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SHORT-TERM FEEDING OF MELENGESTROL ACETATE PLUS GnRH AND $PGF_{2\alpha}$ TO ENHANCE REPRODUCTIVE EFFICIENCY OF REPLACEMENT DAIRY HEIFERS

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SUMMARY

Forty six pure Holstein heifers were assigned randomly to two synchronization treatments Select Synch (n = 21) and MGA 7-11 Synch (n = 25). The MGA 7-11 Synch heifers were fed MGA (0.5 mg/h/day) for 7 days concluded with $PGF_{2\alpha}$ injection. Four days later, both groups (Select Synch and MGA 7-11Synch) were administered GnRH followed with $PGF_{2\alpha}$ on day 0. Heifers were inseminated with frozen semen according to the AM/PM rule. Within 24-48h peak response period after $PGF_{2\alpha}$ injection more (81%, 17/21) Select Synch heifers displayed estrus compared to MGA 7-11 Synch (68.1%, 17/25). However, overall percentages of heifers detected in estrus were not different between Select Synch (95.2%, 20/21) and MGA 7-11 Synch (84%, 21/25) heifers. Select Synch heifers had empirically improved (P=0.2) conception rate to first artificial insemination (AI, 75%, 15/20) compared to MGA 7-11 Synch heifers (57%, 12/21), while overall pregnancy rates were 95.2 and 96%. The total number of follicles (TNF) on both ovaries was not different between the Select Synch (2.4±0.3) and MGA 7-11 Synch (2.2±0.3) heifers. Likewise, the overall diameters of largest follicles were not affected by treatments. However, Select Synch heifers had larger (P<0.05) follicles (11.4±0.9mm) than the MGA 7-11 Synch (9.2±0.6 mm) heifers on day -7. Percentages of induced CLs on days 0 (62 vs. 76%) and 10 (76.2 vs. 80%) after $PGF_{2\alpha}$ injection were not different between Select Synch and MGA 7-11 Synch heifers. Similarly, diameters of induced CLs on days 0 (19.3+2.9 vs. 18.3+2.5 mm) and 10 (19+2 vs. 21.3+1.6 mm) were not different. Progesterone concentrations were greater (P<0.01) on day -7 in the Select Synch (7.1±1ng/ml) compared to the MGA 7-11 Synch (2.5±0.7ng/ml). Short-term feeding of MGA (MGA 7-11Synch) to dairy heifers produced acceptable overall pregnancy rates while Select synch treatment tightened the synchrony for estrus compared to MGA 7-11 Synch. Further research is needed to improve estrual responses and synchrony after short-term of MGA feeding to dairy heifers.

Keywords: Dairy Heifers, MGA, reproductive efficiency

INTRODUCTION

Replacement dairy heifers are the future of the dairy farm (Tenhagen *et al*., 2005). Reproductive management of dairy heifers has always been a challenge to dairy producers. Studies by Peckelhof *et al.* (2000) and Tenhagen *et al.* (2005) assessed the reproductive outcomes of estrus synchronization in dairy heifers using GnRH and $PGF_{2\alpha}$ 7 days apart followed by artificial insemination (AI) on observed estrus. Incorporation of MGA into an estrus synchronization program provides the opportunity to induce estrus in peripubertal heifers (Imwalle *et al*., 1998) and anestrous postpartum beef cows (Fralix *et al*., 1996). Under the daily feeding of MGA the follicles grow and fail to ovulate (Zimbelman and Smith, 1966 and Priedkalns, 1971) and MGA is known to prevent animals from coming to estrus and ovulation mimicking natural progesterone treatments. Brown *et al*. (1988) developed an estrus synchronization system for heifers where MGA is fed for 14 days with an injection of prostaglandin F ($PGF_{2\alpha}$) administered 16 to 18 days after the last feeding of MGA. This system has been shown to provide good synchrony of estrus without a reduction in pregnancy rate that has been reported for other estrus synchronization programs utilizing progestogens (Paterson *et al*., 1989). Paterson *et al*. (1995) reported significant improvements in synchrony, conception rate and fecundity among postpartum beef cows that were synchronized to estrus with MGA prior to $PGF_{2\alpha}$ treatment compared with cows whose estrous cycles were synchronized with $PGF_{2\alpha}$ alone

The objective of the current study was to evaluate the reproductive responses and synchrony of estrus and ovulation following short-term feeding of MGA (MGA 7-11 Synch) compared to the Select Synch in Holstein dairy heifers.

