Efficiency Comparison between Two Systematic Breeding Protocols: Target Breeding and Presynchronization Program At a Large Central Valley Dairy Farm

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By

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Abstract

As dairy herd sizes increase, dairymen often initiate systematic breeding programs on their dairy in order to improve their reproduction efficiency. The objective of this study, compares systematic breeding program by comparing reproductive efficiency between two systematic breeding programs Target Breeding (January 1, 2008 to May 31,2009) and Presynchronization (Presynch) Program (January 1, 2010 to May 31, 2011) at a large central valley dairy. The traditional Target Breeding program is a systematic breeding program that is solely prostaglandin ($PGF_{2\alpha}$) based. The more modern Presynch programs includes both Gonadotropin Releasing Hormone (GnRH) and $PGF_{2\alpha}$, that allows for both superovulation and estrus synchronization. The dairy's herd size is 1500 milking cows. Data was collected from DHI-Plus management software for both two systematic breeding programs. The data compared was the 21 d pregnancy rate, conception rates, and 1st service conception rates. The results of this study state that the Presynch Program was more efficient in all the areas observed during this study. The Presynch Program showed higher averages in 21 d pregnancy rate, conception rates and 1st service conception rates.

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Introduction

Today with the ever increasing herd sizes in the dairy industry has caused dairymen to implement systematic breeding programs that allow for synchronized estrus or Timed Artificial Insemination (TAI). These synchronization programs, allow dairymen to find more cows that are in estrus. Finding more cows in estrus, allows for more cows to become pregnant. It is important for dairyman to select the correct systematic breeding program that is both efficient and profitable for the dairy.

Throughout time, advancements related to efficiency of reproduction programs on dairies has encouraged dairymen to switch from the traditional breeding programs to more modern synchronization programs, that allow to dairymen to choose when the cows enter estrus. In order to track efficiency of a systematic breeding program, many dairymen utilize three benchmarks for their systematic breeding programs; 21 d pregnancy rate, conception rates, and 1st service conception rates. The 21 d pregnancy rate is defined as the percentage of eligible non pregnant cows that become pregnant during a given 21-d interval. Conception rate is percentage of successful breeding during a given time. The 1st service conception rate is the percentage of successful 1st service breedings. A large central valley dairy made the decision to switch from the traditional Prostaglandin based, Target Breeding Program to the Presynch Program that allows for synchronization of estrus. A comparison between the Target Breeding Program and Presynch Program using 21 d pregnancy rate, conception rates, 1st service conception rates, was compared to evaluate which systematic breeding program is more efficient at this large central valley dairy.

Literature Review

History of Artificial Insemination

Artificial Insemination (AI) is the process in which humans have to ability to collect, test, store, and to deposit semen into the uterus of a female in order to get her pregnant. Actually, the thought that people where able to AI animals has been around since the 1300's. During this time, Arab tribal chiefs wanted to mate mares to a stallion owned by his enemies. The tribal chiefs would use the scent of the female to get the stallion to ejaculate, and collect it. The chiefs would then put the semen into the reproduction tract of his mare. Several centuries later, AI became the focal point for many scientists around the world. One of the first scientists that influenced advancement of AI was Leeuwenhoek in 1678 in which he was the first to see sperm under a microscope, in which they called sperm, "animalcules." (Foote, 2002) One century later, the first successful AI was completed by Spallanzani (1784).

It wasn't until the 20th century that scientist started to use AI in a practical sense. The first scientist to develop semen extenders and train technicians to select superior males to be used in progeny was Ivanoff in 1907. (Foote, 2002) The first artificial vagina was made by another Russian scientist, Milovanov in 1964. This advancement greatly influenced the AI industry since scientists, were now able to collect semen in a more efficient way, compared to the collecting semen on a sponge then placing the sponge into the vagina of the recipient. (Foote, 2002) The first AI cooperative dairy was designed by Eduard Sørensen, a Dutch scientist in 1936. This dairy included 1,050 dairy cows in which Sørensen was able conceive 59% which was higher than natural service done on the same herd. (Foote, 2002) This study encouraged the United States and other Western countries to start their own dairy cattle AI programs. Sørensen was also the first scientist to develop the method of rectovaginal fixation of the cervix. This new method

of cattle insemination enabled the use of much less semen since the semen would be deposited in the middle of the cervix. (Foote, 2002) Sørensen created the first semen straw used for packaging semen.

