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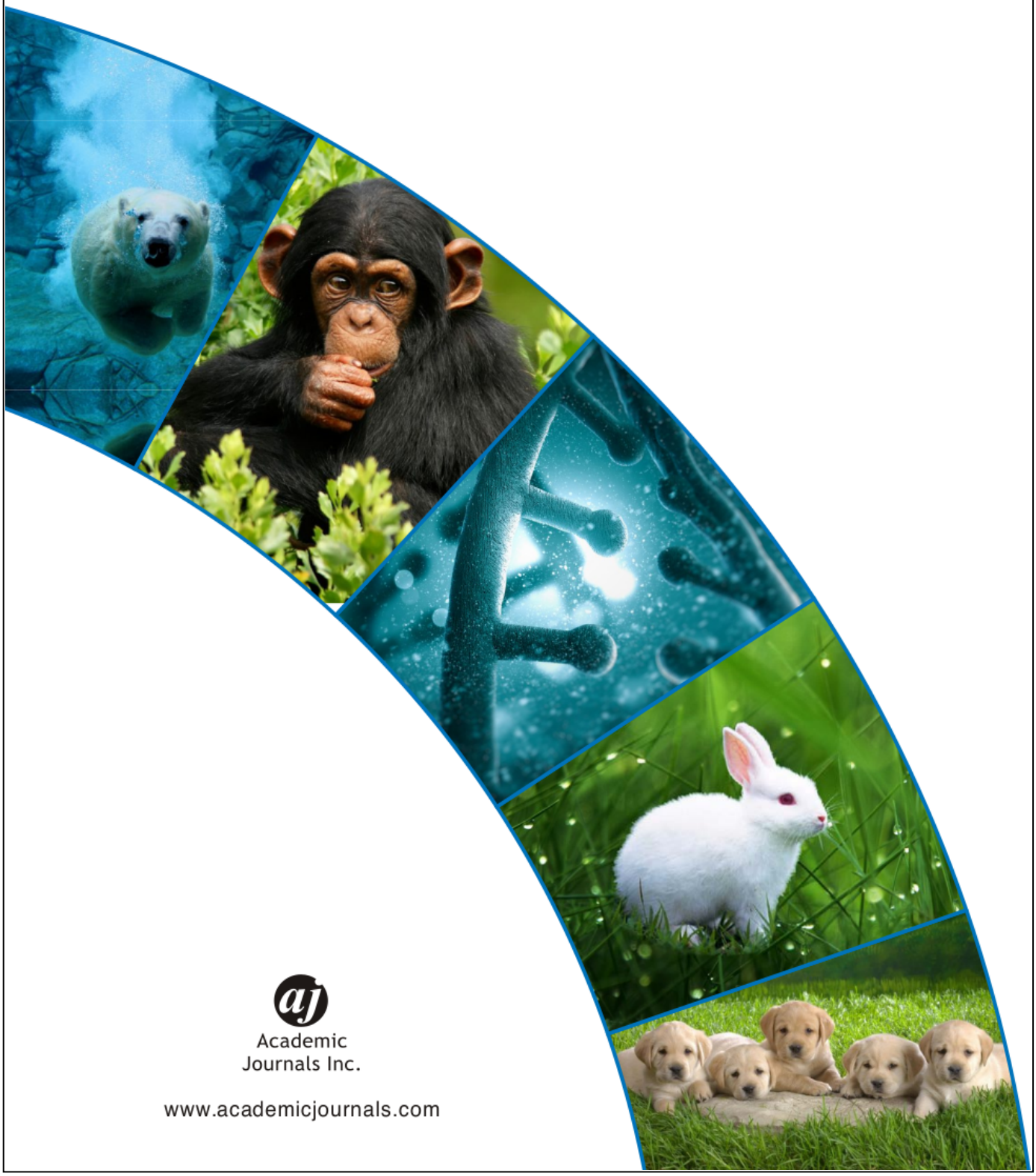

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Research Article

Effect of Ovsynch and Co-synch on Follicle Size and Conception Rate Indifferent Postpartum of Simmental Cows