MATERIAL S AND METHODS

The current study was carried out in a privately owned dairy farm (Alalameia for Animal Production and Land Reclamation) located 90 km south of Alexandria city on the desert road between Alexandria and Cairo. All heifers were born in that dairy farm for pure Holstein cows inseminated with frozen semen imported from USA. Heifers were housed in open barns in groups of 10-15 heifers based on their age and body weight and were raised on heifers' feed consisting of silage and concentrate. The minimum inclusion age was 15-month and 350 kg body weight. The study was carried out during the winter months (December, January and February, 2012).

1. Animals management and experimental design

Pure Holstein dairy heifers (n=46) stratified by age (median=16 month) and body weight (average 337±1.8) were randomly assigned to two estrus synchronization groups, Select Synch (n=21) or MGA 7-11 Synch (n=25). The Select Synch protocol was chosen to compare with MGA 7-11 Synch because of similarity in the treatment schedules for injections of GnRH and $PGF_{2\alpha}$ (Figure 1). The first day of MGA feeding was defined as d -17 of the experiment (Figure 1). Heifers in the MGA 7-11 Synch group were fed MGA (0.5 mg/cow/d) in the heifers diet for 7 d (from d -17 to -11) and received an injection of $PGF_{2\alpha}$ on the last day of MGA feeding (d -11). Four days after the last MGA feeding (d -7), GnRH was administered and a second injection of $PGF_{2\alpha}$ was given 11 d after the last day MGA was fed (d 0). Heifers in the Select Synch group received an injection of GnRH (d -7) and then an injection of $PGF_{2\alpha}$ 7 d later (d 0).

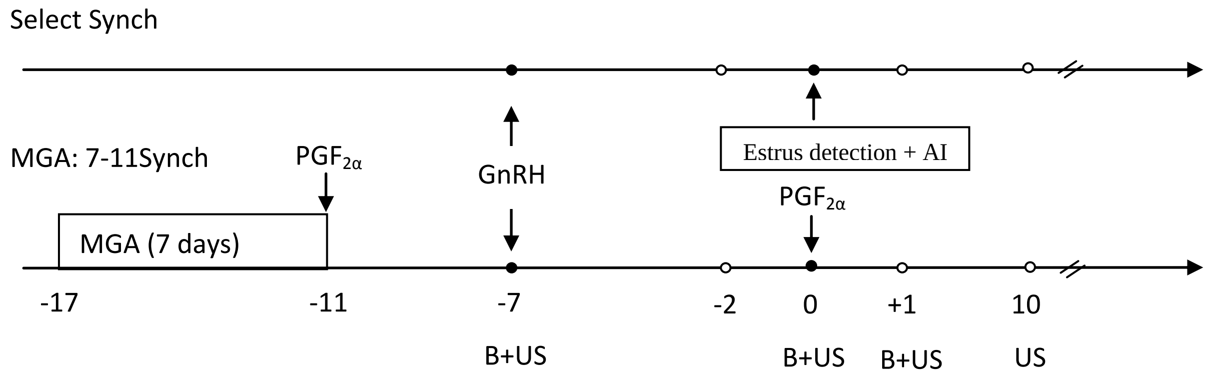

Fig. 1. Treatment protocols for Holstein dairy heifers before first service. Blood (B) samples were collected from all heifers on days -7, 0, 1 and 10

2. Estrus Detection and Artificial Insemination (AI)

Heifers were observed two times a day 0600 and 1800) for signs of behavioral estrus for two days before $PGF_{2\alpha}$ injection and continued for 5 d following the last injection of $PGF_{2\alpha}$ (from d -2 to 5, Fig. 1). Interval from $PGF_{2\alpha}$ injection time to behavioral estrus was recorded for each heifer. Heifers were artificially inseminated 12 h after detection of behavioral estrus by an experienced technician. Re-inseminations were served after detection of behavioral signs of estrus until all heifers were either diagnosed pregnant or culled. Conception rate to AI was determined by a single technician by transrectal ultrasonography approximately 60 d after the first AI. Pregnancy status was confirmed by rectal palpation approximately 120 d later and calvings were recorded. Conception rate to first AI (CR/AI) is the proportion of heifers pregnant divided by the number of heifers inseminated. Pregnant animals that were in estrus during a 7-day interval (d -2 to d 5) were considered pregnant to the first AI.

