



API STOCK PHOTO BY SHAUNA ROSE HERMEL

Heifer synchronization:

# Missouri Protocol

University of Missouri studies show that 14-day protocol developed by school improves pregnancy rates in yearling heifers.

by Ed Haag

It comes as no surprise to savvy beef and seedstock producers that, in order to optimize their breeding potential, yearling heifers require some special treatment.

That view was recently reinforced by the results from a study conducted by University of Missouri (MU) researchers and reported in the *Journal of Animal Science*. The study shows, conclusively, that heifers benefit from an extended protocol (14 days) to synchronize estrus and ovulation when compared with animals that received a

conventional short-term seven-day protocol.

“One of the take-home messages for producers is the fact that not one size

fits all in respect to how these protocols work,” says Dave Patterson, MU Extension researcher and reproductive specialist. “In

last summer’s field trials, the pregnancy rate with the short-term protocol was 47%, while the long-term protocol was 63%.”

Patterson explains that these results are particularly significant in today’s production environment — one that demands that cows conform to an increasingly narrower breeding window. “It is an issue of labor and economics,” he says, adding that if a heifer falls behind the herd in breeding there is a strong likelihood she will remain behind the herd

in breeding back the rest of her calf-production life.

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rest of the herd add to the length of the calving season, increase labor costs and run contrary to the goal of establishing calf crop uniformity.

While the study results are dramatic, the lower pregnancy rate in heifers, for the short-term protocol, comes as no surprise to Patterson and others associated with the beef industry. “Essentially what these studies did was help to explain differences producers are seeing in the field, and they also give some direction in terms of which protocol is perhaps better-suited for use specifically in heifers,” Patterson says.

He notes that there has always been a discrepancy in performance between when the seven-day protocol is used on adult cows and when it is used on first-year heifers. “The seven-day Co-Synch CIDR® protocol used in conjunction with fixed-time insemination in breeding cattle by appointment irrespective of heat works very consistently in adult cows,” he says. “The

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same cannot be said of its effectiveness with young heifers.”

### Two protocols included in study

It was that lack of consistency in the seven-day protocol when breeding first-year heifers that led MU researchers to explore the possibility of developing a program better-suited to dealing with young animals.

“We settled on a protocol similar to the old 14-day MGA (melengestrol acetate) protocol, except we are substituting it with a CIDR,” Patterson says, adding that anecdotal evidence indicated the university-modified protocol showed promise when used on first-year heifers.

To confirm their observations, a research team led by Dan Busch, MU senior research specialist, compared the new 14-day protocol (also referred to as CIDR Select) with the more conventional seven-day protocol (also known as the Co-Synch + CIDR) under research conditions.

The study conducted in summer 2006 involved 217 first-year crossbred heifers in three separate locations. The heifers were assigned reproductive tract scores ranging from 1, representing immature, to 5, signifying the luteal phase of the estrous cycle.

The 108 heifers assigned to the CIDR Select protocol received a CIDR insert from Day 0 to Day 14, followed by an injection of gonadotropin-releasing hormone (GnRH) nine days after CIDR removal (Day 23) and

prostaglandin (PG) seven days after GnRH treatment (Day 30).

The remaining 109 heifers were assigned to the Co-Synch + CIDR protocol. They received a GnRH injection and a CIDR insert seven days before administering PG and removing the CIDR. “Both protocols used the same CIDR implants and the same injections, so the cost of materials was the same for both protocols,” Busch says. “The difference was in the length of time each protocol required and the number of times the heifers had to be worked.”

Fixed-time artificial insemination (AI) was performed at 72 hours after PG for heifers assigned to the CIDR Select treatment and 54 hours after PG for heifers assigned to the Co-Synch + CIDR treatment. All heifers received a second GnRH injection at time of insemination.

### Advantages and a disadvantage

For Busch, one of the most dramatic outcomes of the study was the difference in pregnancy rates between the long- and the short-term protocols. The heifers synchronized and inseminated with the CIDR Select protocol were 1.86 times more likely to conceive to fixed-time AI than heifers synchronized and inseminated with the Co-Synch + CIDR protocol.

