CHAPTER-I

**INTRODUCTION**

 Bangladesh is one of the most densely populated countries in the world with a high population growth rate. This huge population requires more meat and milk to meet up the need for protein requirement. Livestock production is a major component of Bangladesh and goes well beyond direct food production. In the national policy of the country, special importance has been launched for the development of dairy and meat production to fulfill the protein shortage of the country. Dairying is nearly always a part of mixed farming systems in Bangladesh. It has a direct impact on income generation, poverty alleviation and availability of animal protein. Cattle among other livestock species available are the most versatile component in relation to existing integrated agricultural farming system in Bangladesh. Total cattle population of the country is about 24.5 million, which is about 1.79% of the world and 5.47% of Asian cattle population ([FAO, 2004](file:///F%3A%5Creport%5CA%20Review%20on%20Cattle%20Reproduction%20in%20Bangladesh.html#55066_b)). In the last 10 years, the cattle population has increased by 0.3% in contrast with 0.4% of the world. It has been reported by the Bangladesh Bureau of Statistics (BBS 1999), that 52.0% of male cattle, 62.3% of female cattle and 60.9% of cattle <3 years old are raised by small- and medium-sized farms Number of cattle per livestock household is 3.5 and that of 0.94 for all household ([BBS, 2002](file:///F%3A%5Creport%5CA%20Review%20on%20Cattle%20Reproduction%20in%20Bangladesh.html#46086_b)). Along with indigenous/local zebu cattle some exotic and their crosses (not exceeding 10%) constitutes the national herd. Among the indigenous types ([Mason, 1988](file:///F%3A%5Creport%5CA%20Review%20on%20Cattle%20Reproduction%20in%20Bangladesh.html#54241_b)), non-descript Deshi, Pabna, Red Chittagong are predominant. In Bangladesh, around the year a large number of animals remain barren or unproductive having exposed many times for natural mating or artificial insemination and become a burden for the farmers. The main goal in a commercial dairy operation is to optimize calf production per cow as economically as possible. Age at first service av.1179 days in deshi cattle of Bangladesh, ([Majid et al. 1995)](file:///F%3A%5Creport%5CA%20Review%20on%20Cattle%20Reproduction%20in%20Bangladesh.html#273241_ja). The average calving interval ranged from 365-536 days among the indigenous and crossbred cattle. The average postpartum service period is ranged from 103-161 days in indigenous and crossbred cows. The reproductive performance of cattle of Bangladesh is not satisfactory ([Rahman et al. 2009)](file:///F%3A%5Creport%5CA%20Review%20on%20Cattle%20Reproduction%20in%20Bangladesh.html#537144_ja). The target of a dairy farm is to get one calf from a cow every year. The closer a farm gets to this target, the better will be the economic return ([Shamsuddin et al., 2006](file:///F%3A%5Creport%5CA%20Review%20on%20Cattle%20Reproduction%20in%20Bangladesh.html#537200_ja)), but it is seldom achieved in the dairy farms of Bangladesh. The application of estrus synchronization would improve our cattle’s reproductive performance. Estrous synchronization is the manipulation of the reproductive process so that females can be bred with normal fertility during a short, predefined interval (Stevenson et al., 2000). This control facilitates breeding in two important ways: it reduces and in some cases eliminates the labor of detecting estrus (heat), and it allows the producer to schedule the breeding. If the majority of a herd can be induced to exhibit estrus at about the same time, the producer can arrange for a few days of intensive insemination. Although the total amount of labor involved with insemination may not be reduced, it is concentrated into a shorter period. Other advantages of estrous synchronization include creating a more uniform calf crop, enabling more cows to be artificially inseminated (AI) to a genetically superior bull and reducing the length of the calving interval. It has limited disadvantages such as use of this technology generally requires skilled management and adequate facilities. Cows will respond poorly if not fed properly or if body condition is less than adequate.

In Bangladesh, *Chars* are low-lying areas prone to flood and erosion in or adjacent to major rivers. About 80% of the poor and 36% of ultra-poor people in *chars* rear livestock as a major means of livelihood (Hodson, 2006; Howes, 2006). They rear a number of unproductive cows, and are unable to ensure food security specially from September to November. It is imperative to ensure calf birth within this three month by estrous synchronization in order to increase food production and would help to alleviate poverty in *Chars*.

 **1.1** **Objectives of study**

* To know the success of Estrus Synchronization with GnRH-PGF2α-GnRH protocol.

