Artificial insemination in beef cow practice

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Introduction

I have been fortunate to work with a progressive set of veterinarians and producers that are willing to embrace technology, and have a great team of technicians to offer artificial insemination (AI) services. We began offering artificial insemination services in the spring of 2008. AI services had been on our radar for about a year as it showed up a few times on client surveys as a service they would like to know more about. We started with those clients in 2008, and only inseminated 269 head. After evaluating the needs to truly offer a great AI service, we purchased a breeding barn in 2009 and began a partnership with Genex CRI for semen sales. Those 2 components, as well as offering to service the entire process, jump-started our involvement in artificial insemination. We currently AI over 5000 head, including heifers and cows.

With the success in the AI programs, our customers began asking for embryo transfer services. We started offering limited ET services in the spring of 2011, and by spring 2014 we were transferring 800 embryos each spring. The tremendous growth in AI and ET has allowed us to brand our theriogenology services as Republican Valley Genetics, which gives a bit of distinction to reproductive services.

The growth of artificial insemination and embryo transfer services has also allowed us to expand other services like pregnancy ultrasound, nutritional consultation, semen sales, production data collection and consultation. In some instances, AI and genetics consultation has allowed us a seat at the management table for herds that we had not previously obtained that privilege. We do offer clients a slightly discounted ultrasound price following AI or ET services, and send them a reminder at 60 days post-service.

Basic nutritional understanding can lead to consultation with clients about how they should handle heifer or cow nutrition prior to and after breeding. An AI program without discussion about nutrition can set you and your client up for failure. Be sure you include at least a review of nutrition with every program. Understanding your client's goals for herd improvement is the first step to helping with genetic selection. A basic understanding of EPD's, DNA testing, and genetic defects is needed to begin a semen sales program. Finally, AI and synch programs have become a tool to show producers that are not keeping records the benefit of a record and data collection system.

Synchronization Programs with Fix-Timed Artificial Insemination

The success of timed artificial insemination programs is what allows artificial insemination to mesh well with bovine practice today. Today's synchronization programs allow you to set a schedule that will work for both you and the producer. The staple of our program involves either the 7-day co-synch with CIDR, 14-day CIDR, or MGA and prostaglandin program. It is important to keep your synch programs as simple as possible so you, your staff, and the client all are on the same schedule. We have also used a combination of heat detection and timed insemination with many producers that have yielded outstanding results. A critical component for an AI program is offering to service the entire process. We offer all services from putting the CIDRS in to pulling the CIDRS and administering prostaglandin injections. In our area the producers are busy with crop planting during much of the breeding season. It is common for a producer to have 1 employee from their operation present with a couple of our people to complete a project. In all circumstances we print a calendar for the producer showing the date and time for all procedures for whichever synchronization program is going to be used. The Iowa Beef Center has given access for anyone to use their synchronization planner, and can be accessed at www.iowabeefcenter.org. This program is customizable to your clinic, and is a great tool for printing simple calendars and cost analysis for your producers.

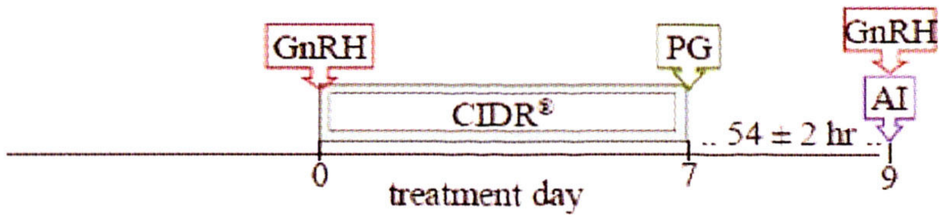
7-Day Co-Synch with CIDR

The 7-day Co-Synch with CIDR is the program we use most often as the schedule is very easy to follow and the timing helps avoid weekends for yourself and the clients. In cows we try to inseminate around 60 to 64 hours following prostaglandin injection. We typically schedule the prostaglandin injection from 2:00 to 5:00 in the afternoon, with the start of breeding from 7:00 to 9:00 a.m. to target the 60 to 64 hour time frame. We will typically initiate the 7-day CIDR program on Monday, Tuesday, and Fridays. For heifers we strive to breed at 52 to 54 hours post-prostaglandin. We have found that early morning injections work best in heifer CIDR

programs, and allows for a mid-day or early afternoon breeding.

