles when GnRH-1 in the synch and cosy inch protocols and the large follicular diameter size increases the Fertility of local cows. Furthermore, states that injecting GnRH to stimulate ovulation can improve TAI. States that the administration of GnRH-2 from synch and cosy inch is positively related to the function of ovulated follicles to produce estrogen. Thus to optimise the ovulation size, follicles are required to tolerate the administration of the hormone GnRH; this is related to the formation of the corpus luteum and the subsequent development of embryos.

According to (W.D. Whittier; 2013), ovulation stimulation in follicles with small categories (11.5±0.2 mm) produces a luteum corpus with a small size with less progesterone secretion than stimulation at larger follicle sizes. So follicle size is associated with a higher chance of bunting and higher serum concentrations of

estradiol, so it is very important to optimise the size of the follicles to obtain as much secretion as possible from estrogen during the administration of GnRH on the Ovsynch protocol.

Results and Discussions

The influence of I.B. time and the cow nation on conception Rate or garden figures

The determination of I.B. time is based on observations in the field by those carried out by the inseminator during I.B. service, namely the beginning of estrus (0-6 hours), the middle of the estrus (7-12 hours), the end of estrus (13-18 hours) and 6 hours after the end of estrus. Average conception rate at the beginning of estrus (45.70%), middle estrus (60.59%), end of estrus (68.91%), and six hours after estrus (61.55%). I.B. time has a natural effect ($P<0.05$) on conception rate. This study obtained the highest conception rate at the end of estrus (13-18 hours) and the lowest at the beginning of estrus (0-6 hours). The best I.B. timing is based on the length of the estrus and the time of ovulation, and the end of the estrus is the time close to ovulation, so ib performed at the end of estrus increases the conception rate of cows (Figure.3).

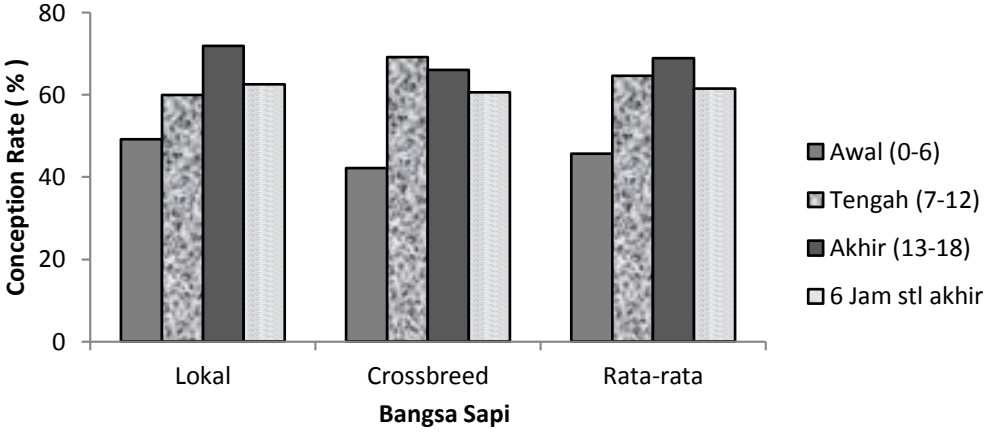


Figure 3. Time of Artificial Insemination to Conception Rate

The results of this study are similar to those reported by M.LK. Mollah that the I.B. time significantly ($P<0.05$) affected the pregnancy rate in cows, with the highest pregnancy rate being 71.1% at the I.B. time of 8-12 hours compared to the I.B. time of 13-24 hours. Eighteen and 6 hours after estrus ended were 46.1% and 34.6%, respectively. There was no interaction ($P>0.05$) between the time of insemination with the breed of cattle on the pregnancy rate. This is related to the same length of estrus and ovulation time in cows, so there is no interaction between I.B. and cattle breeds. Thus, it can be concluded that the A.I. fix-time will determine the occurrence of pregnancy in I.B. cattle. The I.B. time in natural cattle ($P<0.05$) affected the pregnancy rate for I.B. cattle. Pregnancy rates (71.82%) were found in local cattle with late estrus insemination (13-18 hours) and in mixed cattle (69.17%). However, there was no significant difference ($P>0.05$). The local cattle used are coastal cattle and Bali cattle which have high

Fertility and adaptability compared to crossbreed cattle. The low pregnancy rate in crossbred cattle is due to low adaptability because it is already in the second to the fifth generation. The results of this study were lower than in Sarda cattle, with a pregnancy rate of 95%. The results obtained conclude that A.I. time significantly affects the pregnancy rate of cattle in A.I. and local cattle are higher pregnancy rates than crossbreed cattle.