CHAPTER-II

**REVIEW OF LITERATURE**

**2.1 Estrus Synchronization**

Estrous cycle control or estrous synchronization or control breeding is the treatment of a group animal or individual animal so that estrous and ovulation occur at predetermined times rather than at random over a three week period. The history of estrous cycle synchronization and the use of AI in cattle is a testament to how discoveries in science can be applied to advance the techniques used for livestock breeding and management. Several authors described the experiments that have been conducted since the discovery of ovarian steroids and that have led to the effective control of the length of the bovine estrous cycle and the timing of estrus and ovulation (Hansel and Schechter, 1972; Hansel and

Beal, 1979; Patterson et al., 1989; Odde, 1990; Larson and Ball, 1992).

**2.2 Other Management Considerations for Estrous Synchronization**

Timed Insemination versus Breeding on Visual Observation of Estrus.

Many research studies have examined the effectiveness of breeding on a timed insemination following estrous synchronization rather than visual observation of “standing heat.” Almost every type of synchronization regime has been modified to include a timed or appointment breeding option. Time breeding is a desirable alternative to heat checking especially when time to detect estrus is limited. While results from these studies are somewhat conflicting, generally conception rates on timed insemination are lower than for visual observation, especially in Brahman-influenced females. However, this lower conception rate may be offset by the reduction in management costs because of timed insemination. Some synchronization programs even call for a combination of visual observation and timed insemination, which may improve conception rates above either option alone (Geary et al.,1998).

**2.2.1 Removal of Calf for 48-hours**

In beef cows, frequency of suckling by calves causes a hormonal response that inhibits return to estrus (suckling inhibition). Many studies have concluded that short-term calf removal combined with other forms of synchronization improves response of cows to synchrony and conception rates. Even 48-hour calf removal alone has been shown to cause synchrony and cyclicity in some cows. This procedure is useful but does require increased management and good facilities to prevent separated cows and calves from rejoining each other (Geary et.al,.1998) .

**2.3 Estrous Synchronization Protocols**

Many estrous synchronization protocols are available to producers.Scientists from around the world perform research to analyze the effectiveness of each protocol.A few of these protocols have been studied include the Monday Morning system(one-shot prostaglandin), two shot prostaglandin, the MGA/prostaglandin system,the MGA/GnRH/prostaglandin system,select synch, co-synch, ov- synch and CIDR/prostaglandin.

**2.3.1 Use of Prostaglandin**

The prostaglandin F2, (PGF2,) caused luteolysis and synchronized estrus (Lauderdale, 1972; Louis et al., 1972; Rowson et al., 1972). **A** single intramuscular injection of PGF2α, two injections separated by 24 h, or a single intrauterine infusion of PGF2α, were each luteolytic when administered between d 5 and 21 of the estrous cycle (Kaltenbach and Graves, 1975). Animals treated with similar doses of PGF2α, prior to d 5 of the cycle, however, did not consistently experience luteolysis (Lauderdale et al., 1974); hence, the original recommendation to synchronize estrus in a herd of cattle was to administer two injections of PGF2α, 11 to 14 d apart. Prior to 1982 it was believed that after d **4** of the estrous cycle all cows were equally responsive to a luteolytic dose of PGF2α. (King et al. 1982) and others (Tanabe and Hahn, 1984; Stevenson et al., 1984; Watts and Fuquay, 1985), however, demonstrated that cattle injected with PGF2α, between d 5and 9 of the cycle were less responsive than those injected later in the cycle. The average interval from injection of prostaglandin to estrus is usually 60 to 72 h. Variation in the timing of estrus is created in part by differences among cows in the rate of regression of the CL following treatment. The interval from PGF2α, treatment to estrus has also been related to the time required for an ovulatory follicle to develop (Kastelic et al., 1990)