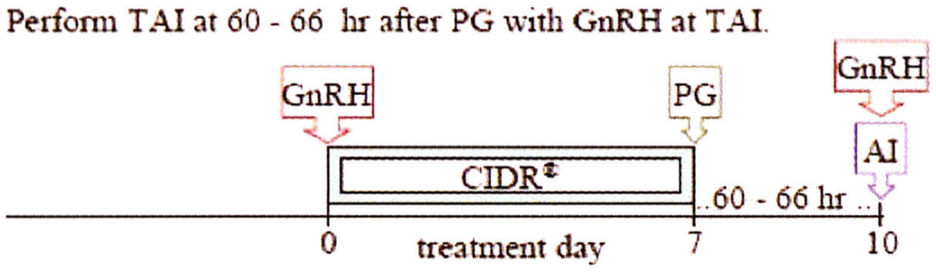
7-day CO-Synch + CIDR® - Heifers

Perform TAI at 54 ± 2 hr after PG with GnRH at TAI.



7-day CO-Synch + CIDR® - Cows

Perform TAI at 60 - 66 hr after PG with GnRH at TAI.

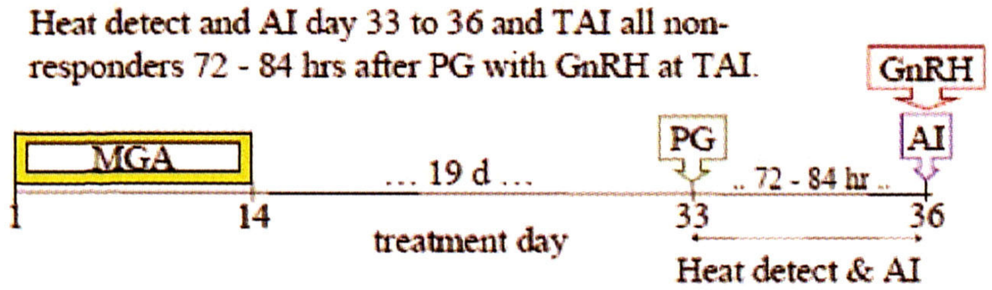


MGA Feeding Program

Melengesterol acetate (MGA) feeding programs for heifers can be rewarding, but first service conception results of simple timed insemination vary much more than we would like to see. MGA programs must be thought-out well in advance as it requires feeding MGA for 14 days followed by a prostaglandin injection 19 days later. We recommend feeding MGA at 0.5 mg/head/day for heifers that do not carry too much flesh, and it is imperative that the diet be wet enough that the MGA pellets cannot be sorted out by the heifers. If the heifers are fleshy we recommend a 14 day CIDR program. The timing of insemination in heifers is much different than the CIDR programs as we have found inseminating 64 to 66 hours post-prostaglandin yields the best results in a timed breeding program. We will generally try heat detection coupled with a timed breeding at 72 hours for best results with the MGA programs in heifers.

MGA®-PG & TAI

Heat detect and AI day 33 to 36 and TAI all non-responders 72 - 84 hrs after PG with GnRH at TAI.