Policies that need to be carried out from cows in I.B. on people's farms to improve the success of I.B. need to determine the right I.B. time for I.B. with the application of companion technologies such as ovsynch protocol. Application of I.B. requires the heifer estrus and inseminated promptly. Determining the right time for I.B. on people's farms is an obstacle and often too late about the skills and time needed for estrus detection.

The influence of parity and nation on plantation numbers in cows in IB

The study found local cattle farming figures at parity-0 to parity-4 respectively P-0 (41.01%), P-1 (45.05), P-2 (55.76%), P-3 (70.38%) and P-4 (43.25), respectively crossbreed cows P-0 (42.12%), P-1 (56.79%), P-2 (52.75%), P-3 (56.79%) and P-4 (45.00%). Figure 4 shows that the highest crop numbers are obtained at parity-3 for local cows and parity-1 for crossbreed cows. The results of this study were almost the same as those that the highest crop numbers were obtained in local cows with parity-2 and decreased at parity-5. Further it reported that the cropping rate was high at parity-3 (79.63%) and parity-4 (75.00%) and decreased from parity-6 to subsequent parity. The cow nation and parity cause differences in garden numbers.

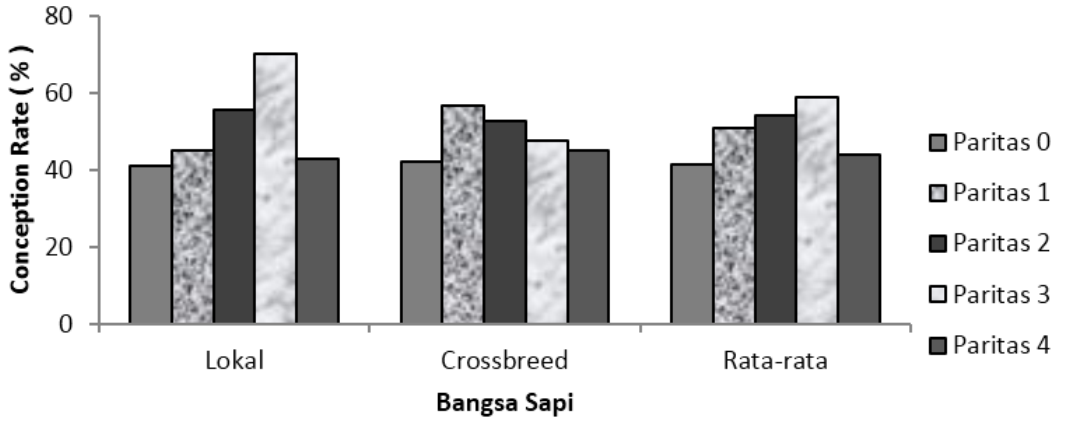


Figure 4. Cow parity to conception rate

On folk farms, it is rather challenging to get the influence of parity on Fertility because environmental factors related to management and feed more affect the Fertility of cows. The number of plantations affected by parity, i.e. parity-1, is slightly lower than parity-6 in Holstein cows. Furthermore, state that parity is the main factor that causes remarriage and allows culling to be carried out. Based on the results of this study, it was revealed that parity-3 highest crop numbers for local cows (70.34%), while crossbreed cows had the highest cropping rate at

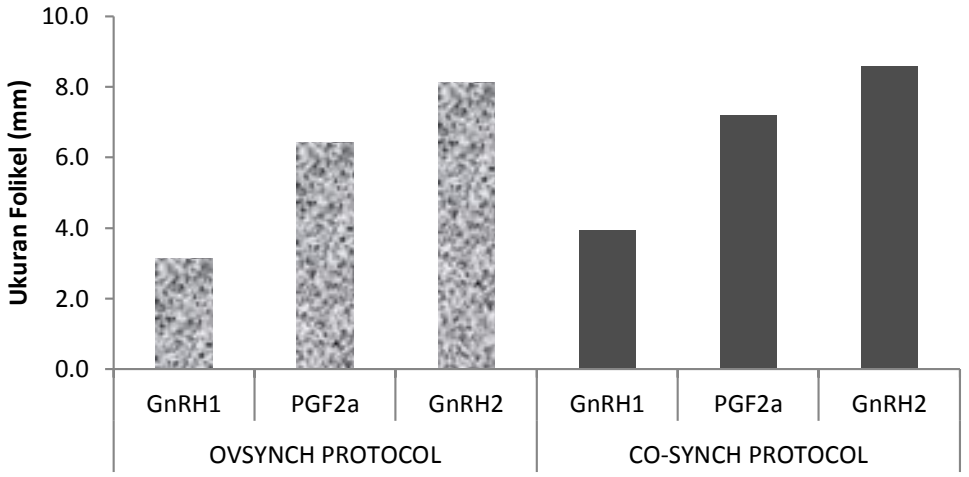
parity-2 (56.79%). This study concludes that absolute parity affects the number of cattle breeding in I.B. and local cows at the highest parity-3 cropping rate while crossbred cows at parity -2. Based on the results of this study, it is recommended that it is necessary to limit the parity of female livestock, and the cow nation needs to be considered seedlings; regular governance is needed so that a productive female population (30%) unproductive ones must be culled. Local cows need to be maintained as seedlings due to their high adaptability compared to crossbred cows.