“We had a 63% pregnancy rate for the Select versus a 43% pregnancy rate for the Co-Synch + CIDR treatment,” he says. “That

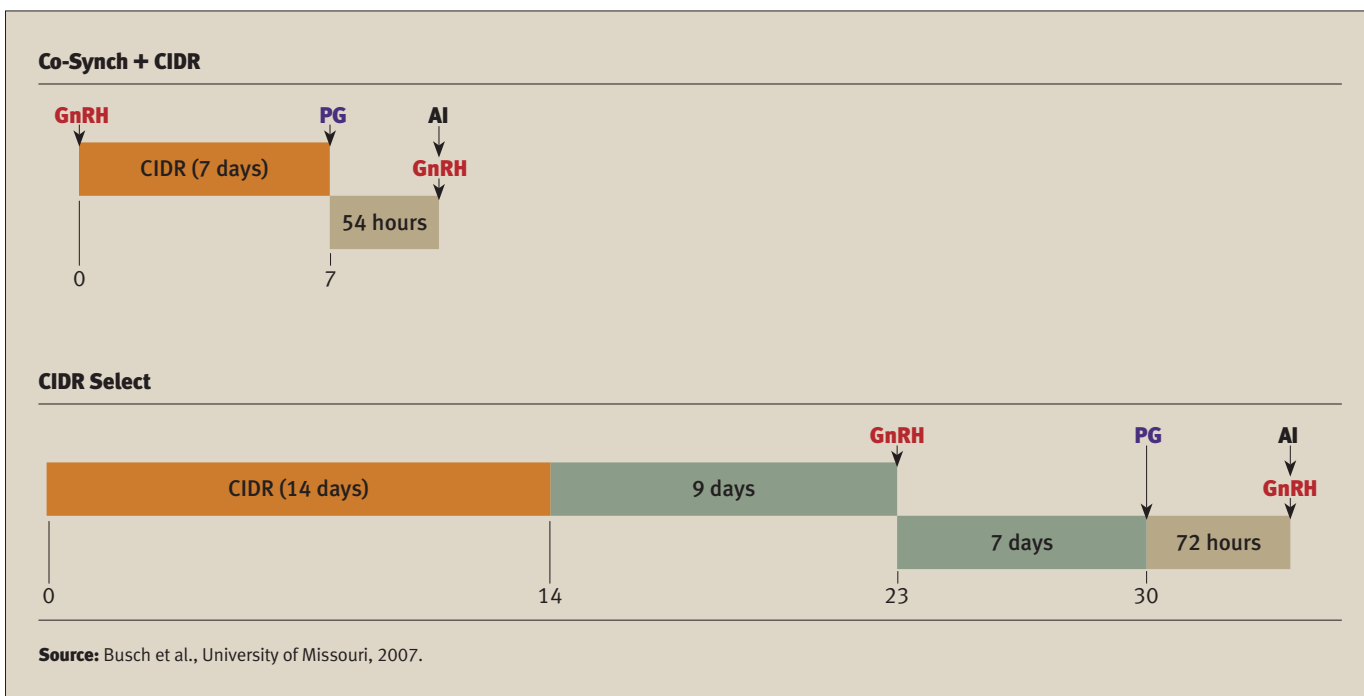
difference between rates is substantial in terms of AI protocols.”

But for Busch and his research colleagues, the higher pregnancy rate in the CIDR Select protocol represented just part of the equation. The longer protocol also demonstrated a greater and more synchronized estrous response as well as a greater degree of synchrony of estrus during the subsequent return to estrus after fixed-time AI when compared with Co-Synch + CIDR-treated heifers.

“We saw more heifers coming into heat in a shorter time period with the CIDR Select compared to the shorter Co-Synch + CIDR protocol,” Busch says. “The CIDR Select protocol tended to tightly synchronize the heifers the first time around, and then they kept synchrony when they came into heat naturally that next time.”

Patterson attributes the above traits associated with CIDR Select to the extended period of time the CIDR remains in the heifer. “You are accomplishing two things with the 14-day CIDR,” he says. “First, you are helping to synchronize the cycling heifers to where they will come into heat in a fairly synchronized manner coming off the 14-day CIDR. Second, with the noncycling heifers, you are inducing cyclicity so when those heifers come off the CIDR the majority of those heifers will exhibit heat.”

**Fig. 1: Protocol comparison of Co-Synch + CIDR with fixed-time AI at 54 hours vs. CIDR Select with fixed-time AI at 72 hours**



Since the study, Busch and his colleagues have continued using the CIDR Select protocol with heifers and have found that the subsequent data correlates closely with the initial study data. “Basically we are averaging around [a] 63% pregnancy rate across over 800 heifers,” he says.