3. Ovarian Structures

During estrus synchronization period all heifers were subjected to thorough transrectal ultrasound examination of their ovaries. A linear array scanner (Dynamic Imaging Concept MLV, Livingston, Scotland) equipped with a dual 5.0-7.5 MHz transrectal transducer was used. Total number of follicles, diameter of largest follicles and presence of luteal structures and their diameters were recorded during scanning session at days -7 (GnRH injection), 0 ($PGF_{2\alpha}$ injection), and days +1 and +10 following $PGF_{2\alpha}$ injection.

4. Blood Collection and Hormonal assay

Blood samples were collected on d -7, 0, +1 and +10 from the MGA: 7-11 Synch and Select Synch heifers and were centrifuged at 3000 rpm for 20 min and sera were harvested and stored at -20ºC for later analysis of progesterone hormone. Serum progesterone (P4) was measured in sera samples using Enzyme Immunoassay kits (DRG International Inc., USA). Intra and inter assay coefficients of variation for P4 were 2.6 and 2.88 %, respectively.

5. Statistical Analysis

Categorical data for estrus detection rate (%), conception rate to first AI (CR/AI, %), overall pregnancy rate (%), and presence of CLs at days 0 and 10 after $PGF_{2\alpha}$ injection were analyzed using the Chi Square analysis of SAS. Calculate number of services per conception and Interval from $PGF_{2\alpha}$ injection (d 0) to first standing of estrus were analyzed using the PROC GLM procedure of SAS (SAS, 2006) with treatment as the main effect. Repeated measurements of total number of follicles, diameter of largest follicle, diameter of CLs at days 0 and 10 after $PGF_{2\alpha}$ injection and serum P4 concentration at days -7, 0, +1 and +10 were analyzed using the PROC MIXED procedure of SAS (SAS, 2006) with treatment, time and treatment × time interaction in the model. Least square means were reported and significance was declared at $P < 0.05$. The appropriate covariance structure was identified based on Akaike's Information Criterion (AIC) model fit statistic.

RESULTS AND DISCUSSION

1. Estrus detection and conception rate

Data for interval to estrus (h), estrus detection rate (%), conception rate to first AI (CR/AI, %), overall pregnancy rate (%) and number of services per conception (NSC) in dairy heifers following the Select Synch and MGA 7-11 Synch protocols are presented in Table (1). Interval from $PGF_{2\alpha}$ injection to estrus in Select Synch heifers (34.7±7.6 h) or MGA 7-11 Synch heifers (39.1±7.4 h) was not significantly different (P=0.7). Percentage of heifers detected in estrus was not significantly different (P=0.2) between Select Synch (95.2%, 20/21) and MGA 7-11 Synch (84%, 21/25) heifers. Following synchronization treatments 75% (15/20) of Select Synch heifers were pregnant to first AI compared to 57.1% (12/21) of the MGA 7-11 Synch heifers (P=0.2). Cumulative pregnancy rates for heifers synchronized with the Select Synch was 95.2% (20/21) compared to 96 % (24/25) for MGA 7-11 Synch heifers. (P=0.5). Number of services per conception in Select Synch (1.2±0.1) and MGA 7-11 Synch (1.5±0.1) did not significantly differ (P=0.16).

