

OVULATION CONTROL ELIMINATES HEAT DETECTION OF RECIPIENTS

Controlled Experiment and Field Trials

W. E. Beal and R. H. Hinshaw
Virginia Polytechnic Institute and State University and Ashby Embryos Inc.

INTRODUCTION

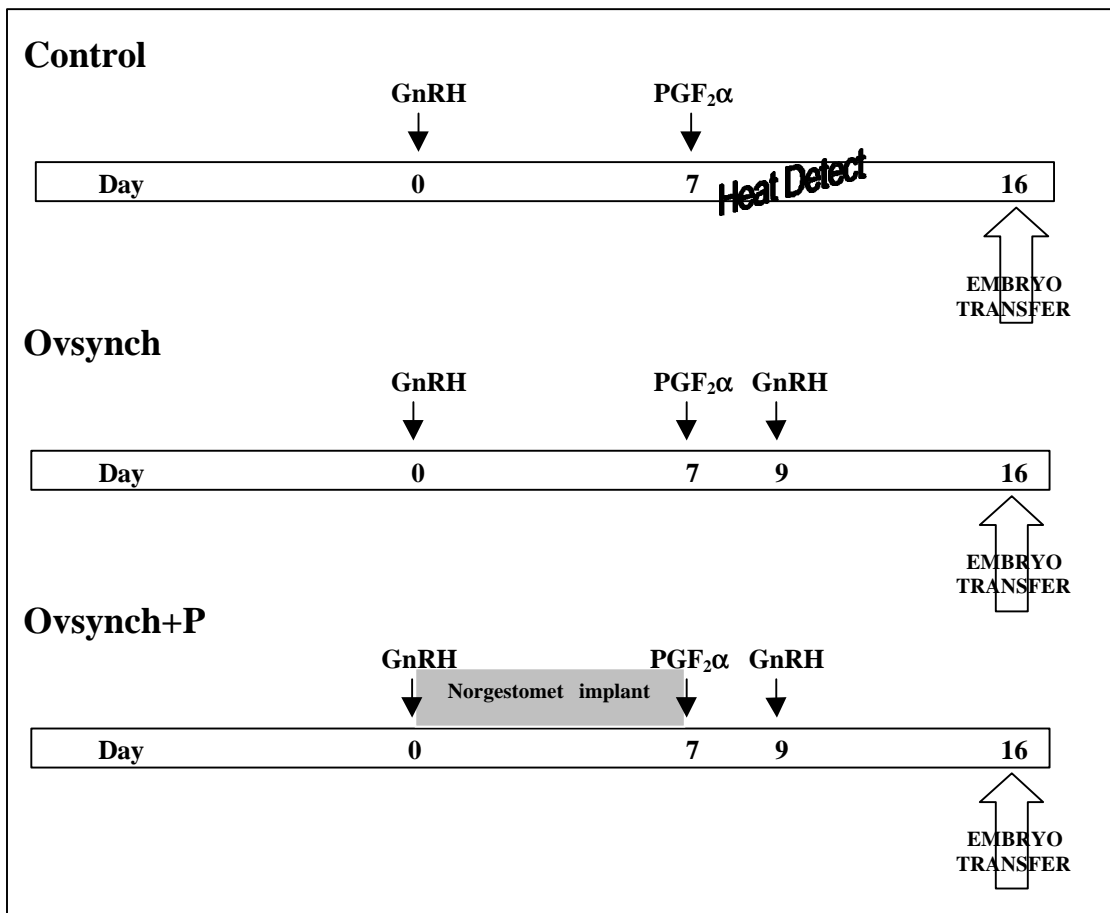
The synchrony of estrus and timing of ovulation following traditional estrus synchronization treatments has been too variable to allow the transfer of fresh or frozen/thawed embryos without heat detection. Synchronization treatments developed more recently, however, combine traditional methods of controlling cycle length with the manipulation of follicular development in order to “program” or “select” the ovulatory follicle. The new methods control ovulation with enough repeatability and precision to use for timing the transfer of embryos to recipient cows without the need for visual estrus detection.