**2.3.2 Ovsynch**

The second method (named Ovsynch; Pursley et al., 1997) is similar to the previous program, except it requires no heat detection. In fact, it is described more accurately as an ovulation synchronization program; hence the name, Ovsynch. A 100-μg injection of GnRH is given 7 days before a PGF2α injection, and then a second 100-μg injection of GnRH is administered 36 to 48 hr after PGF2α, with one timed AI given 0 to 24 hr later. A recent study found that 1 mL or 50 μg of Cystorelin is sufficient (Fricke et al., 1998). The first GnRH injection alters follicular growth by inducing ovulation of the largest follicle (dominant follicle) in the ovaries after the GnRH injection to form a new or additional CL (Pursley et al., 1995). Thus, estrus usually does not occur until after a PGF2α injection regresses the natural CL and the secondary CL (formed from the follicle induced to ovulate by the first GnRH injection). Therefore, a new group of follicles appears in the ovaries (based on transrectal ultrasonographic evidence) within 1 to 2 days after the first injection of GnRH (Vasconcelos et al., 1999). From that new group of follicles, a newly developed dominant follicle emerges, matures, and can ovulate after estrus is induced by PGF2α or it can be induced to ovulate after a second injection of GnRH. The GnRH injections release pituitary luteinizing hormone (LH), the natural ovulation-inducing hormone of the estrous cycle. Few cows will show heat in this program (Stevenson et al., 1999). About 8 to 16% may show heat around the time of the PGF2α injection. If so, those cows should be AI-bred according to the AM-PM rule and the second GnRH injection eliminated.

**2.3.3 CO-Synch**

The CO-Synch program calls for an injection of GnRH on day 1, an injection of prostaglandin on day 8 and then a second injection of GnRH with breeding on day 10( Geary et al., 1998). This program’s advantages are tight synchronization of estrus, most females respond to the program and it encourages estrus in non-cycling cows that are at least 30 days postpartum. The program’s disadvantages are the relative expense and that females are handled twice before breeding, which is the only difference between CO-Synch and Ovsynch. Some females will show improved estrus response when 48 hour calf removal is utilized after the prostaglandin injection (DeJarnette et al., 2001).

**2.3.4 Select-Synch**

The Select-Synch program calls for an injection of GnRH on day 1, injecting cows not artificially inseminated with prostaglandin on day 8 and then estrous detection and breeding following day 8. Select Synch (Geary et al., 2000) differs, too, in that cows do not receive the second injection of GnRH and are not inseminated at a fixed time. Cows synchronized with this protocol are inseminated 12 hrs after detected estrus. It is currently recommended that for Select Synch-treated cows, detection of estrus begin as early as 4 day after GnRH injection and continue through 6 d after PG (Kojima et al., 2000).

**2.3.5 Melengesterol Acetate (MGA)**

MGA is the only synchronization product that is administered orally. Melengestrol acetate, as a progestogen, was shown to be effective for estrus synchronization of beef cows and heifers (Zimbelman et al., 1970). Estrus synchronization programs designed for heifers and postpartum beef cows should be evaluated in relation to their effect on conception (Patterson et al., 1989; Folman et al.,1990). Until recently, there was little published evidence comparing methods of estrous cycle control that utilize PG alone to methods that utilize progesterone or progestogens in conjunction with PGF2α. This program calls for feeding 0.5 milligrams of MGA per head every day for 14 days**.** Feeding MGA for 14 d followed by PGF2α injection 17 d after MGA feeding (MGA-PGF2α protocol) is an effective method of estrous cycle control in heifers (Brown et al., 1988; Patterson and Corah, 1992). More recently, an increase in estrous response, synchronized conception and pregnancy rates, and fecundity in the postpartum cow was reported among cows treated with the MGA-PGF2α protocol when compared with PGF2α alone (Figure 2A and B; Patterson et al., 1995). The second synchronized estrus after MGA, whether spontaneous or induced with PG, may be inherently more fertile both dairy (Britt et al., 1972) and beef cows (Zimbelman et al., 1970; Patterson et al., 1995) . The administration of MGA at the recommended daily rate of 0.5 mg prevents the expression of behavioral estrus, blocks the preovulatory surge of LH, and ovulation (Zimbelman and Smith, 1966; Zimbelman et al., 1970; Imwalle et al., 2002). The MGA-PGF2α protocol avoids problems with reduced conception and offers advantages compared with untreated controls (Brown et al., 1988; Patterson and Corah, 1992).