Stage 2: Conception rate-improvement strategy through estrus control in local cows

Effect of synch and cosy inch protocol on local cow fertility

The follicle diameter when given GnRH1 ranged from 2.5 to 8.00 mm, with a mean of 3.93±1.42 mm and the diameter of the follicle when given PGF2α ranged from 4.00 to 9.00 mm, with a mean of 7.19±1.69 mm. In contrast, the follicle diameter at the time of administration of GnRH2 ranged from 6.00 to 11.00 mm, with the mean follicle diameter being 8.57±1.61 mm (Figure 5). The mean follicle diameter when GnRH1 in the ovsynch protocol was significantly ($P<0.05$) smaller than that in the cosy inch protocol but not significant ($P>0.05$) during PGF2α and GnRH2 administration. The diameter of the follicle at the time of administration of GnRH1 ranged from 2.5 to 5.00 mm, with a mean of 3.13 ± 0.76 mm and the diameter of the follicle when given PGF2α ranged from 3.00 to 8.00 mm, with an average diameter of the follicle 6.43 ± 1.34 mm, while the diameter of the follicle when given GnRH2 ranged from 5.50. to 10.00 mm, with the mean follicle diameter being 8.12±1.34 mm for the co-synch protocol. This study showed that the diameter of the follicles of local southern coastal cattle varied. The diameter at the time of administration of GnRH2 was greater than that of the administration of GnRH1.

Furthermore, the size of the follicle diameter in local south coast cattle is in a small category; this is by the opinion (S.D.G. De Tarso; 2016) that preovulatory follicles classified according to the size category (diameter) are small (10.8-12.8mm); medium (13.2-13.8mm) and broad (14.1-17.5mm). The difference in follicle size is given the unequal phase of the cow's estrus at hormone administration.



Graph 5. Effect of Ovsynch and Cosynch Administration on South Coast Local Cow Follicle Size [2]

The size of the follicles in Bali cattle, when given GnRH1, ranged from 3 mm to 10 mm, with a mean of 5.8±2.26 mm; when given PGF2α ranged from 6 mm to 8.5 mm, with an average of 7.45±0.92 and when given GnRH 2 ranged from 8 mm to 13 mm, with a mean of 10.8±2.09 mm for the Ovsynch protocol. In the Cosynch protocol, the size of the follicles when injected with GnRH1 ranged from 4 mm to 5.5 mm, with a mean of 5.00±0.60 mm; when injected with PGF2α ranged from 6 mm – to 8 mm, the mean was 7.20±0.17 mm and at the injection of GnRH2 it ranged from 10 mm to 11 mm. mm with a mean of 10.50±0.42 mm. This study's results agree with that reported by C.C. Dias that bovine follicles reach ovulatory capacity, a diameter of about 10 mm (Figure 6.)