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Abstract

Background and Objective: The success of any Artificial Insemination (AI) program requires detecting the cows that are ready to be bred and inseminating the cows in the fixed-time insemination. The objective of this study was to determine the effect of ovsynch protocol and co-synch protocol on the follicular size, estrus intensity and conception rate of Simmental cows. **Materials and Methods:** The data used in this study were conducted from 60 heads of Simmental cows in BPTU-HPT Padang Mengatas Farm at a breeding centre, in West Sumatera belonging to Ministry of Agriculture, Indonesia. The cows were stratified by parity, postpartum interval such as 30, 45 and 60 days randomly allotted to one of two treatments ovsynch and co-synch. Ultrasonography examination at the time injection of hormone and at 21 days after AI to determine the conception rate. **Results:** The ovulatory follicle size range from 9.50-11.30 and 8.50-9.75 mm for ovsynch and co-synch protocols, respectively. The averages diameter of ovulatory follicle on 30 days postpartum were 9.50 and 8.50 mm, on 45 days postpartum were 11.30 and 9.30 mm and 60 days postpartum were 10.80 and 9.75 mm of ovsynch and co-synch. Clinical sign of estrus at days 30, 45 and 60 postpartum varied from 70-80% of cervical passage, 40-80% of estrus discharge and 100% uterine tone in 3 interval postpartum and for ovsynch and co-synch protocol. There were no significant ($p>0.05$) effect of ovsynch and co-synch protocol on follicle size, clinical sign of estrus and conception rate of postpartum Simmental cows. The overall conception rate of ovsynch protocol was 60.0% and co-synch protocol was 66.67%. **Conclusion:** Ovsynch protocol and co-synch protocol is caused varied on ovulatory follicle size, clinical sign of estrus and conception rate of postpartum Simmental cows.

Key words: Ovsynch, co-synch, ovulatory, follicle size, conception rate, postpartum, Simmental cows

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Competing Interest: The authors have declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Artificial Insemination (AI) was reproduction technology applied to improve reproductive performance and genetic of farm animal. In cattle, more efficient management practice for maximizing profitability, in order to increase the pregnancy rate. In West Sumatera, AI was introduced as an effective breeding program beginning of 1970 by livestock service in Indonesia with the objective of upgrading indigenous local cows. Latter, a crossbreeding program was planned for upgrading the local cattle with infusion of *Bos taurus* blood. Therefore, the success of any AI program requires detecting the animals that are ready to be bred and inseminating them in the correct time. Fertility or conception rate of beef cows has a great importance expectation of beef cows in rural farm.

There are several factors affect the success rate of AI in small holder beef cows such as days postpartum at first AI, estrus detection, conception rate and pregnancy loss. Estrus synchronization, ovulation-synchronization and AI are reproductive management tools that have been available to beef producers. Estrus synchronization has the potential to shorten the calving season, postpartum interval, increase calf uniformity and facilities the of AI. In rural farm, detection of estrus can be difficult due to a number of factors including the more time used. Hormonal treatments designed to control both luteal and follicular function has permitting efficient synchronization of time of ovulation.

In previous studies several estrus detection have been develop by administration of ovsynch and cosynch protocol to synchronize ovulation and TAI in dairy cows and beef cows[1-3]. Recently, variation of the ovsynch protocol or modification (double ovsynch, co-synch and presynchronization-ovsynch) were test in postpartum dairy and beef cows[4-7]. Many factors affect the interval from parturition to first estrus and conception at the time of breeding. Administration of GnRH during the early postpartum (pp) period has increased early ovulation, but the effect on the interval from calving to conception has been variable. Ovsynch protocol requires handling cows 3 times for injections and 4th times mass insemination. Variations in the ovsynch protocol that included timed insemination at the same time as the third injection (Co-synch) resulted in lower conception rates compared with insemination 24 h[8]. Therefore, there is a requirement for adoption of new technologies like ovsynch and co-synch to overcome the issue. Ovsynch and co-synch plays an importance role improving conception rate in farm animals. In the presence study is focused evaluation of ovsynch and co-synch on postpartum interval of Simmental cow in West Sumatera. The objective of this present study was to evaluate ovsynch and co-synch protocols and their success on ovulation follicle size and conception rate in postpartum beef cows.

MATERIALS AND METHODS

Cows selection and management system a total of 60 Simmental cow in different postpartum period (30, 45 and 60 pp) at a ramdom stage of their estrus cycle from 2 farms in West Sumatera were included in this study. The cows were divided into 2 group: Group A (n = 30) treatmen with ovsynch protocol and group B (n = 30) with treated with co-synch protocol. All cows were reared under same management system and the age ranged from 4-6 years with parities range from 1 and 2.