**2.3.6 Controlled Internal Drug Releasing Device (CIDR)**

CIDRs were developed in New Zealand and have been used there and in other countries for several years with good results. The wings of the CIDR are pulled in so that the entire device is shaped like a rod that can be inserted into the vagina with an applicator. On the end opposite the wings, a tail is attached that hangs outside the heifer and allows you to easily remove the insert seven days after administration. The backbone of the CIDR is a nylon spine covered by a Progesterone impregnated silicone skin. Upon insertion, blood progesterone concentration rise rapidly. Maximal concentrations are reached within an hour (Roche, 1976). Progesterone concentrations are maintained at a relatively constant level during the seven days the insert is in the vagina. Upon removal of the insert, progesterone concentration in the bloodstream drops quickly. Very few CIDRs fall out during the 7-day treatment. The average loss is only 2-3% in most herds with a few reaching 10%. Research with dairy cows has shown that while most cows

with a CIDR insert will have a clear to cloudy mucus discharge from the vagina due to mild irritation of the vaginal wall, very few (2%) had evidence of a vaginal infection.

The schedule that should be followed is:

Day 1 – Insert the CIDR device into the vagina of heifers or cows to be bred. This device will be left in place for 7 days.

Day 7 or 8 – All cows and heifers to be bred are injected with a 5 cc dose of Lutalyse intramuscularly in the neck.

Day 8 – The CIDR is removed. The animal’s head does not necessarily need to be caught to remove the device. Often confinement in a crowding alley will be sufficient.Days 9-11 – Observe for signs of heat and inseminate following detection of heat (Larson et. al.,1996).

CHAPTER-III

**MATERIALS AND METHODS**

Study area: The study area was MJSKS ( Mahideb Jubo Somaj Kallayan Somity) Ulipur,Kurigram .

Study period: The intern placement were brought under study where 21 days period had been fixed for NGO ZIBIKA, CLP,Kurigram starting from 02/O4/2012 to 21/04/2012. I collected all recorded data about estrus synchronization for my clinical report from MJSKS ( Mahideb Jubo Somaj Kallayan Somity) Ulipur,Kurigram .

Experimental animals: One hundred and eighty four female cattle were selected from the beneficiaries of MJSKS ( Mahideb Jubo Somaj Kallayan Somity) Ulipur,Kurigram. These cattle were brought from local cattle markets and all are locally available indigenous type. Among those cattle One hundred and sixty five were heifer and nineteen were dry cow (parity 1). The age of heifers were almost about (2.5-3.0) years. The BCS (Body condition score) of all heifers and cows were above (3.5). Before estrus synchronization treatment the all animals were treated with anthelmentics, appetizer and multivitamin preparations. Animals were maintained by straw and locally available grasses. Sometimes concentrate feeds and Napier grass were supplied from MJSKS. Regular monitoring of cattle health was performed by the local supervisors of MJSKS. All heifers and cows were confirmed non-pregnant by rectal palpation and history taking.

Treatment and post-treatment monitoring:

There are several methods of estrus synchronization. The Ovsynch method of estrus synchronization was used. The Ovsynch program calls for an injection of GnRH on day 1, an injection of prostaglandin on day 8, a second injection of GnRH on day 10 and then insemination has done after detection of estrus.



**Figure: 3.1 Steps of Ovsynch method.**

Injection Fertilon® was used as GnRH (generic name – Synthetic Gonadorelin, 100 microgram/5 ml vial, dose-5ml/cattle intramuscularly,Marketed by Techno Drugs) and Injection Dinoprost® was used as prostaglandin (generic name-Trometamol, 5mg/5ml vial,dose-5ml/cattle intramuscularly, Marketed by Techno Drugs). After the second GnRH injection the animals were kept under close observation for detection of estrous sign. The estrous signs and time of estrus was recorded by the owner/field worker of MJSKS. The selected animals were divided into three groups on the basis of days required to show estrus, such as Group-1;(0-10)days, Group-2; (11-20)days, Group-3; (21-35)days.

Estrus cattle were bred artificially by the local AI (artificial inseminator) worker of BRAC (Bangladesh rural advancement committee) at proper time with ( 50% HF or 50% SW) semen. Cows/Heifers that non-reversed to estrus were assumed to be pregnant. Those cows/heifers reversed to estrus after first AI they were again bred on the next heat. Cows/heifers reversed second time they were bred naturally/artificially. Those reversed third time they were treated as conception failure. The following data were recorded including days required to estrus, conception rate, and conception failure. After that all the recorded data were computerized and descriptive statistical analysis were done.

CHAPTER-IV

**RESULTS AND DISCUSSION**

All the treated cattle were not responding to estrus synchronization program within the normal time. Synchronized animals were shown estrus range from 0-35 days. Among 165 Heifers 122 were response to treatment within different time. It represents 26.06% of total treated population were non responsive. In case of heifer the use of Ovsynch method of estrus synchronization around 30% population fails to show heat (Pursley et al., 1995). In this experiment the percentage of non responsiveness is not too much. On the other hand among cows the nonresponsiveness is 31.58%. Ovsynch method has no importance on cows reproductive profile improvement but it improves heifer’s reproductive performance (Stevenson et al., 1999).