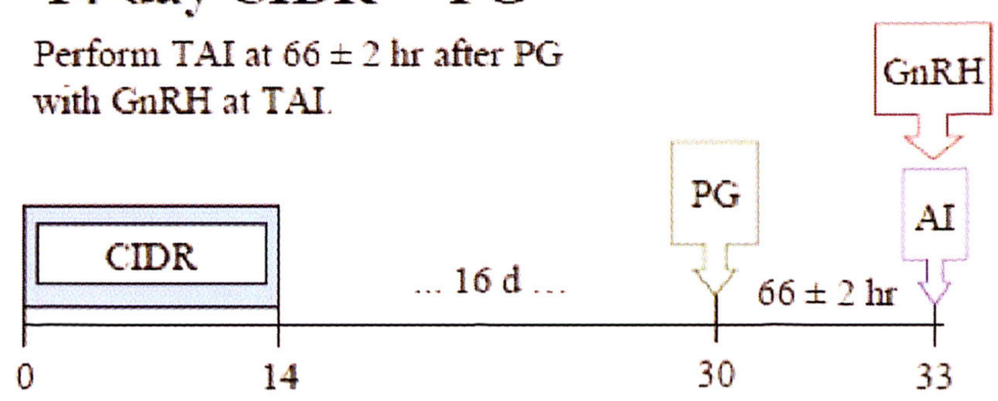


14-Day CIDR Program

We currently use the 14-day CIDR program a great deal as it has yielded good, consistant results in all classes of heifers. The 14-day CIDR program is not for use in cows. This protocol appears similar to MGA and prostaglandin; however, the interval between CIDR removal and prostaglandin injection is reduced to 16 days. The timed insemination is performed at 66 hours. To reduce the incidence of lost CIDRS in confined heifers, cut the CIDR tail to ½ its original length. This practice nearly eliminates the loss of CIDRS from curious heifers pulling them from one another.

14-day CIDR® - PG

Perform TAI at 66 ± 2 hr after PG with GnRH at TAI.



Evaluating if AI Services are Right for Your Practice

Veterinary businesses have a great opportunity to offer artificial insemination services as veterinarians have ready access to the 6 major components needed to be successful:

1. Skilled technicians (veterinarians, veterinary technicians, skilled assistants)
2. Equipment (chutes, breeding barns, portable alleys)
3. Synchronization drugs (CIDR, MGA, GnRH, prostaglandins)
4. Genetics knowledge (EPD's, genetic defects, breed differences)
5. Nutrition basics (postpartum diets, pre- and post-breeding diets)
6. Semen sales

Veterinary clinics have access to clientele through the relationships as herd or consulting veterinarians, or can quickly gain clients through meetings held to specifically address artificial insemination programs. Most veterinarians or veterinary technicians will readily pick-up the necessary skills needed to pass an AI pipette and properly deposit semen. In our practice our technicians take great pride in their AI skills, and have added valuable services as part of our team.

Genetics Knowledge

In addition to technical skills, most veterinarians have had some exposure to genetics, EPD's, genetic defects or have the scientific background to learn the genetic components quickly and easily. You must be able to speak the client's language when discussing an AI program. Whether it's a purebred customer or a first time commercial customer, the first 4 EPD's you need

to know are the birthweight, calving ease direct, weaning weight, and yearling weight. Most producers will start with these traits in mind when selecting genetic improvements for their herd. Many producers will begin AI programs in their replacement heifers, so be careful in your guidance of customers and emphasize the importance of selecting high accuracy proven bulls for birthweight and (CED) calving ease direct. Nothing will turn the producer off to an AI program faster than pulling calves from a bull that was supposed to provide calving ease. A quick explanation of accuracy and how accuracy is obtained for EPD's with a client is important during these discussions.

Genex Partnership

While evaluating what was needed to offer a complete AI program, we quickly realized that we need to have quality sires available and that we needed to explore the possibility of offering semen sales. After comparing semen companies, we found the Genex CRI business model aligned with ours. We also have many clients that will custom collect a bull of higher genetic value, and that service can typically be done for $3 to $5 per straw. Be sure that bulls being collected are at reputable semen collection centers. In our experience, bulls collected with the standards offered by any of the major semen companies is generally high quality. Unfortunately we have found poor quality semen from some services. It will be of value to you and the customer to review the post-thaw analysis offered by the semen collection company. If no post-thaw analysis is offered you should conduct an analysis yourself prior to an insemination program using the semen in question.

Offering semen sales will require you and your AI teams to learn about the genetics that are available. Early on, as you learn about the different breeds, I would suggest finding people from each breed that you trust to help evaluate which bulls will help you meet your client's goals. In addition, we hold a producer meeting in late winter or early spring that discusses new advancements in artificial insemination, as well as new genetics that are coming available.

Nutrition

Nutrition training does not need to be elaborate, but understanding that cattle need to be in a body condition score (BCS) of 5 or 6 is essential for best results. We recommend clients to feed replacement heifers to gain slowly, targeting less than 1.25 lb (0.57 kg) per day to reach 60 to 65% of mature body weight by breeding time. Heifers should not be overly fleshy at the time of breeding. We often recommend an energy flush 3 weeks prior to breeding if the heifers are being fed a ration and are not overconditioned. Finally as a producer begins to retain heifers with better genetic makeup from their AI programs, it is important that they realize growth patterns and nutrient needs will need to be adjusted as most of the animals will have higher growth rates and may have increased efficiencies in nutrient utilization.