In the current study, MGA-fed heifers had 57.1% (12/21) conception rate to first AI which was inferior to the Select Synch rate (75%, 15/20). The difference was not significant (P=0.2) but Chenault *et al*. (1990) reported that heifers treated with MGA plus $PGF_{2\alpha}$ had reduced conception rates compared to PGF-treated heifers. Reduced conception rate to breeding immediately following 7-d MGA feeding has been restricted to cattle in which MGA feeding was initiated during the second half of their estrous cycles (Beal *et al*., 1988). No reduction in conception rates occurred in cattle in which MGA feeding was initiated in the first half of their estrous cycles. When feeding of MGA starts late in the estrous cycle the corpus luteum regresses spontaneously (Zimbelman and Smith, 1966). Under the daily feeding of MGA the follicles grow and fail to ovulate (Zimbelman and Smith, 1966 and Priedkalns, 1971) and hyperestrogenic environment develops (Chow *et al*., 1972) and the Oocyte ages. Estrus detection rate was very high (96%) in beef heifers when MGA feeding was combined with P4 (200 mg) and estradiol benzoate (2 mg) given at MGA initiation (Martinez *et al*., 2002).

Table 1. Time to estrus (h), estrus (%), conception rate to first AI (CR/AI, %), overall pregnancy rate (%) and number of services per conception (NSC) of dairy heifers following the Select Synch and MGA 7-11 Synch protocols

Item	Treatment		*P*-values
	Select Synch	**MGA 7-11 Synch**	
Interval to estrus (h)	34.7±7.6	39.1±7.4	0.7
Estrus detection rate, (%)	95.2 (20/21)	84 (21/25)	0.2
CR/AI, (%)	75.0 (15/20)	57.1 (12/21)	0.2
Overall pregnancy rate, (%)	95.2 (20/21)	96 (24/25)	0.9
Number of services per conception	1.2±0.1	1.5±0.1	0.16

CR/AI: Conception rate to first AI

Distribution of estrus

Proportion of estrus behavior in the Select Synch and MGA 7-11 Synch heifers that started 48 hours before $PGF_{2\alpha}$ injection and continued for 5 days after is shown in Figure (2). Two heifers from each group of heifers displayed estrus prematurely (before $PGF_{2\alpha}$ injection) with one heifer from the Select Synch group displayed estrus 12 h after $PGF_{2\alpha}$ injection. From the Select Synch group (81 %, 17/21) heifers displayed estrus between 24 and 48 after $PGF_{2\alpha}$ injection compared to (68 %, 17/25) heifers displayed estrus within the same period from the MGA 7-11 Synch group. Four more MGA 7-11 Synch heifers displayed estrus later at 72 h (1), 96 h (1) and 120 h (2) after $PGF_{2\alpha}$ injection and 4 more heifers did not respond to treatment within the 7 days (d-2 to +5) period of insemination compared to only 1 heifer from Select Synch group. The longer interval to onset of estrus in heifers fed MGA may reflect the time necessary for body clearance of MGA in the bovine (Neff, 1983). This delay may be due either to a direct inhibitory effect of MGA on estrus expression or to an indirect effect of MGA on follicular growth and development via suppression of LH (Chenault *et al*., 1990).