Ovsynch protocol the group of cows in three postpartum were treated with intramuscular injection of GnRH analogue (Fertagyl) 2 mL at day 0 followed by a PGF2α (lutalyse) 5 mL at day 7, a second GnRH injection using frozen semen from AI service (GnRH-day 7, PGF2α-GnRH-days 9 and 12-24 h TAI) (Fig. 1a). Co-synch protocol using similar protocol: GnRH at 0 day, PGF2α at day 7 and GnRH at day 9 and TAI (Fig. 1b). Pregnancy diagnosis was at 21 days after TAI by ultrasonograph.

The ovulatory follicular of all cows were assessed by transrectal ultrasonography examinations performed every injection (3 times) of hormone. Ovulation was defined as the disappearance of of a previously identified dominant follicle from one ultrasonograpgy examination to the nect. The measurement of the dominant follicle diameter was made on frozen image of the apparent maximal area of the highest follicle in the ovary. The diameter of the ovulatory follicle was considered as the diameter of dominant follicle in the last ultrasonography examination before ovulation.

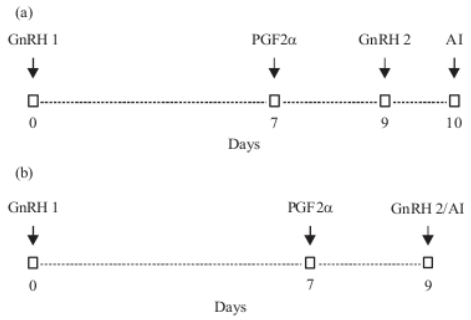

Fig. 1(a-b): (a) Ovsynch and (b) Co-synch protocols

Ultrasonographic pregnancy diagnosis were performed 21 after TAI in order to determine the conception rate. conception rate on day 21 was calculated by dividing the number of pregnancies on day 21 by the total number of treated animals.

The data of follicle size were analyzed using ANOVA in factorial in Ramdomize Blok Design (RBD) tool under the Statistical Package Social Science (SPSS). The data of conception rate were analyzed by chi-square the mean values and standar deviation among the sample.

RESULTS

Effect ovsynch and co-synch on ovulatory follicle diameter of Simmental cows: Diameter of the ovulatory follicle at 30 days pp were 9.5±3.35 mm for ovsynch protocol and 8.50±1.90 mm for co-synch protocol. Diameters of ovulatory follicle at 45 days pp were 11.30±1.94 and 9.30±1.33 mm for ovsynch and co-synch protocol, respectively and at 60 days pp were 10.8±2.44 and 9.80±1.58 mm for ovsynch and co-synch, respectively (Fig. 2). There was no significant affect ($p>0.05$) interval postpartum and ovsynch and co-synch protocol on diameter of ovulatory follicle of Simmental cows. This present study founded that the diameter ovulatory follicle was higher for ovsynch protocol than for co-synch protocol ($p>0.05$). Mean of diameter ovulatory follicle in ovsynch was 10.53±2.66 and 9.18±1.65 mm (Fig. 3).

Effect of ovsynch and co-synch on conception rate of Simmental cows: The conception rate was varied from 60% at 30 days higher than at 45 days postpartum was 50 and 70% at 60 days postpartum for ovsynch protocol. For co-synch protocol the conception was 30 days hihghr than 45 days postpartum and and lower than 60 days postpartum respectively (Fig. 4). In this result showed that the conception was fluctuatated in ovsynch but tend to increased by

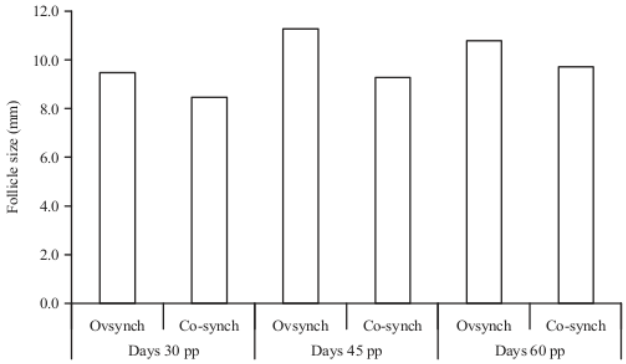

Fig. 2: Diameter of ovulatory follicle in different interval postpartum of ovsynch and co-synch protocols of Simmental cows