One of the major mistakes I see is heifers in a feeding program that are receiving a nice balanced ration, then we breed them and immediately send them to grass. In our area, the grass is usually lush and green at turnout, meaning very high protein and not enough energy. We see those heifers go backwards for the next 2 to 3 weeks because, in my opinion, we have a net negative energy balance at this time. We've likely had a good number of heifers conceive, but we've lost a number of pregnancies to early embryonic death because of the negative energy balance and very high protein content in the forage. If we can hold the heifers in the yard for 30 to 45 days and slowly bring the nutrition plane down before going to grass, we see much better results every time.

In cows, pre- and post-calving BCS need to be evaluated and discussed with your client. If cows are not in a BCS of 5 at the time of breeding, first service conception rates will fall below 50%, and you likely are not going to be inseminating those cows the following year. You don't have to be a nutritionist, but you do need to have some basic understanding of how the BCS, diet, and reproductive physiology needs interact, and be able to communicate these interactions to your clients.

Synch Drugs and Equipment

Most clinics already inventory the synchronization products that will be needed. The synch drugs and devices most commonly use are:

- Progestins:
  - CIDR (progesterone)
  - MGA (melengesterol acetate)
- Prostaglandins: Estrumate, Lutalyse,
- GnRH: Factrel, Fertagyl, OvaCyst, Cystorelin, In-Synch

There will be the obvious equipment needs such as AI guns, thawing units, straw cutters or scissors, AI sheaths, paper towels, and lube to perform the actual services. Be sure to have AI guns that will handle both ½ cc and ¼ cc straws as most sexed semen is packaged in ¼ cc straws. In addition, you will likely need at least 2 nitrogen tanks for semen storage, or several tanks if you offer semen sales. Bulk liquid nitrogen is generally pretty cheap, and can add another service if you have interest in filling nitrogen tanks as a service to your clients. The largest investment for complete AI services is a good double breeding barn. I would argue that a

double AI barn is a necessary component for artificial insemination programs as the cattle will handle much easier and faster through an AI barn than through a normal cattle chute. An AI barn is a significant investment ($12,000 to $14,000) but can quickly become a source of income as your program grows. We have a per head charge for the use of the AI barn if we are providing the arm service. We also rent the barn to our producers by the day. Once a producer sees how easily animals enter and leave the AI barns, they will request their use every time. We recently designed and built our own ET and AI barn that has a larger office space required for ET lab work. The barn also incorporates a hydraulic squeeze arm/panel that will move the animal to the left side of the individual stall. This was done to allow for better biomechanics during the AI or ET procedure for left handed palpators. We use this barn for AI and ET procedures, as well as ultrasound 60 to 90 days following the insemination or transfer. Our hope with this type of barn is to incorporate the safe and calm handling with better biomechanics for the longevity of our veterinarians and technicians.

Evaluating the economics for your practice comes down to a few fixed costs of sheaths, needles, syringes, and doctor or tech time needed to perform the services. In our practice we will average about 50 to 80 head per hour through our double breeding barn, and 30 to 50 head per hour if we are using a single chute. We provide tiered pricing to the quantity of inseminations performed. Our lowest price is $7.00 per head on large projects over 100 head, and goes to $13.00 per head for small numbers of cattle. We have found these to be somewhat higher than our competition, but feel we can provide a better and complete service that is worth the additional investment.

Labor

The number one obstacle for not utilizing an AI program is labor shortage. It is necessary to service the entire process to offer a complete AI service. We utilize a combination of full-time and part-time employees to meet client's needs. Offering a complete service is part of what jump-started our AI business, and has moved us to over 5200 inseminations in 2014. Our clients are very busy in the spring of year when most of the AI season occurs. Most of the time we are putting CIDRs in, taking them out, administering prostaglandins, and doing the inseminations. The complete service can be charged individually or come as a packaged deal. Adding AI programs to your services will likely extend your busy season by a month or 2, which can be a good thing going into the seasonally slow summer months in mixed practice.