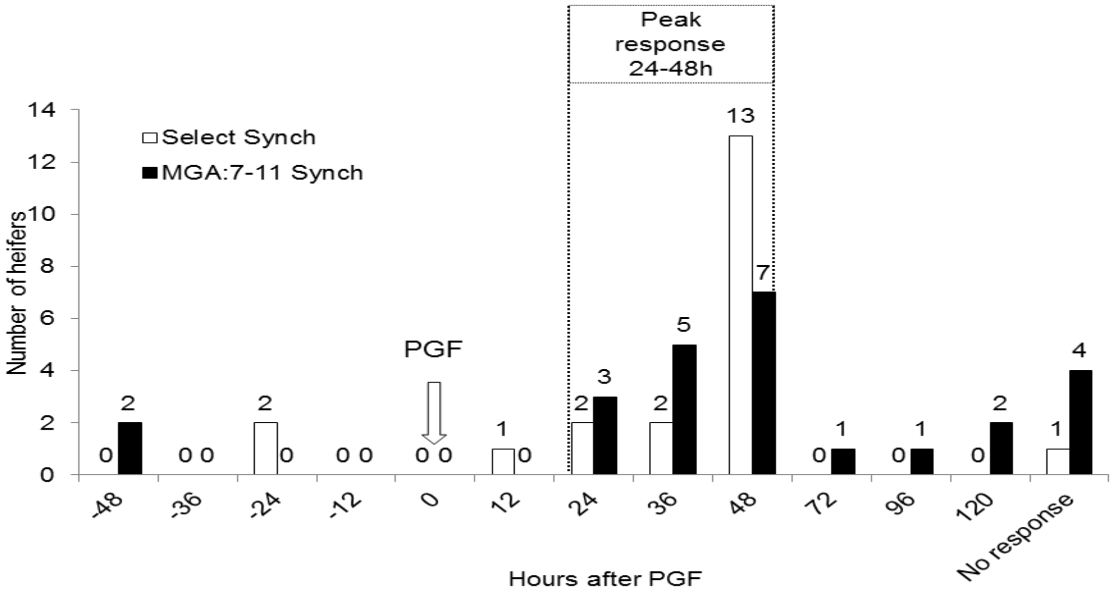

Fig. 2. Distribution of estrus response in Holstein heifers treated with either the Select Synch or MGA 7-11 Synch protocols. PGF2α was administered on hour 0. Heifers were observed for behavioral estrus 2 times a day (0600 and 1800)

Ovarian responses and progesterone concentrations

Data for total number of follicles (TNF) and diameter of largest follicle are shown in Table (2). The total number of follicles of both ovaries recorded during synchronization was not significantly different between Select Synch heifers (2.4±0.3) and MGA 7-11 Synch heifers (2.2±0.3). There was a significant time effect (P<0.01) as the TNF recorded at d -7 (3.2±0.4) was greater than TNF recoded at days 0 and +1 (1.7±0.3 and 1.9±0.3). No effect of the two synchronization protocols (Select Synch and MGA 7-11Synch) on overall diameter of largest follicles (12±0.5 and 11.3±0.4mm). Also, data in Table (2) revealed that Select Synch heifers had larger (P<0.05) follicles (11.4±0.9mm) than the MGA 7-11 Synch heifers (9.2±0.6mm) on day -7. Overall diameter of largest follicle recorded at d -7 (10.3±0.5mm) was less (P<0.01) than that recoded at days 0 and +1 (12.1±0.5 and 12.6±0.5mm). The indirect effect of MGA on follicular growth and development via suppression of LH (Chenault *et al*., 1990) was seen at day -7 in heifers fed MGA reflected in smaller dominant ovarian follicles compared to Select Synch heifers. Such effect diminished as time progressed to days 0 and +1 and the MGA-fed heifers had large follicles similar to the Select Synch heifers.

Table 2. Total number of follicles (TNF) and diameters of largest follicles (mm) during the Select Synch and MGA 7-11 Synch protocols in dairy heifers

Days	Total number of follicles, n			Diameter of largest follicle, mm		
	Treatments			Treatments		
	Select Synch	MGA 7-11Synch	Overall	Select Synch	MGA 7-11Synch	Overall
d -7	3.1±0.6	3.2±0.4^{a}	3.2±0.4^{a}	11.4±0.9^{A}	9.2±0.6^{Bb}	10.3±0.5^{b}
d 0	2.0±0.5	1.5±0.4^{b}	1.7±0.3^{b}	12.4±0.7	11.7±0.7^{a}	12.1±0.5^{a}
d +1	2.1±0.5	1.7±0.4^{b}	1.9±0.3^{b}	12.2±0.7	12.9±.6^{a}	12.6±0.5^{a}
Overall	2.4±0.3	2.2±0.3		12±0.5	11.3±0.4	

d -7 = day of GnRH injection; d 0 = day of PGF injection; d 1 = day following PGF injection
^{ab}Values with different letters within the same column differ (P<0.01)
^{AB}values with different letters within the same row differ (P<0.05)

Table 3. Percentages (%) and diameters (mm) of corpora lutea present on ovaries on days 0 and +10 in Holstein heifers subjected to Select Synch and MGA 7-11 Synch protocols