Great advancements occurred in the AI industry, after the first two AI cooperatives started in United States, 1938. Some of these advancements include semen evaluation, semen cooling, semen extenders, genetically selecting bulls for milk program, frozen semen, etc. The first issue that dairy scientist needed to figure out was how to extend the life of collected semen. In 1941, dairy scientist developed the first semen extender media that was buffered with egg yolk. Glycerol was later added to media to act as a cryopreservation for the bull sperm. (Foote, 2002) This initiated the idea of being able to freeze the semen for later use. The main reason for starting AI programs was to collect bull semen that genetically superior for milk production. In the 1950's scientist created new ways to evaluate bull semen for milk production.

These advancements led to the improved status of AI programs across the world. This status turned the several AI cooperatives into large corporations. The next step to improve the AI program was the ability to find cows that were in estrus. The advancement in estrus detections includes superovulation and synchronization of estrus. These advancement in estrus detection led to higher fertility ratings in dairy cattle.

Importance of a Successful Reproduction Program

A successful and profitable reproduction program on any large dairy should be kept at the upmost importance. As dairymen increase their herd size and maximize their herd's milk production in order to compete with the rising expenses in running a dairy, dairymen often neglect their reproduction program on their dairy. Neglecting this program can cause them to be less profitable in the long run. (Nebel, 1998) A dairy with a successful reproduction program has

a calving interval around 12 mo. to 13 mo. As this calving interval increases, the dairies profits decrease due to inefficiency of a reproduction program. A higher calving interval means that cows spend more time producing a lower amount in milk production. (Nebel, 1998) There are many factors related to the calving interval such as estrus detection, days at first service, and Voluntary Waiting Period (VWP). Improving your estrus detection, would help increase your pregnancy rate within a certain time period, thus lower calving interval. (Nebel, 1998)

Estrus detection plays an important role in the profitability and effectiveness of the reproduction programs. If you are unable to recognize when the cows are not in estrus, then you will be unable to get your cows to conceive. Estrus detection is described as the percentage of possible estruses that have been observed in a certain time period. (Nebel, 1998) Detecting estruses inaccurately results in you breeding cows that are not in estrus, causing your conception rate to decrease. Detection inefficiency results in a loss of over $300 million to the dairy industry. (Senger, 1994) A low detection rate is also directly rated to poor fertility, long calving intervals, intensive replacement of heifers, and reduced genetic progress. (Fuquay, 2011)

Systematic breeding programs help dairymen detect heats, since systematic breeding programs allow dairymen synchronize estrus. There are many different systematic breeding programs available such as Target Breeding, Presynch, or Ovysynch. There are two important hormones injections are used with these programs, GnRH and $PGF_{2\alpha}$. (Nebel, 1998) These two hormones injection help the cow reach estrus in a timely fashion. Economics play an important role in choosing which systematic breeding program a dairyman chooses. Dairymen have to consider cost effectiveness when deciding if a systematic breeding program is right for them. (Nebel, 1998)

Table 1 Standard Cost of Injections used during Protocols

Item	Cost ($)	Range ($)
GnRH per dose	**1.65**	**1.50 to 4.50**
$PGF_{2\alpha}$	**2.50**	**1.50 to 4.50**
Labor per hour	**12.00**	**6.50 to 14.00**
Daily rearing cost per cow per day	**2.00**	**.75 to 2.25**

Presynchronization Program

The initiation of the Ovysynch protocol on dairies was a huge advancement in a estrus synchronization programs and timed artificial insemination (TAI). The Ovysynch protocol consists of a first injection of GnRH 7 d before $PGF_{2\alpha,}$ followed by another injection of GnRH 30-36 h, then TAI 16-20 h later. (Nebel, 1998)