Table:4.1 Onset of estrus after synchronization with GnRH-PGF2alpha-GnRH in cattle

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Animals | Heat shown after synchronization | Total | Repeat to heat 2nd time | Repeat to heat 3rd time |
| 0-10 (Days) | % | 11-20 (Days) | % | 21-35 (Days) | % | Av |
| Heifer (n=165) | 52 | 42.62 | 43 | 35.24 | 27 | 22 | 33.33 | 122 | 41 | 9 |
| Cow (n=19) | 8 | 61.53 | 3 | 23.03 | 2 | 15.38 | 33.31 | 13 | 4 | 1 |
| Total (N= 184) | 60 |  | 46 |  | 29 |  |  | 135 | 45 | 10 |

The table 4.1 shows the onset of estrus after synchronization with GnRH-PGF2alpha-GnRH protocol. Among 165 heifers 122 were shown estrous at different time. The highest number of heifers shows estrous within (0-10) days 52;42.62%, followed by 43;35.24% and 27;22% within (11-20) and (21-35)days respectively. Its due to that the heifers at first group were respond to this synchronization method and this synchronization program enhance to show estrous for the next two groups. Among the cows highest number was shown estrous within (0-10)days 8; 61.53% followed by 3;23.03% and 2;15.38% within (11-20) and (21-35) days respectively.

The range of onset of estrus in ovsynch method is very narrow. Usually after 16-24 hrs of 2nd GnRH injection. About 8 to 16% may show heat around the time of the PGF2α injection (Stevenson et al., 1999).

The deviation may be due to the quality of hormone used, nutrition, age, breed, health status of cattle. Among 122 responsive heifers 33.60% were repeat to heat 2nd time and 7.37% were repeat to heat 3rd time.

35% of heifer repeat estrus at 2nd time (Stevenson et al., 2000).

Table: 4.2 Conception rate of AI in cattle after estrus synchronization with GnRH-PGF2alpha-GnRH

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Animal | Insemination | Conception | Conception Rate | OCR | SPCR |
|  | 1st | 2nd | 3rd | 1st | 2nd | 3rd | 1st | 2nd | 3rd |  |  |
| Heifer(n=165) | 122 | 41 | 9 | 59 | 22 | 04 | 48.36 | 53.65 | 44.44 | 51.51 | 2.02 |
| Cow(n=19) | 13 | 4 | 1 | 9 | 01 | 01 | 69.23 | 25 | 100 | 57.90 | 1.8 |
| Total | 135 | 45 | 10 | 68 | 23 | 05 | 50.37 | 51.11 | 50.00 | 52.17 | 1.97 |

\*OCR=Overall conception rate. \*SPCR=service per conception rate

This table represents the conception rate of experimental heifers and cows. The overall conception rate was 51.51 and 57.90in heifer and cow respectively.

Ovsynch protocol revealed that when cows were started on this protocol between days 5 and 12 of the estrous cycle, conception rates tended to be greater than at other stages of the cycle

(Vasconcelos et al., 1999).

In Ovsynch protocol conception rate is around 50% (Stevenson et al., 1999).`In the study the conception rate is higher than 50%.

The services per conception rate were 2.02 and 1.8 in heifer and cow respectively in this study. Heifers usually required 1.5 service per conception (Badingia et.al., 1985).

CHAPTER-V

**CONCLUSION**

Estrous synchronization can be a useful tool in the reproductive management of a cow herd. However, if proper levels of nutrition, body condition and health are not maintained, the program is likely to fail. Improvements in facilities and management may be necessary before implementing an estrous synchronization program. This study represents good synchronization rate and conception rate but there is deviation in the length of showing estrus. It’s may be due to hormone quality, age, nutritional status and health status of the animal. In this study 73.96% heifer and 68.42% cows respond to synchronization method. Overall conception rate was 51.51 and Service per conception rate was1.97%. For the greater accuracy further study is recommended.

