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## Supplemental progesterone increases pregnancy rates and embryo survival in lactating dairy cows

### Abstract

Administering progesterone to lactating dairy cows has sometimes proven effective in increasing pregnancy rates. In this study, cows were treated with the Ovsynch protocol in addition to supplemental progesterone given for 7 days between the first gonadotropin-releasing hormone (GnRH) injection and the prostaglandin F<sub>2</sub>α (PGF<sub>2</sub>α) injection. Conception rates were greater in lactating Holstein dairy cows receiving exogenous progesterone (62.5%) than in controls treated with only the Ovsynch protocol (35.5%). In addition, progesterone supplementation increased embryo survival between 28 and 56 days of pregnancy.; Dairy Day, 1999, Kansas State University, Manhattan, KS, 1999;

### Keywords

Dairy Day, 1999; Kansas Agricultural Experiment Station contribution; no. 00-136-S; Report of progress (Kansas Agricultural Experiment Station and Cooperative Extension Service); 842; Dairy; Ovsynch protocol; Progesterone; Lactating cows; Pregnancy rates

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## SUPPLEMENTAL PROGESTERONE INCREASES PREGNANCY RATES AND EMBRYO SURVIVAL IN LACTATING DAIRY COWS<sup>1</sup>

*S. Z. El-Zarkouny, J. A. Cartmill, and J. S. Stevenson*

### Summary

Administering progesterone to lactating dairy cows has sometimes proven effective in increasing pregnancy rates. In this study, cows were treated with the Ovsynch protocol in addition to supplemental progesterone given for 7 days between the first gonadotropin-releasing hormone (GnRH) injection and the prostaglandin F<sub>2α</sub> (PGF<sub>2α</sub>) injection. Conception rates were greater in lactating Holstein dairy cows receiving exogenous progesterone (62.5%) than in controls treated with only the Ovsynch protocol (35.5%). In addition, progesterone supplementation increased embryo survival between 28 and 56 days of pregnancy.

(Key Words: Ovsynch Protocol, Progesterone, Lactating Cows, Pregnancy Rates.)

### Introduction

Lactating dairy cows with high genetic merit and outstanding production are likely more vulnerable to fertility problems such as lower conception rate, weaker expression of estrus, and greater embryonic loss after insemination than lower producing cows.

This experiment was based on the hypothesis that cows with higher concentrations of progesterone during the luteal phase of the cycle before AI will be more likely to conceive. Using a progesterone insert for 7 days with the Ovsynch protocol provides a means to test the hypothesis that progesterone might improve synchronization of ovula-

tion with the Ovsynch protocol and pregnancy rates in dairy cows.

### Procedures

Lactating dairy cows (n = 184) from one herd (less than 50 days in milk) were used. Cows were assigned randomly to each of the two treatments (Figure 1): 1) Ovsynch (OVS) protocol; 2) the OVS protocol + CIDR (OVS + CIDR). The CIDR (controlled internal drug release) is an experimental intravaginal device implanted with 1.9 g of progesterone. In the OVS protocol, cows received two injections of gonadotropin-releasing hormone (GnRH), one 7 days before an injection of prostaglandin F<sub>2α</sub> (PGF<sub>2α</sub>) and the second 48 hrs after. Cows were inseminated 17 to 19 hrs after the second GnRH injection. The OVS + CIDR cows received the same OVS protocol with the CIDR inserted at the time of first GnRH injection and removed 7 days later before the (PGF<sub>2α</sub>) injection.

Blood samples were collected prior to each hormone treatment for later determination of blood concentrations of progesterone. The size of the ovulatory follicle was determined by transrectal ultrasonography on the day of the second GnRH injection. To determine if that follicle ovulated, a second ultrasonographic examination was conducted 48 hours later. Pregnancy was diagnosed by ultrasonography of uterine contents (viable embryo) at 28 and 56 days after insemination.

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<sup>1</sup>Thanks to Meier Dairy, Palmer, KS, for their cooperation in this study.

Cows were housed in a 4-row freestall barn with bedding sand. They were fed a total mixed ration consisting of chopped alfalfa, corn silage, whole cottonseed, and concentrate-mineral mix to meet their daily requirements for maintenance and milk production.

## Results and Discussion

Lactating Holstein dairy cows in the OVS + CIDR treatment had greater ( $P<.01$ ) pregnancy rates on day 28 after insemination than control cows treated with only the OVS treatment (Table 1). Early in pregnancy, luteal function becomes established to provide the appropriate conditions for survival of the embryo. In other studies with different species, progesterone had remarkable effects on the uterus by modulating its function and performance, such as secretion of milk and of some essential nutrients to sustain the embryo during early pregnancy.

Pregnancy rates at 56 days also were increased ( $P<.01$ ) by the OVS + CIDR treatment (Table 1). Therefore, progesterone treatment increased ( $P<0.05$ ) embryo survival between days 28 (first pregnancy check) and 56 (second pregnancy check) of pregnancy (Table 1).

Further studies are needed to validate these findings and ensure their repeatability in other herds of lactating dairy cows. Further, it is important to determine how and why this design of progesterone treatment (OVS + CIDR) improves the compromised fertility of high-producing dairy cows.

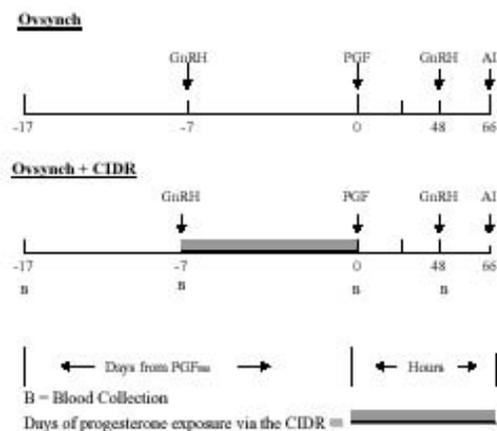
**Table 1. Effects of Ovsynch and Ovsynch + CIDR in Lactating Dairy Cows**

Item	Treatment <sup>1</sup>	
	Ovsynch	Ovsynch + CIDR
No. of cows	93	91
Pregnancy rate at 28 days, %	35.8	62.5 <sup>x</sup>
Pregnancy rate at 56 days, %	20.5	50.0 <sup>x</sup>
Embryo survival (28 to 56 days), %	57.2	79.8 <sup>y</sup>

<sup>x</sup>Different from Ovsynch ( $P<0.05$ ).

<sup>y</sup>Different from Ovsynch ( $P<0.01$ ).

<sup>1</sup>See Figure 1.



**Figure 1. Treatment Protocols.** GnRH = gonadotropin-releasing hormone (100 Fg of Cystonelin®, Merial, Iselin, NJ); PGF = prostaglandin F<sub>2a</sub> (25 g of Lutalyse, Pharmacia and Upjohn, Kalamazoo, MI); and CIDR = controlled internal drug release (intravaginal progesterone insert, InterAg, Hamilton, NZ).