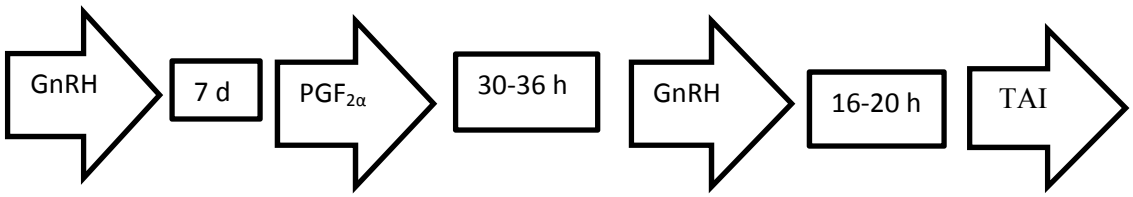

Figure 1 Standard Ovysynch Protocol

The first injection of GnRH is used to cause luteinization of the largest follicle in approximately 85% of all cows. (Nebel, 1998) The first shot of $PGF_{2\alpha}$ is used to help the Corpus Luteum (CL) regress that was luteinize by GnRH. A new follicle is formed by the time you give the second injection of GnRH. When the cow is injected with the second GnRH, causes the second forming

follicle to luteinize. Studies have shown that conception rates of the Ovsynch protocol do not differ than cows that were inseminated after detection of estrus. (Cartmill, 2001) On the other hand, some studies also show that there was a decrease in conception, bur an increase in pregnancy rates occurred. (Cartmill, 2001)

The Presynch program is a modified form of the Ovsynch program. The presynch program consists of two $PGF_{2\alpha}$, before the first injection of GnRH in the Ovsynch program. The second shot of $PGF_{2\alpha}$ is given 12 d after the first injection. The first injection of GnRH should be given 2 d after the second injection of $PGF_{2\alpha}$.

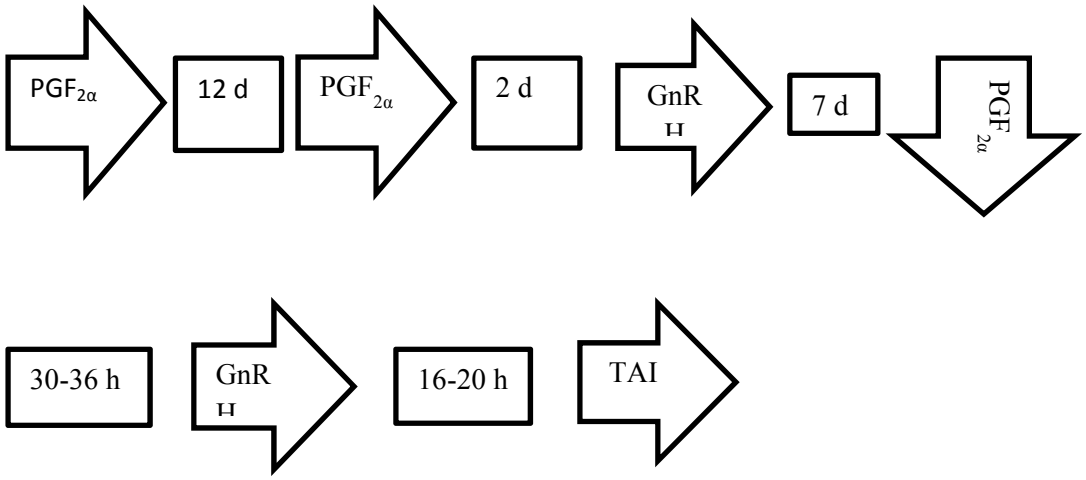

Figure 2 Standard Presynch Protocol

When comparing Presynch program to the OvSynch program, Presynch program had higher conception rate, but the timing of reinsemination of the non-pregnant cows is reduced. (Tenhagen, 2004) Ovsynch is also a better choice if the dairy has insufficient estrus detection. Presynch has shown an increase in conception rates compared to the Ovsynch protocol, by optimizing the stage of the estrous estrus cycle at the initiation of Ovsynch. (Dalton, 2005)

The reduction of days open and the numbers of cows that are culled for infertility are what directly affect the economic status of Presynch and Ovsynch programs. (Tenhagen, 2004) One economic downturn from the Presynch and Ovsynch programs is the amount of work and labor cost related to these programs. (Tenhagen, 2004)

Target Breeding

Simplest systematic breeding programs is target breeding. Since this program only requires two injections of $PGF_{2\alpha}$. Each of the $PGF_{2\alpha}$ injection shall be given 14 d apart; TAI shall be completed by the third day after the last $PGF_{2\alpha}$. The first injection should be given 14 d after the VWP. After given that first injection of $PGF_{2\alpha}$, the cow should be examined for the estrus. (Nebel, 1998)