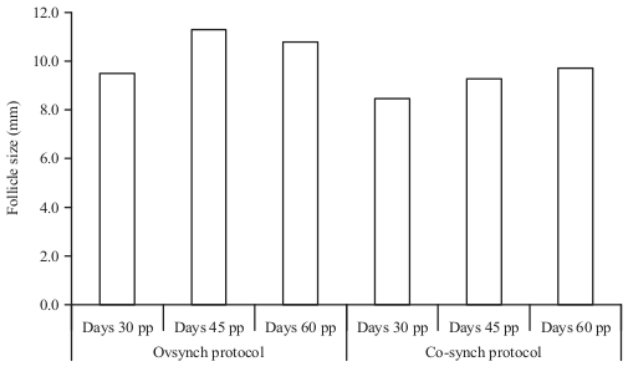

Fig. 3: Effect of ovsynch and co-synch protocol on diameter of ovulatory follicle of Simmental cows

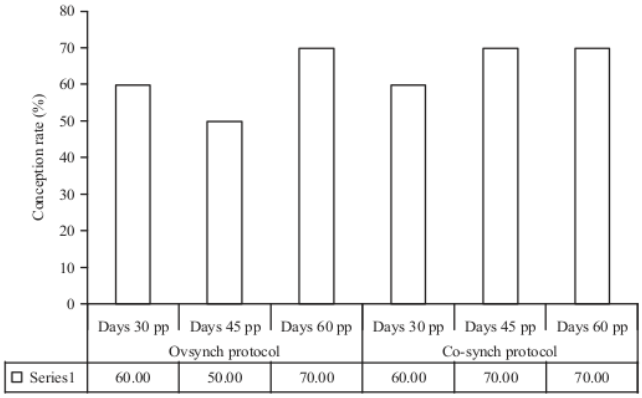

Fig. 4: Effect of ovsynch and co-synch protocol on conception rate of Simmental cows

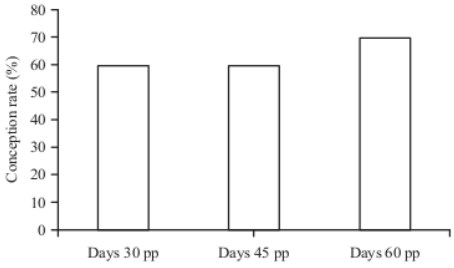

Fig. 5: Averages of conception in different interval postpartum of Simmental cows

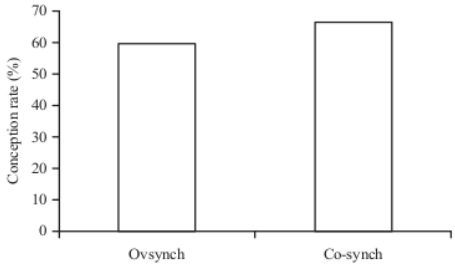

Fig. 6: Conception rate on vsynch and co-synch protocol of Simmental cows

increasing the postpartum interval in co-synch protocol. The conception rate at 30 and 45 days pp were lower than 60 days pp (Fig. 5), but no significant affect ($p>0.05$). Postpartum interval did not affect conception rate or pregnancy rate of cows. The conception rate of ovsynch protocol was 60.0% lower than was 66.67% for co-synch protocol (Fig. 6), but no significant effect ($p>0.05$).

Effect of ovsynch and co-synch on clinical sign of estrus in cows: The clinical sign of estrus at for ovsynch protocol and co-synch protocol on cervical passage at 30 days pp were 70 and 60% . The cervival passage at days 45 pp were 80 and 70% for ovsynch and co-synch protocol and at days 60 pp were 80% for both ovsynch and co-synch protocol. All groups of 30, 45 and 60 days interval postpartum cows had the same uterine tone were 100% for two treatment. The estrus discharge at days 30 pp, at 45 and 60 days pp were 40, 70 and 80% for ovsynch protocol, respectively. In co-synch protocol the estrus discharge at day 30, 45 and 60 days pp were 60, 70 and 80%, respectively. The result of this study showed that the all the cows responded to the ovsynch and co-synch protocol and the clinical of estrus of uterine tone was high 100% for all groups of postpartum interval. The cervical passage range from 70-80% and estrus discharge ranged from 40-80% (Table 1). The ovsynch and co-synch protocol was no significant ($p>0.05$) affect on clinical sign of estrus.