Item		Treatments		P values
		Select Synch	MGA: 7-11Select	
Presence of CL, (%)				
	d 0	62 (13/21)	76 (19/25)	0.6
	d +10	76.2 (16/21)	80 (20/25)	0.5
Diameter of CL, (mm)				
	d 0	19.3±2.9	18.3±2.5	0.9
	d +10	19.0±2.0	21.3±1.6	0.5

d 0 = day of PGF injection; d 10 = day 10 after PGF injection

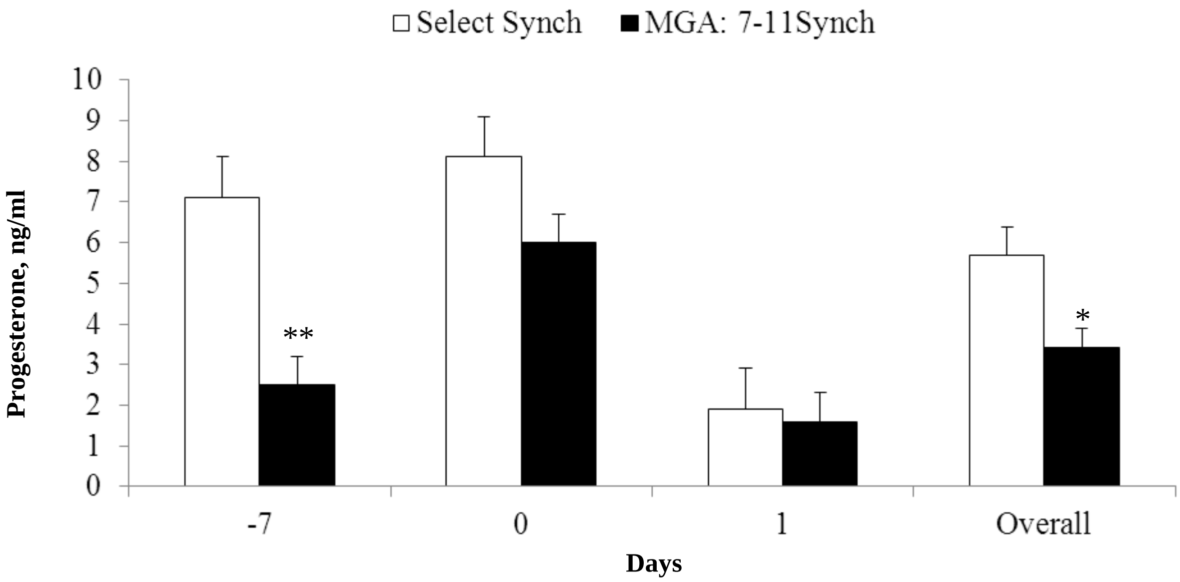

Fig. 3. Serum progesterone concentrations during the Select Synch and MGA 7-11 Synch protocols in dairy heifers. d -7 = day of GnRH injection; d 0 = day of PGF injection; d 1 = day following PGF injection. * P<0.05 and ** P<0.01

Data for percentages (%) of corpora lutea (CLs) present on ovaries and their diameters are presented in Table (3). Presence of CLs on ovaries of Select Synch and MGA 7-11 Synch heifers on d 0 (62 vs. 76 %) was not different. Also presence of CLs structures on ovaries of Select Synch and MGA 7-11 Synch heifers on d 10 after $PGF_{2\alpha}$ injection (76.2 *vs*. 80%) was not significantly different and so were the diameters of these CLs structure recorded on days 0 (19.3±2.9 *vs*. 18.3±2.5mm) and day 10 (19.0±2.0 *vs*. 21.3±1.6mm) were not different.

Data for serum progesterone (P4) concentrations in dairy heifers during the Select Synch and MGA 7-11 Synch protocols are presented in Figure. (3). Overall serum P4 concentrations (5.7±0.7ng/ml) in the Select Synch heifers were greater (P<0.05) than MGA 7-11 Synch heifers (3.4±0.5ng/ml). On d -7, Select Synch heifers had more (P<0.1) serum P4 concentrations (7.1±0.7ng/ml) compared with MGA 7-11 Synch heifers (2.5±0.5ng/ml). However, no differences in serum P4 concentration were detected between Select Synch and MGA 7-11 Synch heifers at days 0 and +