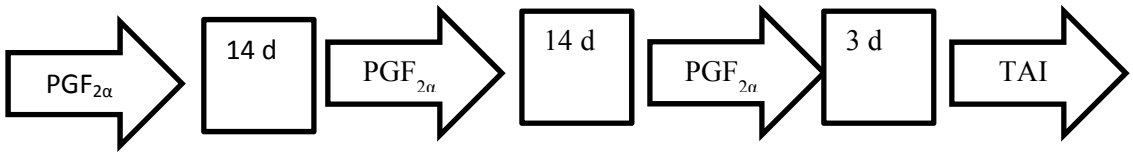

Figure 3 Standard Target Breeding Protocol

Figure 4 Target Breeding Protocol

There many different methods to this program depending on the dairy. Some alternate methods include only giving one or two $PGF_{2\alpha}$ injections before the TAI. Target breeding program is solely based on the presence of the functional CL of the cow. So when breeding your cows using $PGF_{2\alpha}$ as the luteolyic agent, estrus detection becomes a little easier since most of the cows will be in estrus at the same time, although estrus is not exact because the follicular development varies at the time of luteal regression. (Nebel, 1998) This protocol was intended to start the

cycle, while the cow a has a midcycle CL causing the cow to be thrown into estrus after the second injection of $PGF_{2\alpha}$. (Nebel, 1998) The efficiency of the Target breeding program conceptions rates are also directly involved with the amount of plasma progesterone produced during the days of preceding luteolysis. (Nebel, 1998)

There have been many studies related to the efficiency of the Target Program with conflicting results. One study completed by Stevenson, said that there is no significant difference in the duration or variations of calving intervals using the Target breeding program. (Nebel 1998) While another study completed by Lucy et al, found that the Target breeding program had reduced calving intervals. (Nebel, 1998)

Methods and Materials

Herd Management

In this study, I gathered all my data from a large central valley dairy. This project compares previous reproduction data (Target Breeding Program) to current reproduction data (Presynch Program) to determine which systematic breeding program is more efficient at this large central valley dairy. The dairy has 1500 Holstein cows. All of the cows are housed in freestall barn with self-locking stations and fed a Total Mixed Ration (TMR). The dairy's reproduction records are kept both on DHI-Provo and handwritten cow cards. Both sets of records are updated daily. The dairy originally initiated a Target Breeding Program. In May, 2009 the dairy switched from their traditional Target Breeding Program to the Presynch Program. The data gathered for the Target Breeding is from January 1, 2008 to May 31, 2009. The data gathered for the Presynch Program is from January 1, 2010 to May 31, 2011. The dairy uses chalk as a method of estrus detection. Pink chalk represents cows that open. Blue chalk represents cow that are confirmed pregnant.

The Target Breeding program at this dairy consisted of only two shots of $PGF_{2\alpha}$. In which the first injection were given at 34 DIM. The next injection of $PGF_{2\alpha}$ is given to cows at 57 DIM. (Figure 5) Any cow showing estrus after the VWP would be bred that same day. The injection of 2 ml estrumate was given as a Prostaglandin. Estrus detection is completed every morning at six. Cows that showed signs of estrus would be checked to see if they are passed the VWP of 60 d. Pregnancy checks were completed every Friday morning using ultrasound technology.

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	DIM30	DIM31	DIM32	DIM33	DIM34 First $PGF_{2\alpha}$	DIM35
DIM36	DIM37	DIM38	DIM39	DIM40	DIM41	DIM42
DIM43	DIM44	DIM45	DIM46	DIM47	DIM48	DIM49
DIM50	**DIM51**	**DIM52**	**DIM53**	**DIM54 Second $PGF_{2\alpha}$**	**DIM55**	**DIM56**
DIM57	**DIM58**	**DIM59**	**DIM60 End VWP**	**DIM61**	**DIM62**	**DIM63**
DIM64	**DIM65**	**DIM66**	**DIM67**	**DIM68**	**DIM69**	**DIM70**

Figure 5 Large Central Valley Dairy Target Breeding Schedule

The cows that were under the Presynch program were given their first injection of $PGF_{2\alpha}$, at 42 DIM. Fourteen days later at 56 DIM the cow will receive its second injection of $PGF_{2\alpha}$. At 60 DIM, if the any cows exhibited signs of estrus the cow would be bred, that same day. Estruses are checked every morning. Two weeks after the second injection of $PGF_{2\alpha}$, the cow would receive her first injection of GnRH. At 77 DIM the cow would receive her third injection of $PGF_{2\alpha}$. 2 ml of estrumate was used as the prostaglandin injection. 2ml of cystorellin was used as the GnRH injection. Pregnancy checks are completed using ultrasound technology, ever Friday morning.