DISCUSSION

This present study detected that the increasing the length of postpartum interval was the largest diameter of ovulatory follicle ($p>0.05$). This result supported by "Those previous study[9]" that number of days postpartum (range 44-114 days) did not affect diameter of individual ovulatory follicles in the suckled cows and there is no interaction between days postpartum ovulation rate. The diameter of largest follicle was 10.1 ± 0.3 mm at 26-20 days PP and 9.1 ± 0.21 mm[10]. Similarly reported[11] that in postpartum beef cows, ovulatory follicle size varied <11 to >16 mm, at spontaneous estrus or at GnRH induced. In this study indicated ovsynch protocol was larger diameter of ovulatory follicle than the co-synch protocol,

Table 1: Percentage of clinical sign of estrus from ovsynch and co-synch protocol of Simmental cows

	Ovsynch protocol			Co-synch protocol		
Postpartum interval (days)	Cervical passage	Uterine tone	Estrus discharge	Cervical passage	Uterine tone	Estrus discharge
30	70 (7/10)	100 (10/10)	40 (4/10)	70 (7/10)	100 (10/10)	60 (6/10)
45	80 (8/10)	100 (10/10)	70 (7/10)	70 (7/10)	100 (10/10)	70 (7/10)
60	70 (7/10)	100 (10/10)	80 (8/10)	80 (8/10)	100 (10/10)	80 (8/10)

Effect of ovsynch, co-synch and postpartum interval was no significant at p>0.05 on clinical sign of estrus

altthought the co-synch facilitates more efficient labor utilization. In ovsynch protocol the follicle had the time to optimize growing follicle for ovulation. The different follicle size in this study was coused the estrus cycle at GnRH 1 and postpartum interval. "This result supported by Atkins *et al.*[12] that treatment with GnRH 1 in the earlier part of the estrus cycle (on or before days 10) increased the proportion of dominant follicle that were large enough to respond to GnRH 2 (≥10 mm) and increased ovulatoty response after GnRH 2". In addition by Bello *et al.*[13] founded that follicle ≥16 mm diameter, pregnant cows had greater (p<0.01) circulating concentration of E2 than non pregnant cows". In contrast, if preovulatory follicle was approximately 14 mm in diameter, circulating concentration of E2 did not differ with pregnancy status. Fertility also was associated with the size and function of preovulatory follicle at the final GnRH of ovsynch protocol. Follicle size of at final GnRH of ovsynch was a significant predictor of pregnancy 35 days after AI. In present study the diameter of ovulatory follicle was ≤11 mm that was in small category of follicle size". "Similarly reported by Busch *et al.*[14] that a small follicle <12 mm. The diameter of largest follicle at GnRH 2 range from 4-15 mm[12] and the ovulation was defined as the disappearance of large follicle (> or = 8.00 mm)[15]". This result was smaller than founded by Keskin *et al.*[16] that cow with follicle size between 13.5 and 17.5 mm were more likely to be pregnant than cow with other follicle size and that 8-16 mm in heifer[17]. "According to De Tarso *et al.*[18] that synchronized beef cows and pregnant cow had large follicle and greater blood flow was closely associated with increasing follicle diameter".

Postpartum interval did not affect conception rate or pregnancy rate of cows." Pregnancy rate established is some and cows inseminated as early to 25-29 days pp[14]". "This result indicated tht difference in interval from insemination to ovulation may affect conception rate. The result was supported by Keskin *et al.*[16] that there was no difference among treatment in cow age, days postpartum and estrus cyclicitry status and pregnancy rate among 3 treatment were 70, 72 and 70% through days 60. This indicated uterine involution appears to require 30-40 days". "According to De Tarso *et al.*[18] from 30-80 days postpartum, there was identified several parameters to explain poor lame with absence of ovarian activity. Furthermore, Geary *et al.*[11] reported that calf removal increased conception rate to timed AI by 9% point were not different among co-synch and ovsynch protocols. The co-synch+calf removal protocol induces a fertile ovulation in cyclic and anestrus cows, requires handling cattle just 3 times, results in high conception rates from timed insemination and should be a useful program for synchronization of ovulation in beef cows. The co-synch protocol with 48 h calf removal, which resulted in the highest numerical conception rate, was the easier protocol to administrater because it required handling cows and calves less than the other protocols.