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**APPENDIX**

1. Estrus within ( 0-10 days) after GnRH-PGF2α-GnRH treatment.

 **For Heifer**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SL****No** | **Cattle ID No.** | **First service conception** | **Second****service conception** | **Third service conception** | **Conception****Failure** |
| **01** | 01 | 1 |  |  |  |
| **02** | 02 | 1 |  |  |  |
| **03** | 05 |  |  |  | 1 |
| **04** | 13 | 1 |  |  |  |
| **05** | 15 | 1 |  |  |  |
| **06** | 16 | 1 |  |  |  |
| **07** | 19 |  | 1 |  |  |
| **08** | 22 | 1 |  |  |  |
| **09** | 24 |  |  |  | 1 |
| **10** | 26 | 1 |  |  |  |
| **11** | 32 | 1 |  |  |  |
| **12** | 34 |  |  |  | 1 |
| **13** | 39 |  | 1 |  |  |
| **14** | 44 |  |  |  | 1 |
| **15** | 45 | 1 |  |  |  |
| **16** | 47 | 1 |  |  |  |
| **17** | 48 |  |  |  | 1 |
| **18** | 49 |  | 1 |  |  |
| **19** | 52 |  | 1 |  |  |
| **20** | 53 | 1 |  |  |  |
| **21** | 54 |  |  |  1 |  |
| **22** | 55 | 1 |  |  |  |
| **23** | 57 | 1 |  |  |  |
| **24** | 59 |  | 1 |  |  |
| **25** | 60 |  |  |  | 1 |
| **26** | 62 |  | 1 |  |  |
| **27** | 65 | 1 |  |  |  |
| **28** | 66 | 1 |  |  |  |
| **29** | 70 |  |  |  | 1 |
| **30** | 72 | 1 |  |  |  |
| **31** | 76 | 1 |  |  |  |
| **32** | 84 |  |  |  | 1 |
| **33** | 88 |  |  |  | 1 |
| **34** | 93 | 1 |  |  |  |
| **35** | 96 |  | 1 |  |  |
| **36** | 117 | 1 |  |  |  |
| **37** | 118 | 1 |  |  |  |
| **38** | 122 |  |  |  | 1 |
| **39** | 126 | 1 |  |  |  |
| **40** | 133 | 1 |  |  |  |
| **41** | 134 |  |  |  | 1 |
| **42** | 138 |  | 1 |  |  |
| **43** | 139 |  | 1 |  |  |
| **44** | 146 | 1 |  |  |  |
| **45** | 151 |  |  |  | 1 |
| **46** | 155 | 1 |  |  |  |
| **47** | 158 |  |  | 1 |  |
| **48** | 162 | 1 |  |  |  |
| **49** | 168 |  |  |  | 1 |
| **50** | 169 |  | 1 |  |  |
| **51** | 176 | 1 |  |  |  |
| **52** | 178 |  | 1 |  |  |
|  | **Total** | **26** | **11** | **2** | **13** |

 Table 1.1: Estrus within ( 0-10 days) after GnRH-PGF2α-GnRH treatment.

 **For cow**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SL****No** | **Cattle ID No**. | **First service conception** | **Second service conception** | **Third service conception** | **Conception****Failure** |
| 01 | 10 | 1 |  |  |  |
| 02 | 23 |  |  |  | 1 |
| 03 | 129 | 1 |  |  |  |
| 04 | 135 |  |  | 1 |  |
| 05 | 171 | 1 |  |  |  |
| 06 | 174 |  | 1 |  |  |
| 07 | 175 | 1 |  |  |  |
| 08 | 179 | 1 |  |  |  |
|  | **Total** | **5** | **1** | **1** | **1** |