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	DIM40	DIM41	DIM42 First $PGF_{2\alpha}$	DIM43	DIM44	DIM45
DIM46	DIM47	DIM48	DIM49	DIM50	DIM51	DIM52
DIM53	DIM54	DIM55	DIM56 Second $PGF_{2\alpha}$	DIM57	DIM58	DIM59
DIM60 End of VWP	DIM61	DIM62	DIM63	DIM64	DIM65	DIM66
DIM67	DIM68	DIM69	DIM70 First GNRH	DIM71	DIM72	DIM73
DIM74	DIM75	DIM76	DIM77 Third $PGF_{2\alpha}$	DIM78	DIM79	DIM80

Figure 6 Large Central Valley Dairy Presynch Schedule

Efficiency Tools

In this study there is three different comparison data points that I will be calculating in order to determine which systematic breeding program is more efficient. The first data compared is the 21 d pregnancy rate. The 21 d pregnancy rate is defined as the percentage of eligible non pregnant cows that become pregnant during a given 21-d interval. Conception rate is percentage of successful breeding over total breedings. The third comparison data point is the 1st service conception rate is the percentage of successful 1st service breedings. All statistical data was calculated use the Two Variable T-Test.

Results and Discussion

The results of this study indicates that there was an increase in the 21 d pregnancy rate, Conception Rate, and 1st service Conception Rate when this large central valley switched from their traditional Target Breeding Program to their more recent Presynch program. During the Target Breeding Program (January 1, 2008 to May 31, 2009) the mean 21 d pregnancy rate was 18.3%, and during the Presynch program (January 1, 2010 to May 31, 2009) the mean 21 d pregnancy rate was 18.5. (Table 2) The conceptions rates mean for the Target Breeding Program and Presynch Program were 25.9 and 27.4, respectively. (Table 2) 1st service conception rate for the Target Breeding Program and the Presynch Program was 27.2 and 34.4, respectively. (Table 2) The mo. with the highest 21 d pregnancy rate, Conception Rate, and 1st service conception rate during the Target Breeding Program was October 2008, February 2008, and February 2009, respectively. (Figure 7) The mo. with the highest 21 d pregnancy rate,

Table 2 21 d Pregnancy, Conception Rates, and 1st service conception rates results for the Target Breeding Program (January 1, 2008 - May 31, 2009) and Presynch Program (January 1 2010 - May 31, 2011)

	21 d Preg rate	Conception Rate	1st serv Conception rate
Jan-08	18	25	27.5
Feb-08	17.9	30.3	26.3
Mar-08	18.6	26.3	25.3
Apr-08	19	27.5	29.6
May-08	17.6	26.3	28.3
Jun-08	19.5	26.4	26.5
Jul-08	16.3	26.9	27.6
Aug-08	16.3	25.3	24.3
Sep-08	19.9	25.7	23.6
Oct-08	20	24.3	24.3
Nov-08	18.5	22.3	28.5
Dec-08	18.1	26.9	27.9
Jan-09	18	27.8	27.6
Feb-09	17.6	23.5	29.1
Mar-09	18.5	27.1	28.6
Apr-09	18	24.9	28.6
May-09	18.6	24	28.4
08-09 Avg	18.3	25.9	27.2
Jan-10	19.6	29	34
Feb-10	18.9	28.2	33.6
Mar-10	18.1	25.4	33.5
Apr-10	18.3	28.9	35.6
May-10	19.4	26.2	37
Jun-10	16.6	24.6	36.5
Jul-10	18.8	29.1	33.4
Aug-10	18.6	29.6	33.6
Sep-10	17.9	26.3	31.2
Oct-10	17.6	25.6	34
Nov-10	18.6	26.8	34.8
Dec-10	19.5	27.6	35.9
Jan-11	18.5	23.4	34.8
Feb-11	18.5	26.5	34.6
Mar-11	17.6	26.2	34
Apr-11	18.9	26.7	34.2
May-11	19.6	28.5	34.6
10-11 Avg	18.5	27.0	34.4