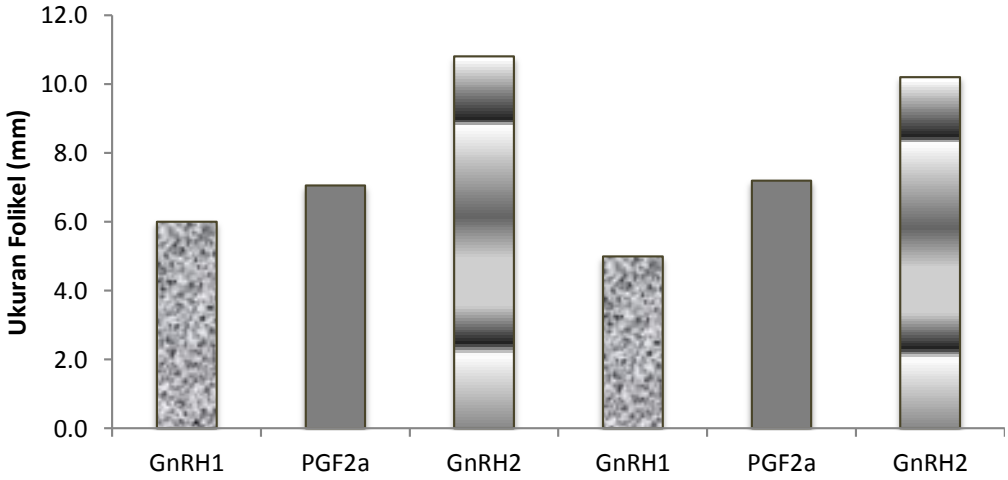


Figure 6. Effect of Ovsynch and Co-synch administration on the size of local Balinese cow follicles

This study also showed no significant difference (P>0.05) between ovsynnch and cosy inch on the follicle size of Bali cattle. The follicle size in Bali cattle is the same as that of local south coast cattle, including the category of small follicle size. Fertility in cows is high when ovulation is in the medium follicle category (15-19 mm). Furthermore, in dairy cows and beef cattle, the follicle size is too small at the last GnRH from the Ovsynch protocol causing low Fertility. The results of this study are similar to those reported by C.C. Dias in that the ovulatory follicle size ranges from <6 mm to 16 mm. The size range of ovulatory follicles has been reported in Bos taurus to be <10 mm to 18 mm and Bos indicus ranges from <9 mm to 17 mm. Based on the size of the follicles, it can be concluded that the two breeds of cattle have the same follicle size, ranging from 8-10 mm, with the follicular developmental waves having the same pattern.

South Coast Local Cow Progesterone Hormone Pattern

The level of the hormone progesterone with the two treatments showed a pattern that was not significantly different (P>0.05), with the level of progesterone fluctuating according to the pattern of hormones during the reproductive cycle in cows (Figure 7). The results of this study are consistent with those of previous investigators that progesterone levels were high during the luteal phase of the ovsynch protocol. According to P. Longergan; 2011, progesterone levels are high in the mid-luteal phase and low in the early and late luteal phases, increasing during pregnancy. The level of the hormone progesterone is related to the size of the ovulatory follicle and the K.L. Basically, K.L. with a large size produces the hormone progesterone, which is higher than the size of a small corpus luteum.

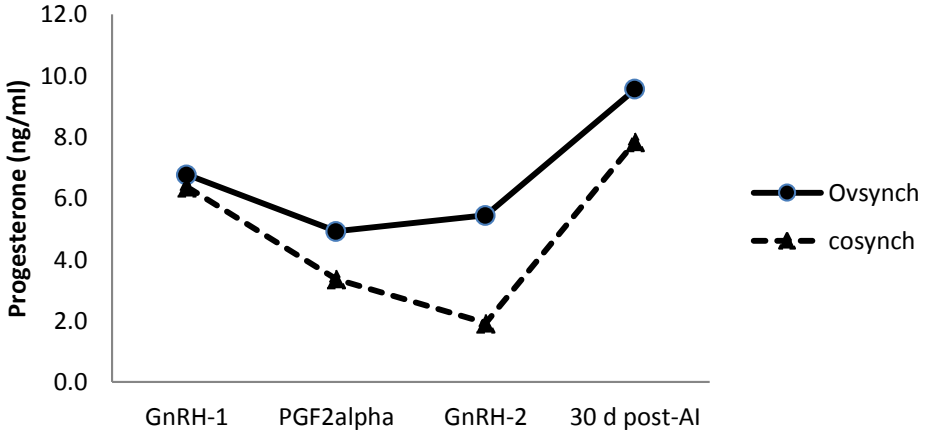


Figure 7. Progesterone hormone patterns in ovsynch and cosynch protocol local south coast cows

Influence of Ovsynch and Cosynch on Local Cattle Farming Figures

The conception rate of local south coast cattle at 30 days after mating is equal to the ovulation rate, both in the synch protocol and the cosy inch protocol. The number of plantations in synch is 72.00%, and the cosy inch protocol is 68.44 % (P>0.05). In this study, the proportion of follicles that are many follicles are

follicles with a size of 8.00 mm to 9.5 mm, but the highest ovulation rate and conception rate are follicles with the largest diameter of 10.00 mm to 11.00 mm is 100%, and the lowest in follicles with a small diameter of 33.33% to 60%. No noticeable difference (P>0.05) between synch and cosy inch protocol to garden numbers.