 **Table 1.2 :** Estrus within ( 0-10 days) after GnRH-PGF2α-GnRH treatment.

1. Estrus within ( 11-20 days) after GnRH treatment. **For heifer**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SL****No** | **Cattle ID No** | **First service conception** | **Second service conception** | **Third service conception** | **Conception****Failure** |
| **01** | 09 |  |  | 1 |  |
| **02** | 11 | 1 |  |  |  |
| **03** | 12 |  |  |  | 1 |
| **04** | 14 | 1 |  |  |  |
| **05** | 17 | 1 |  |  |  |
| **06** | 25 |  |  |  | 1 |
| **07** | 27 | 1 |  |  |  |
| **08** | 28 | 1 |  |  |  |
| **09** | 29 |  |  |  | 1 |
| **10** | 31 | 1 |  |  |  |
| **11** | 33 | 1 |  |  |  |
| **12** | 40 |  |  |  | 1 |
| **13** | 46 |  |  |  | 1 |
| **14** | 50 |  | 1 |  |  |
| **15** | 51 | 1 |  |  |  |
| **16** | 56 |  | 1 |  |  |
| **17** | 61 | 1 |  |  |  |
| **18** | 71 | 1 |  |  |  |
| **19** | 73 |  | 1 |  |  |
| **20** | 92 |  | 1 |  |  |
| **21** | 95 |  |  |  | 1 |
| **22** | 97 | 1 |  |  |  |
| **23** | 100 |  |  |  | 1 |
| **24** | 101 |  |  | 1 |  |
| **25** | 102 |  | 1 |  |  |
| **26** | 103 | 1 |  |  |  |
| **27** | 107 | 1 |  |  |  |
| **28** | 108 | 1 |  |  |  |
| **29** | 113 | 1 |  |  |  |
| **30** | 120 |  | 1 |  |  |
| **31** | 125 |  | 1 |  |  |
| **32** | 130 |  |  |  | 1 |
| **33** | 137 |  | 1 |  |  |
| **34** | 140 | 1 |  |  |  |
| **35** | 141 | 1 |  |  |  |
| **36** | 147 |  | 1 |  |  |
| **37** | 149 | 1 |  |  |  |
| **38** | 150 | 1 |  |  |  |
| **39** | 152 | 1 |  |  |  |
| **40** | 160 |  |  |  | 1 |
| **41** | 164 |  | 1 |  |  |
| **42** | 165 | 1 |  |  |  |
| **43** | 180 |  |  |  | 1 |
|  | **Total** | **21** | **10** | **2** | **10** |

 **Table 2.1:** Estrus within ( 11-20 days) after GnRH-PGF2α-GnRH treatment

 **For cow**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SL****No** | **Cattle ID No** | **First service conception** | **Second service conception** | **Third service conception** | **Conception** **Failure** |
| **01** | 7 |  |  |  | 1 |
| **02** | 145 | 1 |  |  |  |
| **03** | 157 |  |  |  | 1 |
|  | Total | 1 |  |  | 2 |

 **Table 2.2:** Estrus within ( 11-20 days) after GnRH-PGF2α-GnRH treatment

1. Estrus within ( 21-35 days) after GnRH-PGF2α-GnRH treatment.

 **For Heifer**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SL****No** | **Cattle ID No** | **First service conception** | **Second service conception** | **Third service conception** | **Conception****Failure** |
| **01** | 21 | 1 |  |  |  |
| **02** | 35 |  |  |  | 1 |
| **03** | 79 |  |  |  | 1 |
| **04** | 86 | 1 |  |  |  |
| **05** | 90 | 1 |  |  |  |
| **06** | 91 |  | 1 |  |  |
| **07** | 98 |  |  | 1 |  |
| **08** | 99 |  |  |  | 1 |
| **09** | 106 | 1 |  |  |  |
| **10** | 109 | 1 |  |  |  |
| **11** | 110 | 1 |  |  |  |
| **12** | 111 |  |  |  | 1 |
| **13** | 112 |  |  |  | 1 |
| **14** | 114 | 1 |  |  |  |
| **15** | 116 |  | 1 |  |  |
| **16** | 181 | 1 |  |  |  |
| **17** | 6 |  | 1 |  |  |
| **18** | 8 |  |  |  | 1 |
| **19** | 37 |  |  |  | 1 |
| **20** | 63 |  |  |  | 1 |
| **21** | 94 |  |  |  | 1 |
| **22** | 115 | 1 |  |  |  |
| **23** | 123 |  | 1 |  |  |
| **24** | 143 |  |  |  | 1 |
| **25** | 182 | 1 |  |  |  |
| **26** | 183 | 1 |  |  |  |
| **27** | 184 |  |  |  | 1 |
|  | **Total** | **11** | **4** | **1** | **11** |

 **Table 3.1:** Estrus within ( 21-35 days) after GnRH-PGF2α-GnRH treatment.

 **For cow**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SL****No** | **Cattle ID No** | **First service conception** | **Second service conception** | **Third service conception** | **Conception****Failure** |
| **01** | 30 | 1 |  |  |  |
| **02** | 105 | 1 |  |  |  |
|  | **Total** | **2** |  |  |  |

 **Table 3.2:** Estrus within ( 21-35 days) after GnRH-PGF2α-GnRH treatment