Conception Rate, and 1st service conception rate during the Presynch Program was January 2010, August 2010, and May, 2010, respectively. (Figure 8)

During the summer mo. (June July August) the mean for 21 d pregnancy rate, conception rate, and 1st service conception rates for the target breeding program was 17.3, 26.2, and 26.1. (Table 2) The summer mo. mean for the 21 d pregnancy rate, conception rate, and 1st service conception during the Presynch program was 18, 27.7, and 34.5, respectively. (Table 2)The winter mo. (December, January, February) mean for 21 day pregnancy rate for both the target breeding program and Presynch Program 17.9 and 19. (Table 2)The winters mean for conception rates is 26.7 and 28.5, respectively. (Table 2) Winter's mean for 1st service conception rate for both the target breeding program and Presynch program was 27.7 and 34.6, respectively. (Table 2) The winter mo. where slightly higher in 21 d pregnancy rate, conception rate, and 1st service conception rates.

As I interpreted this data I found that the Presynch Program had a higher 21 d pregnancy rate, conception rate, and 1st service conception rate. When comparing the Presynch Program and target breeding for the 21 day pregnancy rate, the Presynch Program will have a higher mean (P = .2).The 21 d pregnancy rate was not a significant increase, which might have resulted from uncontrolled variables such as different TMR's and climate differences during the time periods. Comparing the conception rate, the Presynch Program had a higher conception rate than the Target Breeding Program (P= .04). The Presynch Program will have a higher 1st service conception rate compared to the Target Breeding Program (P= .01). After the switch from the Target Breeding Program to the Presynch Program, the dairyman is becoming more sufficient in synchronizing estrus, thus causing an increase in conception rates and 1st service conception.

During the summer mo., heat stress has a great impact on the reproduction status related. During the summer of 2008, the 21 d pregnancy rate decreased from 19.5 to 16.3. (Figure 7) Once the weather started to cool down the 21 d pregnancy rate leveled out in September 2008.

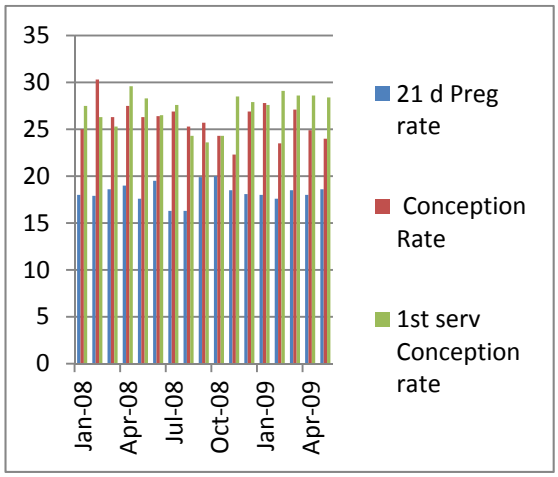

Figure 7 January 1 2008 to May 31, 2008 Monthly 21 d Pregnancy Rates, Conception Rates, and 1st service Conception Rates

During the summer of 2010, the Presynch Program all had a decrease in the 21 d pregnancy rate from 19.4 to 16.6. (Figure 8) By the end of summer 2010, the 21 d pregnancy increased up to 18.8. Heat stress affects both systematic breeding programs the same. During the summer, cows tend to reject the semen, having a negative effect towards the 21 d pregnancy rate. Conception rates and 1st services conception rates are also negatively affected by heat stress. During the Target Breeding Program conception rates and 1st service conception rates slightly decreased from 26.3 to 25.3 and 28.3 to 24.3, respectively. (Figure 7) Presynch Program's conception rates increased during the summer months from 26.2 to 29.6. (Figure 8) Presynch Program's 1st service conceptions rates decreased from 37 to 33.6. (Figure 8) Even though the Presynch Program's conception rates increased during the summer mo., they still were negatively affected from heat stress since the 1st service conception rates decrease. The conception rates might have increased during the summer mo. due to multiple inseminations per cow causing the dairyman to spend more money per conception.