The results showed that the size of ovulation follicles was the main factor that affected the proportion of ovulation rates and the conception of local cows on the south coast. These results are those stated by some previous researchers that an increase in E2 concentration is associated with an increase in follicle size. Cows are stimulated to ovulate at small follicle sizes (≤ 11 and 12 mm) with GnRH, progesterone concentration decreases. Percentage ovulation rate and conception rate related to follicle size when GnRH1 in Ovsynch and Cosynch protocol and large follicle diameter size increases Fertility of local southern coastal cows.

Table 1
Percentage of ovulation rate and conception rate after administration of ovsynch and co-synch local south coast cattle

Follicle diameter at GnRH 2	Ovsynch protocol			Co-synch protocol		
	N	Ovulation rate (%)	Conception rate (%)	N	Ovulation rate (%)	Conception rate (%)
6-7.5 mm	5	3/5 = 60	40	3	1/3 = 33.33	33.33
8-9.5 mm	2 1	16/21 = 76.19	76.19	25	19/25 = 76.00	72.00
10-11 mm	3	3/3 = 100	100	5	5/5 = 100	100
Mean		78.73^{ns}	72.00 ^{ns}		69.77^{ns}	68.44^{ns}

Information: ns = no signifinant P> 0.05 [2]

In this study, the conception rate for the ovsynch protocol was 72.0% higher (P>0.05) than for the cosy inch protocol, which was 68.44% (Fig. 7). The average conception in this study is 72.22%, which is higher than that obtained by P.D. Carvalho; 2015 in dairy cows, which is 61.5%. Meanwhile,] stated that primiparous cows had better pregnancy rates per insemination (47%) than multiparous cows (35%). This study indicates that the size of the ovulatory follicle has a more significant influence on the Fertility of local southern coastal cattle. These results are supported by several previous studies, namely J.S. Stevenson; 2003 that injecting GnRH to stimulate ovulation can improve the success of the TAI protocol and reporting that serum estradiol concentrations and estrus behaviour provide a medium pregnancy rate based on follicle size and practical management. to optimise the size of the ovulatory follicle, which will improve Fertility. It states that the size of the follicle at the end of the Administration of GnRH of the ovsynch protocol is positively related to the preovulation function of the follicle to produce estrogen. Based on the results and discussions above, it can be concluded that the administration of synch and cosy inch has no natural effect (P>0.05) on the number of gardening. Still, the size of ovulation follicles is the most decisive factor in the number of embryos and subsequent embryo growth. It is related to the hormone produced and the formation of the corpus luteum for further development in cow reproduction.

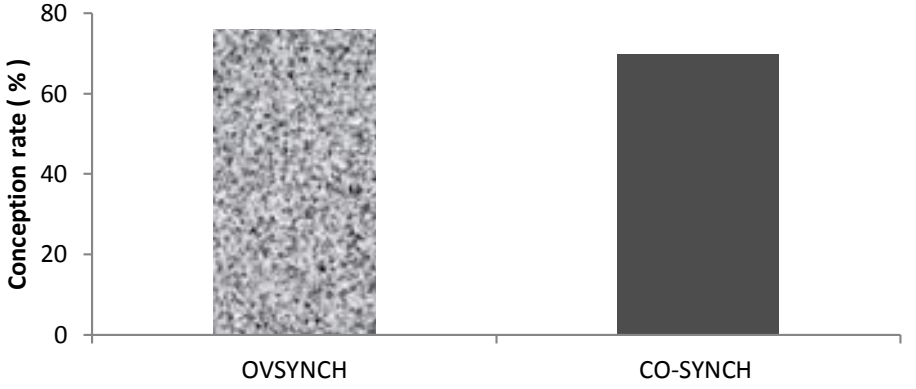


Figure 7. Influence of ovsynch and cosynch on south coast local cattle conception rate

Conclusion

1. IB time is closely related to the number of cow plantations and the highest number of orchards obtained at ib time at the end of estrus, parity-3 and local cows with the appearance of a red vulva
2. Follicle size and progesterone hormone pattern can predict Fertility in local cattle by increasing the ovulation rate and conception rate in cows. Ovsynch and cosy inch protocol can increase ovulation rate and conception in local cattle.
3. The use of synch and co-synch protocol can accelerate postpartum ovary activity in Simmental cows, estrus intensity and conception rate so that the postpartum anestrus interval can be shortened.
4. We are maintaining and optimising the Fertility of local cattle and crossbreeds through ovulation Synchronization and fix-time I.B. with the ovsynch protocol program to improve food security in Indonesia.

Acknowledgement

On this occasion, we are very grateful to L.P.P.M. Andalas University for providing B.O.P.T.N. funds to implement this research, thanks also to BPTU-HPT Padang Mengatas for providing facilities for facilities research.