GENERAL DISCUSSION

The control of the estrous cycles in cattle requires the synchronization of follicular growth and synchronized luteal regression (Kojima *et al*., 2000). The goal of the current study was to use the new MGA-7-11Synch protocol to improve synchrony of ovulation, estrus and conception rates by synchronizing development and ovulation of follicles from the first-wave compared to the currently available estrus synchronization protocol (Select Synch). The variations in expression of estrus in the MGA-fed heifers may be related to differences in clearance rate of MGA among individual animals after MGA withdrawal from feed (Kojima *et al*., 1995). Neff (1983) reported that MGA can be stored in adipose tissue and released at different rates. Another possibility for delayed and less synchronized pattern of estrus is that some heifers may have been in latter portion of the follicular wave at the end of MGA feeding when $PGF_{2\alpha}$ was administered. Therefore, a new follicular wave was initiated resulting in delayed estrus (Downing *et al*., 1988). A GnRH injection was included in such protocol 4d after last MGA feeding to ensure ovulation or luteinization of dominant follicles and synchronization of first wave follicular development (Kojima *et al*., 2000). In beef cows subjected to timed AI after short-term feeding of MGA for 7 days the response to GnRH injection was far more subtle compared to cows treated with Select Synch (El-Zarkouny and Kesler, 2010). Dairy heifers fed MGA in the current study had a sporadic pattern of estrus after second $PGF_{2\alpha}$ injection compared to Select Synch heifers.

The injection of GnRH 4 days after MGA withdrawal from feed was decided based on the clearance interval of MGA from the body of cattle fed MGA (Kojima *et al.*, 1995). It is apparent that the 4 days interval is not long enough to start synchronizing the ovulation or luteinization of existing follicle by GnRH and this time should be extended further so initiation of GnRH/$PGF_{2\alpha}$ (Select Synch) treatment coincides with early luteal phase (days 5-10) of the cycle to allow for higher rate of ovulation or luteinization of existing follicles (Vasconcelos *et al*., 1999). Initiation of Ovsynch on d 5 to 9 of the estrous cycle in lactating dairy cows resulted in a greater synchronization rate and pregnancy rate per AI (PR/AI) compared to other stages of the cycle (Vasconcelos *et al*., 1999). Administration of the first GnRH injection of Ovsynch on days 5 to 10 of the estrous cycle may increase the probability of ovulating the dominant follicle of the first follicular wave of the estrous cycle, thereby improving synchrony of emergence of a new wave and synchronized ovulation rate to the second GnRH injection of Ovsynch. The stage of the cycle at administration of the first GnRH injection of Ovsynch on days 5 to 10 of the estrous cycle may provide a more favorable P4 environment during development of the ovulatory follicle which may affect PR/AI. However, extending the interval after MGA to GnRH injection from 4 to 5-10 days may render the MGA-based protocol impractical due to time and labor concerns. Early studies in beef heifers demonstrated that feeding MGA for 14 d followed by $PGF_{2\alpha}$ 17 days later was an effective method of estrous cycle control in heifers (Brown *et al*., 1988 and Patterson *et al.*, 1989). Following the success of this protocol, researchers began to include GnRH in estrus synchronization protocols for timed AI (TAI). Addition of GnRH to the above protocol followed by $PGF_{2\alpha}$ successfully synchronized heifers (Lamb *et al*., 2003).

In the current study 4 MGA-fed heifers compared to 1 Select Synch heifer did not display estrus. Also 4 MGA-fed heifers displayed late estrus later than 48 h after $PGF_{2\alpha}$ injection and this pattern of synchrony might have reduced conception rates to first AI services as the combined pregnancy rate for the following services were identical to the Select synch group (96 *vs*. 95.2%). Therefore, MGA feeding might have had direct effect on estrus expression or indirect effect on follicular development via suppression of LH and /or FSH secretion (Chenault *et al*., 1990). The latter conclusion is supported by the hindered follicular growth and smaller follicle size (9.2±0.6mm) recorded on day -7 in MGA-fed heifers compared to Select Synch heifers (11.4±0.9mm) in the current study.