CONTROLLED EXPERIMENT

In a cooperative experiment with Ashby Embryos and Mossy Creek Farm we evaluated methods for controlling the estrous cycles of recipient cows and eliminating the need for visual heat detection. Four hundred ninety-nine primiparous (n=90) or multiparous (n=409) beef cows nursing calves (28-92 days postpartum) were assigned to one of three treatments to synchronize estrus or to synchronize estrus and control ovulation (Figure 1). Approximately one-third of the animals received 100 µg of gonadotropin-releasing hormone (GnRH; Cystorelin®, Merial, Islin, NJ) via intramuscular injection followed 7 days later by 25 mg of prostaglandin F₂α (PGF₂α, im, Lutalyse®; Upjohn Co., Kalamazoo, MI). This group (Control, n=169) was monitored continuously for signs of behavioral estrus using an electronic heat detection system (HeatWatch™; DDx Inc., Boulder, CO). Recipients in the Control group were designated for ET 6-8 days following detection of estrus and embryos were assigned based on the stage of embryo development (stage 3-6).

The second one-third of the animals (Ovsynch, n=165) were treated as described above, but received a second injection of GnRH 48 h after the administration of PGF₂α to control the timing of ovulation (Figure 1). The final one-third of the animals (Ovsynch+P, n=165) were injected with 100 µg of GnRH and fitted with a subcutaneous hydron implant containing 6 mg Norgestomet (Merial, Islin, NJ) at the beginning of treatment. Seven days later the subcutaneous implant was removed and each cow received 25 mg of PGF₂α. A second injection of GnRH was administered 48 h after implant removal to control the timing of ovulation. All cows in the Ovsynch and Ovsynch+P groups were presented for ET 9 days after the injection of PGF₂α, without regard to the detection of estrus. Following palpation to verify the presence of a CL, embryos were thawed and transferred to suitable recipients in this group without regard to the occurrence of estrus. Embryos frozen at different stages of development were assigned for transfer to recipients in the ovulation control groups (Ovsynch and Ovsynch+P) based on an “assigned” time of estrus that was coincident with the second injection of GnRH.

Figure 1. Diagram of estrus synchronization and ovulation control treatments



The pregnancy rate of cows that received an embryo (pregnancies/transfers; Table 1) was greater ($P < .05$) among cows in the Control group than among cows in either ovulation control group. The higher pregnancy rate per transfer in the Control group may have been due to better synchrony between the embryo and recipient. The assignment of embryos to recipients in the Control group was based on stage of embryo development and the actual timing of estrus in that group. The synchrony between embryo development and the stage of the estrous cycle is likely to have been less precise in Ovsynch or Ovsynch+P recipients that received an embryo based on an “assigned” time for the onset of heat coincident with the timing of the second GnRH injection.

The overall pregnancy rates (pregnancies/recipients; Table 1) were not significantly different among the three treatment groups. The higher transfer rate among cows in the ovulation control groups compensated for the lower pregnancy rate per transfer recorded in those groups. Therefore, the use of an ovulation control treatment in addition to a method for controlling corpus luteum function and synchronizing estrus was successful in enabling the transfer of embryos without the need for estrus detection in this experiment.

Table 1. The Pregnancy Rate in Recipients Treated to Synchronize Estrus and Control the Timing of Ovulation