References

A. Bonneville-Herbert, P.J. Bouc-Bridges, R.Taft, P.E. Lewis, W.R. Wagner, and E.K. Inskeep, "Effect of the previously gravid uterine horn and postpartum interval on follicular diameter and conception rate in beef cows treated with estradiol benzoate and progesterone". *J. Anim. Sci.* 2000, Vol.78, pp.2172-2176.

A. Keskin, G. Mecitogla, E. Bilen, B. Guner, A. Orman, H.R. Okut, and A. Gumen, "The effect of ovulatory follicle size at the time of insemination on pregnancy rate in lactating dairy cows". *Turk. J. Vet. Anim. Sci.* 2016, Vol.40, pp. 68-78.

A. Waldmann, J. Kurykin, UJaakma, T. Kaart, M. Aidnik, M. Jalakas, L. Majas, and P. Padrik, "The effects of ovarian fuction on estrus Synchronization with PGF in dairy cow". *Theriogenology* 2006, Vol.66, pp.1364-1374

A.G. Miah, U. Salma, and M.M. Hossain, "Factors influencing conception rate of local and crossbred cows in Bangladesh". *Intern. J of Agric & Biology* 2004, Vol. 5, pp. 797-801

Akbar, D., Setiawan, A., Prayuda, R., Putra, A., Aznor, A., & Yudiatmaja, W. E. (2020). Community Preparedness on Transboundary Oil Spill Governance in Bintan Island. In Journal of Physics: Conference Series (Vol. 1655). IOP Publishing Ltd. https://doi.org/10.1088/1742-6596/1655/1/012144.

C.C. Dias, F.S. Wechsler, M.L. Day, and J.L. Vasconcelos, JL. 2009. Progesterone concentrations, exogenous equine chorionic gonadotropin, and timing of prostaglandin F(2alpha) treatment affect Fertility in postpuberal *Nelore heifers*. Theriogenology 2009, Vol.72, pp.378-385.

C.J.C. Muller, J.P. Potgieter, S.W.P. Cloete, and K. Dzama, "Non-genetic factors affecting fertility traits in South African Holstein cows". *S. Afr. J. Anim. Sci.* 2014, Vol.44, pp.54-63.

D. Vukonic, A. Bozic, R. Relic, B. Stancic, D. Gvozdic, and D. Kucevic, "Progesterone concentration in milk and blood serum and reproductive efficiency of cows after Ovsynch treatment". *Turk. J. Vet. Anim.Sci.* 2016, Vol.40, pp.75-80.

D.C. Busch, J.A. Atkins, D.F. Bader, D.J. Schafer, D.J. Patterson, T.W. Geary, and M.F. Smith, "Effect of ovulatory follicle size and expression of estrus on progesterone secretion in beef cow". *J. Anim. Sci.* 2008, Vol. 86, pp. 553-563

D.Z. Caraviello, Weigel, P.M. Fricke, M.C. Wiltbank, M.J. Florent, N.B. Cook, K.V. Nordland, N.R. Zwald, and C.L. Rawson, "Survey of management practices on reproductive performance of dairy cattle on large U.S. commercial farm", *J. Dairy Sci.* 2006, Vol.97, pp. 6306-6315.

G.A. Perry, M.F. Smith, A.J. Roberts, M.D. MacNeil, and T.W. Geary, "Relationship between size of the ovulatory follicle and pregnancy success in beef heifers". *J. Anim. Sci.* 2007, Vol.85, pp.684-689.

G.A. Perry, M.F. Smith, M.C. Lucy, J.A. Green, T.E. Parks, M.D. Macneil, A.J. Rob erts, and T.W. Geary, "Relationship between follicle size at insemination and pregnancy success". *Proc. Natl. Acad. Sci.* U.S.A. 2005, Vol. 102, pp.5268-5273.

G.C. Lamb, C.R. Dahlen, J.E. Larson, G. Marquezini, J.S. Stevenson, "Control of the estrous cycle to improve fertility for fixed-time artificial insemination in beef cattle". J Anim Sci,2010, Vol. 88, pp.181-192.

H. Ayres, R.M. Ferreira, A.P. Cunha, R.R. Araujo, and M.C. Wiltbank, "Double-Ovsynch in high- producing dairy cows: effects on progesterone concentration and ovulation to GnRH treatments". *Theriogenology* 2013, Vol.79, pp.159-164.