While the higher pregnancy rate speaks for itself, Busch recognizes that not all beef producers have the resources to implement a heifer program that uses the longer protocol. “The biggest drawback with the CIDR Select protocol is that you have to run the heifer through the chute five times; whereas, with the shorter protocol you can get away with three times.”

He notes that with the long-term protocol it takes one time through the chute to insert the CIDR, a second time to remove it, a third time to inject the GnRH, a fourth to inject the PG, and a fifth to AI.

“With the shorter protocol there are only three times those heifers have to be worked,” Busch says. “You put the CIDR in and you inject GnRH at the same time, then when you pull the CIDR out, you inject the PG. The third time is when you give the fixed-time insemination.”

Busch believes that the extra time and work involved in implementing the CIDR Select protocol will limit its use primarily to first-year heifers, where there is a marked improvement in pregnancy rates compared to the standard protocol and where the logistics associated with moving virgin heifers through the chutes two extra times aren’t overwhelming.

“With mature cows you are having to sort calves and go through a lot more trouble each time they go through,” Busch says, adding that the need to apply the longer protocol isn’t so critical because the Co-Synch + CIDR protocol performs consistently well with older animals.

### Broader implications

For both Busch and Patterson, what makes their work with heifers and the CIDR Select protocol particularly significant is its timeliness in relation to the evolution of the modern beef industry.

While hormonal treatment of heifers and cows to synchronize estrus has been commercially available and universally applied by confinement dairy operators for

**Fig. 2: AI pregnancy rates of yearling heifers bred with fixed-time AI following CIDR Select or Co-Synch + CIDR synchronization protocol**

	Fixed-time AI pregnancy rate		
	Pre/peri-pubertal	Estrous cycling	Combined
<b>CIDR Select</b>	13/21 (62%)	54/87 (62%)*	67/108 (62%)*
<b>Co-Synch + CIDR</b>	11/23 (48%)	40/86 (47%)*	51/109 (47%)*
<b>Total</b>	24/44 (55%)	94/173 (54%)	118/217 (54%)
<b>Diff.</b>	+14%	+15% (*P=0.03)	+15% (*P=0.02)

Source: Busch et al., University of Missouri, 2007.

more than three decades, it is only recently that market pressures have encouraged broader acceptance of the practice by beef producers.

“Synchronization of estrous cycles has the potential to shorten the calving season,

increase calf uniformity and facilitate AI,” Busch says in his research report. “Artificial insemination allows producers to use genetically superior, proven sires and facilitates rapid improvement of U.S. beef herds.”

Patterson adds that in the quest for higher-quality beef and the premium it brings, seedstock and commercial producers are recognizing that proper heifer development is the foundation on which all

successful 21st century beef herds rests.

“In some cases, if you have a reliable source of heifers it is much more logical for a commercial producer to purchase them rather than running his own program,” Patterson says, noting that as more producers come to this realization, they are encouraging the development of a new niche within the seedstock industry. “There are a growing number of producers in the country that are specializing in heifer development and have taken that on as a new enterprise. Because of their focus, they can do [a] good job on the nutritional background, the health programs and the breeding.”

For this emerging group of beef entrepreneurs, Missouri’s heifer protocol

research is particularly relevant. “CIDR Select is attractive to these producers,” Patterson says. “The protocol does require more labor, but when you are investing that money in your heifers, that little bit of extra labor really does pay off when you get that additional pregnancy rate.”

Busch agrees. “If you can get 63% of your heifers conceiving on that one day, you have a large portion of your heifers calving early in that breeding season,” he says. There are already some real financial incentives for those who want to make the extra effort to maximize the number of heifers they AI-breed in the first round, he adds. “We are already seeing a \$100 or more advantage when you are selling an AI-bred heifer over a natural-service-bred heifer.”

He goes on to point out that part of that premium can be attributed to the potential of high-quality genetics in the calf. The rest can be credited to the predictability of the calving date.

“If somebody buys a group [of] AIed heifers all bred on the same day, they are going to calve within two weeks of each other,” Busch says. “From a management standpoint he can concentrate his efforts out there for two weeks versus two months waiting for a group of naturally serviced heifers to calve.”



**Editor’s Note:** The MU research titled “Comparison of progestin-based estrus synchronization protocols before fixed-time artificial insemination on pregnancy rate in beef heifers” appears in volume 85 of the Journal of Animal Science 2007, pages 1933-1940.

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