The conception rate of ovsynch protocol was 60.0% lower than was 66.67% for co-synch protocol (Fig. 4), but no significant effect (p>0.05). This result was similar to reported by Alnimer *et al.*[19] that P/AI at first insemination not different between ovsynch and co-synch at the same farm during the summer season This result higher than reported by Alnimer *et al.*[5] that the P/AI at day 30 were 59.0% for cosynch and 60.3% for ovsynch protocol[11] than the conception rates were not different among co-synch (54%) and ovsynch-treated (52%) cows, however, both estrual status and 48 h calf removal affected This result was different by Akbarabadi *et al.*[6] that pregnancy rate was higher for ovsynch (72%) than co-synch (53%) Therefore, supported by Oliveira *et al.*[20] that inseminating the heifers at the moment of GnRH injection in a progesterone-based TAI protocol is practical strategy and provided satisfactory result regarding ovulation and and conception rates in dairy heifers. "In a previous study by Carvalho *et al.*[21] that at first TAI, there was no effect of presynchronization with GnRH 6 days before initiation of the ovsynch protocol on P/AI 32 days after TAI". However, this presence study was higher that reported by Lean *et al.*[22] was 37.6% for ovsynch protocol indicating that reproductive performance of cows was not significantly different with ovsynch program or PG program. Several large dairy farms have adapted co-synch as part of their standard reproductive management of postpartum cows. Despite the applications of different ovsynch protocols, low percentages of cows show estrus and fertility is still low, because of a

relatively lower estradiol concentration around TAI by Lopez *et al.*[23]. Otherwise, the ovsynch protocol resulted in higher incidence of the expression of estrus than the co-synch protocol. However, fertility as measured by P/AI and pregnancy losses was not improved. This result was higher than fouded by Caraba and Velicevici[1] that pregnancy rate were 25% for ovsynch protocol and 57% for co-synch protocol and obtained an AI pregnancy rate of 31% of ovsynch protocol[24]. Despite the applications of different ovsynch protocols, low percentages of cows show estrus and fertility is still low, particularly in the summer, becaused of relatively lower estradiol (E2) concentration around TAI[23,25]. This study showed the conception rate of co-synch protocols higher than ovsynch protocols. In co-synch protocol cows are inseminated at GnRH 2 injection, the benefit of synchronization diminishes when the time between insemination is longer. This result supported by Caraba and Velicevici[1], Silva *et al.*[26] and Dewey *et al.*[27] studies showed an improvement in pregnancy rate by timed AI. Kacar *et al.*[2] reported that presynchronization with PGF2α before co-synch 56 protocol did not enhance pregnancy rates was 28.3% in Brown Swiss cows. Otherwise, some research suggest that presynchronization with PGF2α prior to ovsynch protocol increases the pregnancy rates achieved. Furthermore, Whittier *et al.*[28] reported that cows synchronized with the 5 days co-synch+CIDR protocol had greater pregnancy rate than those that received the 7 days co-synch+CIDR protocol.

The present study showed that all the cows had good response to ovsynch and co-synch protocol at the 3 diffrence of postpartum interval this indicated that this protocol can be use earlier in postpartum cows without estrus detection, this supported by Caraba and Velicevici[1] that synchronization of ovulation using ovsynch protocols can provide an effective way to manage reproduction in lactating dairy cows by eliminating the need for estrus detection. The variation of estrus response of cows caused the several factors such as cow age, body condition and the interval from calving to initiation of the timed, AI protocol administration of synchronization program. According to Wolfenson *et al.*[29] that heat stress may be have altered ovarian follicle development and steroidogenic capacity, with a decrease in length and intensity of estrus. However, the study showed higher clinical sign of estrus[1] than 63 and 57% in ovsynch and co-synch protocol of dairy cows. Morris *et al.*[30] founded 62% displayed sign of estrus, in which there were fewer lame cows. From 30-80 days postpartum, there was a graded effect that ranged from 29% lame cows with ansence of ovarian activity, whereas another 21% lame cows failed to express estrus or ovulate a low estrogenic follicle[31]. In the presence study the mean estrus discharge was 63.33 and 70.00% for ovsynch and co-synch protocols, respectively. Mean of estrus discharge was 66.66%. The averages of cervical passage was 73.33% for both ovsynch and co-synch protocol. This result was similar with reported by Wolfenson *et al.*[29] was 65%. The presence of transparent discharge of uterine origin during insemination indicated increased fertility in cattle[32]. In this study higher sign of estrus is caused of GnRH injection to induce follicle development and ovulation. This result consistent with those of previous studies where estrus respone after synchronization Perry *et al.*[17] that the GnRH-induced ovulation of small dominant follicles decreased pregnancy rates in heifers and cows[33]. In addition by Alnimer *et al.*[5] reported that the OV-56+E2 synchronization protocol resulted in higher expression of estrus than the CO-72 without improving fertility as measured by P/AI and pregnancy loss.

CONCLUSION

Ovsynch protocol and co-synch protocol is caused varied on ovulatory follicle size, clinical sign of estrus and conception rate of postpartum Simmental cows. Using the ovsynch and co-synch protocol can induce activity of ovarium, ovulation and conception rate of postpartum Simmental cows.

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