When comparing my study to other studies comparing the Target Breeding Program and Presynch Program. In a study (Jordan, 2002), found that a Target Breeding Program with a high enough estrus detection can be just as effective as Presynch Program. Another study (Cartmill,

2001) which had similar results of to mine stated that the Presynch program had greater pregnancy rates than the Target Breeding Program, but only for cows that were in multiple lactations. This study also confirmed that the Target Breeding Program had similar pregnancy rates to that of a traditional Ovysynch Program.

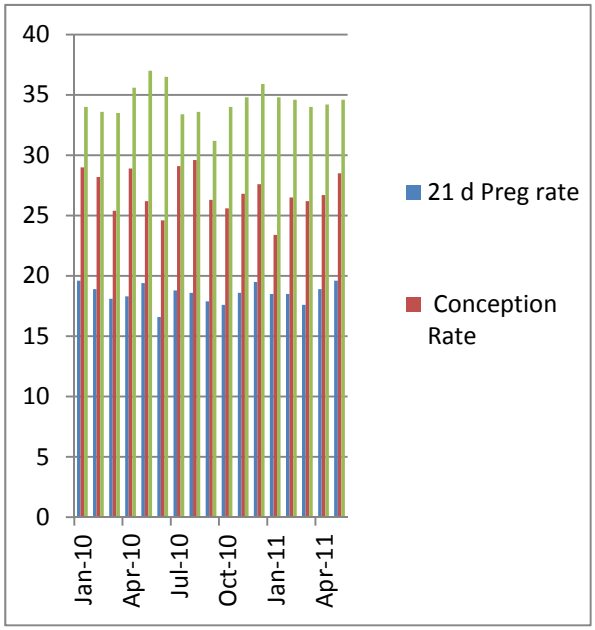

Figure 8 January 1, 2010 to May 31, 2011 Monthly 21 d Pregnancy Rates, Conception Rates, and 1st service Conception Rates

After examining the dairy's records, I found that the overall increase the mean of the 21 d pregnancy rate, conception, and 1st service conception rate by switching to the Presynch Program in May, 2009 improved the dairy's reproduction efficiency. Due to these efficiency improvements at this large central valley dairy by switching to the Presynch Program, the dairy's calving interval and open cow services per cow decreased, resulting in a more profitable systematic program. Refer to Table 3. By decreasing the calving interval, the dairyman is now able to dry off cows before they reach a lower milk production level. Decreasing the open cow services per cow, results in lower cost in order to achieve a pregnancy. I also examined that during the summer mo., heat stress plays that same negative role in affecting the efficiency in both the Target Breeding Program and the Presynch Program. The biggest change between the Target Breeding Program and the Presynch Program was the 1st service conception rate. This increase in the 1st service conception rates means that dairy men are spending less in obtaining a pregnancy.

There are many limitations that affected the results of this study. One limitation is that I gathered data for both systematic breeding programs in January 2012. If was to complete this study again I would split the dairy into two different groups, Target Breeding Program and Presynch Program, and test them both at the same time in control the number of uncontrolled variables in this study.