H.C.M. Ayres, M. Martins, R.M.Ferreira, J.M. Mell, J.H. Dominguez, A.H.R. Souza, R. Valentin, I.C.C. Santos, and P.S. Baruselli, "Effect of timing of estradiol benzoate administration upon Synchronization of ovulation in suckling Nelore cattle (*Bos indicus*) treated with a progesterone releasing intavaginal device. *Anim. Reprod. Sci.* 2008, Vol.109, pp. 77- 87.

I. Supriatna, "Transfer Embrio pada Ternak Sapi". *Saemeo Biotrop* 2013, Bogor.

J. Jamrozik, J. Fatehi, G.J. Kistemaker, and L.R. Schaeffer, "Estimates of genetics parameters for Canadian Holstein Female reproduction traits". *J Dairy Sci* 2005, Vol.88, pp.2199-2208.

J.A. Atkins, D.C. Busch, J.F. Bader, D.H. Keiser, D.J. Patterson,M.C. Lucy and M.F. Smith, "Gonadotropin-releasing hormone induced ovulation and luteinising hormone release in beef heifer: effect of day of the cycle", *J.Anim. Sci.* 2008, Vol.86, pp. 83-93.

J.A. Atkins, M.F. Smith, K.J. Wells, and T.W. Geary, "Factors affecting preovulatory follicle diameter and ovulation rate after gonadotropin-releasing hormone in postpartum beef cows". *J Anim Sci.* 2011, Vol. 88, pp.2311-2320.

J.B. Roelofs, E.A.M. Graat, E. Mullaart, N.M. Soede, W. Voskamp-Harkema, and B. Kemp, "Effects of insemination – ovulation interval on fertilition rates and embryo characteristics in dairy cattle". *Theriogenology* 2006, Vol.6, pp. 2173-2183.

J.O. Giordano, M.C. Wiltbank, P.M. Fricke, S. Bas, R. Pawlisch, J.N. Guenther, and A.B. Nascimento, "Effect of increasing GnRH and PGF2α dose during Double-Ovsynch on pvulatory response,lutal regression, and fertility of lactating dairy cows". *Theriogenology* 2013, Vol. 80, pp.773-783.

J.P.N., Martin, and J.R. Puesley, "Fertility programs for lactating dairy cows, their physiological basis, and the factors that are eritical for their success". *Anim. Reprod.* 2016, Vol.13, pp. 283- 289.

J.R. Pursley, M.O. Mee, and M.C. Wiltbank, "Synchronization of ovulation in dairy cows using PGF2alpha and GnRH". *Theriogenology* 1995, Vol. 44 (7), pp. 915-923.

J.S. Stevenson, G.C. Lamb, S.K. Johnson, M.A. Medina-Britos, D.M. Grieger, K.R. Harmoney, J.A. Cartmill, S.Z. El-Zarkouny, C.R. Dahlen, and T.J.Marple, "Supplementel norgestomet, progesterone, or melengestrol acetat increases pregnancy rates in suckled beef cows after timed inseminations". *J.Anim. Sci.* 2003, Vol.81, pp.1571-1586

J.S. Stevenson, G.C. Lamb, S.K. Johnson, M.A. Medina-Britos, D.M. Grieger, K.R. Harmoney, J.A. Cartmill, S.Z. El-Zarkouny, C.R. Dahlen, and T.J.Marple, "Supplementel norgestomet, progesterone, or melengestrol acetat increases pregnancy rates in suckled beef cows after timed inseminations". *J.Anim. Sci.* 2003, Vol. 81, pp.1571-1586

L.Z. Oliveira, V.F.M. Hossepian de Lima, C.S. Oliveira, B.G. Alves, H.B. Graff, and R.M. Dos Santos, "Fertility rates following fixed-time artificial insemination in Dairy Heifers in a practical progesterone = based protocol". *Acta Science Veterinarinae* 2011, Vol. 39, pp. 964-966.

M.A. Alnimer., A.A. Alfataftah, M.M.Ababneh, "Acomparison of fertility with a cosynch protocol versus a modified ovsynnch protocol which included estradiol in lactating dairy cows during the summer season in Jordan". *Anim. Reprod.* 2011, Vol.8, pp.32-39.

M.A. Shrafuzzaman, S.C. Jalil, M.A. Barman, M.D. Matin, M. Rokonuzzaman, and M.D.A. Haque, 2015. "Comparative study on conception rate in indigeneous and crossbred cows after artificial insemination". *International Journal of Natural and Social Sciences* 2015, Vol.2, pp.9-12.