CONCLUSION

In conclusion short-term feeding of MGA for 7 days plus GnRH and $PGF_{2\alpha}$ (MGA 7-11Synch) produced acceptable overall pregnancy rates however, Select synch treatment tightened the synchrony for estrus compared to MGA 7-11 Synch. More research is needed to improve synchrony and conception rates to first services beyond the known GnRH/PGF-based protocols in Holstein dairy heifers.

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التغذية قصيرة المدى على خلات الميلانجيسترول و المعاملة بالـ GnRH و الـ $PGF_{2\alpha}$ لرفع الكفاءة التناسلية فى عجلات احلال الأبقار الحلابه

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تم استخدام ٤٦ عجلة هولستين نقية وزعت عشوائيا على اثنين بروتوكولات تنظيم الشياع Select Synch (عدد٢١) و MGA 7-11 Synch عدد (٢٥). عجلات المعاملة الأخيرة غذيت على خلات الميلانجيسترول (٠.٥مجم/رأس/يوم) لمدة ٧ أيام و حقنت بالبروستاجلاندين فى أخر يوم تغذية. بعد ٤ ايام من أيقاف التغذية (اليوم -٧) تم حقن جميع الحيوانات فى المعاملتين MGA 7-11 Synch وSelect Synch بحقنتين GnRH ثم PGF بينهما ٧ ايام و تم اجراء التلقيح الأصطناعى لجميع الحيوانات تبعا لقاعدة الـ AM/PM. فى خلال اعلى فترة استجابة للمعاملات (٢٤-٤٨ ساعة) بعد حقن الـ $PGF_{2\alpha}$ لوحظت علامات الشياع بمعدل اعلى ٨١% (٢١/١٧) فى عجلات الـ Select Synch مقارنة بـ ٦٨.١% (٢٥/١٧) لعجلات الـ MGA 7-11 Synch و برغم هذا فان المعدل الأجمالى للشياع لم يختلف بين المعاملتين. العجلات المعاملة بالـ Select Synch تحسن بها معدل الأخصاب ٧٥ % من أول تلقيحة (٢٠/١٥) مقارنة بـ ٥٧% (٢١/١٢) فى العجلات المعاملة بـ MGA 7-11 Synch مع ان معدل الحمل الأجمالى للعجلات كان ٩٥.٢ و ٩٦% على الترتيب. العدد الكلى للحويصلات المبيضية لم يختلف بين المعاملات (٢.٤±٠.٣ و ٢.٢ ± ٠.٣) و كذلك اقطار اكبر الحويصلات المبيضية حجما لم يتأثر بالمعاملات مع أن العجلات المعاملة بالـ Select Synch كان بها حويصلات مبيضية (١١.٤±٠.٩ مم) اكبر معنويا (P<0.05) من العجلات المعاملة بالـ MGA 7-11 Synch (٩.٢±٠.٦ مم). فى اليوم -٧. لم تختلف النسبة المؤية للأجسام الصفراء المتكونة فى اليوم ٠ (٦٢ vs. ٧٦%) و فى اليوم ١٠ (٧٦.٢ vs. ٨٠%) بعدحقن البروستاجلاندين بين العجلات فى المعاملتين و بالمثل اقطار الأجسام الصفراء فى الأيام صفر (١٩.٣ ±٢.٩ vs. ١٨.٣±٢.٥ مم) و فى اليوم ١٠ (١٩±٢ vs. ٢١.٣±١.٦ مم). أدت المعاملة بالـ Select Synch الى رفع مستوى هرمون البروجسترون فى السيرم معنويا (P<0.01) فى اليوم -٧ (٧.١±١ نجم) مقارنة بالمعاملة MGA 7-11 Synch (٢.٥±٠.٧ نجم).

التغذية قصيرة المدى على خلات الميلانجستيرول فى برنامج الـ MGA 7-11 Synch انتجت معدلات حمل مقبولة بينما برنامج الـ Select Synch حسن من تنظيم الشياع مقارنة ببرنامج MGA 7-11 Synch . لكن يلزم مزيد من البحث لتحسين معدلات الشياع و التلقيح بعد التغذية قصيرة الأجل على خلات الميلانجستيرول .