Table 3 25 Month Herd Summary Data

Test Date	DIM at 1st Brdg	% Cow Preg	Total Preg Cows	Preg Serv/conc	Open cow serv/cow	Calving Interval
17-Jan-08	64	55	783	3.8	4.2	13.8
19-Feb-08	63	46	787	4	4.18	14
15-Mar-08	68	49	765	3.9	4.3	13.9
17-Apr-08	62	52	780	3.5	4.32	13.8
17-May-08	64	51	784	3.9	4.23	14.6
16-Jun-08	64	49	788	3.9	4.25	13.9
18-Jul-08	65	48	789	4.2	4.29	13.4
20-Aug-08	61	46	777	4.1	4.13	13.6
21-Nov-08	62	48	760	3.6	4.15	13.8
19-Oct-08	65	48	769	3.6	4.16	13.7
18-Nov-08	63	48	775	3.8	4.19	13.8
20-Dec-08	65	47	779	3.9	4.2	13.9
20-Jan-09	63	47	783	3.8	4.25	13.8
22-Feb-09	63	45	793	3.7	4.39	13.6
24-Mar-09	63	48	790	3.51	4.38	13.5
28-Apr-09	67	49	793	3.53	4.4	13.5
26-May-09	63	49	781	3.56	4.45	13.4
Jan 08 - May 09 AVG	63.8	48.5	780.9	3.8	4.3	13.8
26-Jan-10	72	70	860	3.23	3.93	13.4
18-Feb-10	72	73	872	3.2	4.14	13.4
18-Mar-10	73	72	843	3.14	3.89	13.5
15-Apr-10	74	69	813	3.15	3.54	13.5
20-May-10	74	69	806	3.16	3.41	13.4
17-Jun-10	74	67	785	3.09	3.39	13.4
15-Jul-10	74	68	775	3.15	3.37	13.4
19-Aug-10	75	65	806	3.11	2.96	13.4
16-Sep-10	75	67	839	2.98	3.09	13.3
21-Oct-10	75	68	855	2.87	3.37	13.3
18-Nov-10	75	69	878	2.86	3.26	13.3
16-Dec-10	75	70	904	2.88	3.34	13.3
20-Jan-11	76	70	861	2.89	3.42	13.3
17-Feb	76	72	866	2.94	3.48	13.3
17-Mar-11	75	70	846	2.89	3.38	13.3
22-Apr-11	75	69	846	2.86	3.42	13.3
19-May-11	75	67	807	2.87	3.4	13.3
Jan 10 -May 11 Avg	74.4	69.1	838.9	3.0	3.5	13.4

Conclusion

After comparing the Target Breeding Program to the Presynch Program, at this large central valley dairy, I have found that the Presynch Program, to be more efficient Program in terms of 21 d pregnancy rate, conception rates, and 1st services rates. During this 17 mo. period Presynch had a higher 21d Pregnancy Rate, conception rate, and 1st service conception rate. Resulting in a lower calving interval and open service per cow, enabling the dairy to become more profitable. I also found that heat stress has the same negative impact on the efficiency of these systematic breeding programs. According to this study, superovulation and synchronization of estrus plays a huge role in the efficiency of reproduction program.

Works Cited

Carthmill, J. A., El-Zarkouny, B. A. Hensley, G. C. Lamb, J. S. Stevenson. 2001. Stage of cycle, incidence, timing of ovulation, and pregnancy rates in dairy cattle after three timed breeding protocols. J. Dairy Sci. 84: 1051-1059.

Dalton, J. C., R. Manzo, A. Ahmadzadeh, B. Shafii, W. J. Price, and J. M. Dejarnette. 2005. Shot communication: conception rates following detection of estrus and timed AI in dairy cows synchronized using GnRH and $PGF_{2\alpha}$. J. Dairy Sci. 88: 4313-4316

Foote, R. H. 2002. The history of artificial insemination: Selected notes and notables. J. Anim. Sci. 80:1-10

Fuquay, J. W., Fox, P. F; McSweeney, Paul L. H. 2011. Encyclopedia of Dairy Sciences. Burlington: Academic Press, 2011. EBook Library. Web. 24 Jan. 2012.

Jordan, E. R., M. J. Schouten, J. W. Quast, A. P. Belchner, M. A. Tomaszewski. 2002. Comparison of two timed artificial insemination (TAI) protocols for management of first insemination postpartum. J. Dairy Sci. 85: 1002-1008.

Nebel, R. L., and S. M. Jobst. 1998. Evaluation of systematic breeding programs for lactating dairy cow: A Review. J. Dairy. Sci. 81: 1169-1174.

Senger, P. L. 1994. The estrus detection problem: new Concepts, technologies, and possibilities. J. Dairy Sci. 77: 2745- 2753 (Abstr.)

Stevenson, J. L., J. A. Rodrigues, F. A Braga, S. Bitente, J. C. Dalton, and J. E. P. Santos. 2008 Effect of breeding protocols and reproductive tract score on reproductive performance of dairy heifers and economic outcome of breeding programs. J. Dairy Sci. 91: 3424-3438

Tenhagen, B. A., M. Drillich, R. Surholt, W. Huewieser. 2004. Comparison of timed AI after synchronized ovulation to AI at estrus: Reproductive and Economic Considerations. J. Dairy Sci. 87: 85-94.