Artificial Insemination vs the Bull (Economics of AI)

There have been several studies showing the advantage of AI programs, and few producers will argue the genetic potential is greater than natural service programs. Most studies show somewhere around a 100 lb (45 kg) increase in weaning in AI sired calves over bull sired progeny as a result of both better genetics and age of the calf. Many of our client discussions start with these studies as it is easy for the client to calculate what the additional weight will add to their bottom line. Additional value also comes from increased uniformity in calf crop and improved cow productivity through better replacements. Our own data from the herds we work shows an average of 96 lb (43.6 kg) weight gain advantage for AI sired calves compared to traditional bull programs. In 2012, my family's calves averaged 94 lb (42.7 kg) more weaning weight and a 125 lb (56.8 kg) increase in market weight; 851 lb (387 kg) for the AI steers and 726 lb (330 kg) for the bull sired steers. This yielded a difference in value of $173 per head. These results are typical of what we have encountered in most herds.

While presenting an AI program to a producer, it is very useful to discuss what the bull actually cost per pregnancy or per live calf, and what the associated cost would be. With the price of an average bull quickly heading north of $5000, it makes the economics of an AI program very comparable to a bull breeding program on a cost per pregnancy basis. We have put together a cost calculator with our partners at Genex that we share with producers that allows them to see the cost involved in both programs, and an example is shown below.

Conclusions

Even after a severe drought and a few very challenging years, there is still close to 30 million beef cows in the United States. It is estimated that less than 5% of producers are utilizing an AI program in their herds. Accordingly, there are about 4.1 million replacement heifers in the US with around 15% utilizing AI. The percentage of heifers being bred using AI is on the rise, and will continue to rise as we begin to rebuild the nation's beef herd. With only 3 to 5% of herds utilizing AI across the United States, there is tremendous room for growth of these services.

We've seen the price of bulls go up exponentially over the past few years. The price of an AI program hasn't changed that much. Semen prices and synchronization drugs have increased by less than 5%. It's a lot easier to talk to producers about an AI program now than it has ever been in the past. I believe the veterinar-

ian is the person best suited to offer the most complete services. From genetics consultation to synchronization programs to arm service to all the associated services, artificial insemination has the potential to be a profit driver for any bovine-associated veterinary practice.

Fixed Time AI

A I vs. The Bull

Republican Valley Genetics

Bull Costs

$ 5,000	Bull Purchase price
$ 500	10 % Risk
$ 1,750	Less Salvage Value
$ 3,750	Net Cost of Bull
$ 500	Pasture Costs Per Year
$ 400	Feed Costs per Year
$ 100	Other Costs, fencing, corrals
$ 75	Vet., Medicine, Semen Testing
$ 1,075	Total Bull Cost per Year
4	Breeding Seasons Expected
30	Number of cows exposed per year
28	Number of calves born per year
112	Total Number of Lifetime Calves Born
$ 4,300	Total Bull Cost

(Equals Breeding seasons Expected -> 4
X Bull Cost per Year $ 1,075

$ 3,750	plus Net Cost of Bull (above)
$ 8,050	Total Bull Costs
112	Total Number of Lifetime Calves Born(above)
$ 71.88	Total Cost per calf Lifetime

(Equals Total Bull Costs divided by the Number of Lifetime Calves born)

A I Costs

30	Number of AI Females
60.00%	Conception Rate
18	Number of Calves Born A I

Choose Synchronization Breeding System

$ 67.50	One Shot Prostaglandin ($3.00 per dose Prostaglandin X 75% of the cows)
$ 150.00	MGA plus One Shot Prostaglandin ($3.00 per dose Prostaglandin + $2.00 for MGA)
$ 180.00	Gnrh/Prostaglandin System ($3 for GnRH + $3.00 for Prostaglandin)
$ 270.00	Two Shot GnRH + Prostaglandin-Fixed Time Insemi ($6 for GnRH + $3.00 for Prostaglandin)
$ 501.00	Cidr + Prostaglandin-Fixed Time Insemination ($10 for Cidr + $2.5 for Prostaglandin)

Cidr $10.00 $10.00
GnRh $2.10 X2 $4.20

$ 501	Cost of Synchronization Breeding System Chosen from above
$ -	Labor for Heat Detection

Days X Labor Cost per Day

$ 240	Technician Costs
30	No.of Females Bred X $ 8 Cost per Insemination
$ 540	Semen Costs
30	No. of Units X $ 18 Cost per Unit
$ 1,281	Total A I Costs (Synch., Labor, Technician & Semen)
18	Number of A I Calves Born (from above)
$ 71.17	A I Cost per Calf

(Equals Total A I Costs divided by the Number Calves born)