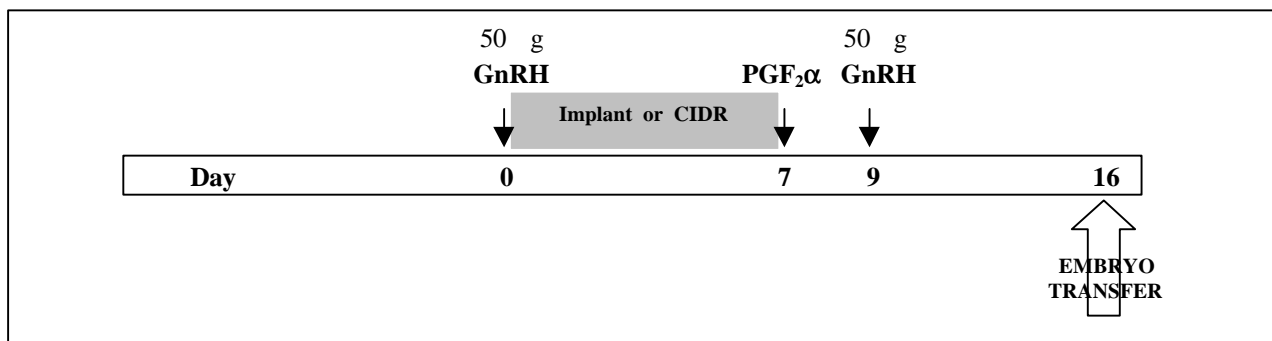
Treatment	No.	Pregnancy Rate/ Transfer	Pregnancy Rate/ Recipient
Control	169	67/108 = 62% ^a	67/169 = 40%
Ovsynch	165	72/150 = 48% ^b	72/165 = 44%
Ovsynch+P	165	82/152 = 54% ^b	82/165 = 50%

^{a,b} means with different superscripts are significantly different (P<.07).

FIELD TRIALS

Based on the results of the controlled experiment, we conducted nine field trials involving 1637 transfers (Table 2). Recipients were postpartum beef cows (English and Continental breeds), except at Location G where 233 ¼-Brahman, virgin heifers and 62 postpartum Brahman-cross cows were used. Recipients were treated with the Ovsynch+P treatment described above. However, the 7-day progestin treatment consisted of either a subcutaneous hydron implant containing 6 mg Norgestomet (Merial, Islin, NJ) or a controlled intravaginal drug release device (EAZI-BREED™ CIDR; Vetrepharm, London, Ontario, Canada). In addition, the dose of GnRH (Fertagyl; Intervet, Millsboro, DE) injected at both times was reduced to 50 µg of the releasing-hormone (Figure 3). No heat detection was performed.

Figure 2. Diagram of estrus synchronization treatment used in field trials



All recipients with a palpable CL present 7 days after the second injection of GnRH received frozen thawed embryos (Grade 1 or 2). Embryos were collected and frozen by 18 different embryo transfer enterprises. Embryos were assigned to recipients based on an “assigned” time for the onset of heat coincident with the timing of the second GnRH injection. Pregnancy was determined via transrectal ultrasonography 60 to 70 days after embryo transfer, except at Location G where pregnancy was determined by rectal palpation 48 days after transferring embryos.

Table 2. The Pregnancy Rate in Recipients in Field Trials

Farm	Date	Progestin	Transfers	Pregnancies	Pregnancy Rate/ Transfer
A	Spring 99	Implant	437	288	65.9%
B	Fall 99	Implant	111	49	44.1%
C	Winter 99	CIDR	57	26	45.6%
D	Winter 99	CIDR	43	27	62.8%
E	Winter 99	Implant	70	42	60.0%
F	Spring 00	CIDR	91	47	51.6%
G	Spring 00	CIDR	295	185	62.7%
H	Spring 00	Implant	496	296	59.7%
I	Spring 00	CIDR	37	20	54.1%
Totals			1637	980	59.9%

Pregnancy rates per recipient treated ranged from 44.1 to 65.9%. Treatments involving implants or CIDR were not compared at the same location, however, the pregnancy rates at the four locations using implants, 60.6% was similar to that recorded at the five locations using CIDRs. The number of recipients that were rejected at the time of transfer after being treated to synchronize estrus was not consistently recorded, however, in those locations where data was recorded, approximately 15% of the animals presented for embryo transfer lacked a palpable CL and did not receive an embryo.

The results of the controlled experiment and field trials indicate acceptable pregnancy rates can be achieved when embryos are transferred to recipients that have received estrus synchronization and ovulation control treatments, but have not been observed for estrus detection.