M.C.Wiltbank, and J.R. Pursley, "The cow as an induced ovulator: Timed A.I. after Synchronization of ovulation". *Theriogenology* 2014, Vol.81, pp. 170-185

M.L. Marongiu, G. Molle, L. SanJuan, G. Bombo, C. Ligios, A. Sanna, S. Casu, and M.G. Diskin. "Effect of feeding level b3efore aand after calving ,and restricted suckling frequency on postpartum reproductive and productive performance of Santa and Charolaisx Sarda beef cows". *Livestock Production Sci.* 2002, Vol. 77, pp. 339-348.

M.LK. Mollah, M.R. Gofur, K.M. Asaduzzaman, and M.M.U. Bhuiyan, "Conception rate of non-descript zebu cows and its attributing factors in Bangladesh research". *J. of Veterinary Sci.* 2015, Vol. 8, pp. 42-51.

M.N. Haque, M.R. Gofur, K.M. Asaduzzamann, and M.M.U. Bhuiyan, "Factors limiting the pregnancy rates in artificially inseminated cows in Bangladesh". *Int.J. Dairy Sci.* 2015, Vol.10, pp.278-287.

M.N. Sa Filho, A.M. Cres Pilho, J.E. Santos, G.A. Perry, and P.S. Baruselli, "Ovarian follicle diameter at timed insemination and estrus response influencelikehood of ovulation aand pregnancy after estrus Synchronization with progesterone or progestin,based protocol in suckled Bos Indicus cows". *Anim . Reprod. Sci.*2010, Vol. 120, pp. 23-30.

M.R. Toelihere, "Inseminasi Buatan pada Ternak". Penerbit Angkasa 1993 ,Cetakan ketiga, Bandung, hlm. 142-150.

N.M. Bello., J.P. Steibel, and J.R. Puursley, "Optimising ovulation to firest GnRH improved outcomes to each hormonal injection of ovsynch in lactating dairy cows". *J.Dairy Sci.* 2006, Vol.89, pp. 3413-3424.

P. Longergan, A.Woods, T. Fair, F. Carter, D. Rizos, F. Ward, K. Quinn, and A. Evans, "Effect of embryo source and recipient progesterone environment on embryo development in cattle". Reprod. Fertil. Dev. 2011, Vol.19, pp. 861-868.

P.D. Carvalho, M.J. Fuenzalida, A. Ricci, A.H. Souza, R.V. Barletta, M.C. Wiltbank, and P.M. Fricke, "Modifications to Ovsynch improve fertility during reSynchronization: Evaluation of presynchronization with gonadotropin-releasing hormone 6 d before initiation of ovsynch and addition of a second prostaglandin F2α treatment". *J. Dairy Sci.* 2015, Vol. 98, pp. 8741-8752

R. A. Cushman, M. F. Allan, R. M. Thallman, and L. V. Cundiff, "Characterisation of biological types of cattle (Cycle VII): Influence of postpartum interval and estrous cycle length on fertility". *J Anim Sci.* 2007, Vol.85, pp.2156-2162.

S.D.G. De Tarso, G.A. Apgas, M.O. Gastal, and E.L. Gastal, "Relationships between follicle size and CL diameter, blood flow and progestine production in beef cow and heifer ;preliminary result". *Anim. Reprod. Belo Horizonte* 2016, Vol. 13, pp. 81-92.

T.V. Silva, F. S. Lima, W. W. Thatcher, and J. E. P. Santos, "Synchronised ovulation for first insemination improves reproductive performance and reduces cost per pregnancy in dairy heifers". *J. Dairy Sci.* 2015, Vol. 98, pp.7810-7822.

T.W. Geary, M.F. Smith, M.D. Macnell, M.L. Day, G.A. Bridges, G.A. Perry, "Influence of follicular characteristics at ovulation on early embryonic survival". *J. Anim. Sci.* 2013, Vol.91, pp.3014-3021.

U. Zaitun, F. Rahim., Hendri, and Y. Yellita," Effect of ovsynch and cosynch on follicle size and conception rate indifferent postpartum of Simmental cows". *Asian, J. Anim. Vet. Adv.* 2017, Vol.12, pp. 115-122.

U. Zaituni, F. Rahim, Hendri dan Y. Yellita, "Waktu dan kemerahan vulva saat inseminasi buatan merupakan faktor penentu angka kebuntingan sapi di Sumatera Barat". *J. Veteriner* 2016, Vol.17, hlm. 501-509.

W.D. Whittier, J.F. Currin, H. Schramm, S. Holland, and R.K. Kasimanickam, "Fertility in Angus cross beef cows following 5-days Co-synch+CIDR or 7-days Co-synch + CIDR estrus Synchronization and timed artificial insemination". *Theriogenology* 2013, Vol. 80, pp. 963-96