

ODV MEETING  
2006

**DEVELOPING REPRODUCTIVE  
PROGRAMS  
THAT YIELD  
MORE PREGNANCIES**

## Synchronization Protocols

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## What should be expected?

	Nat'l Average <small>(21-day interval)</small>	TAI <small>(single day)</small>
AI submission rate <small>(Estrous Detection Rate; # bred# eligible)</small>	45	100
<b>x Conception Rate</b>	<b>35</b>	<b>30</b>
<b>= Pregnancy Rate</b>	<b>15.7</b>	<b>30</b>




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## Computerized calculations of AI submission rate and pregnancy rate

- Based on 21 day intervals
- Clock starts ticking at VWP
- Computers don't care about the "Yea but's..."
  - What is the real VWP
  - If heat detect occurs or not
  - How often is pregnancy checks
  - How often are cows scheduled for synchronization
  - AISR & PR % based on the number of "eligible" cows
- More pregnant in 1 cycle means fewer "eligible" (denominator) in all subsequent cycles
- Open cows - EARLY pregnancy diagnosis and PROMPT re-insemination




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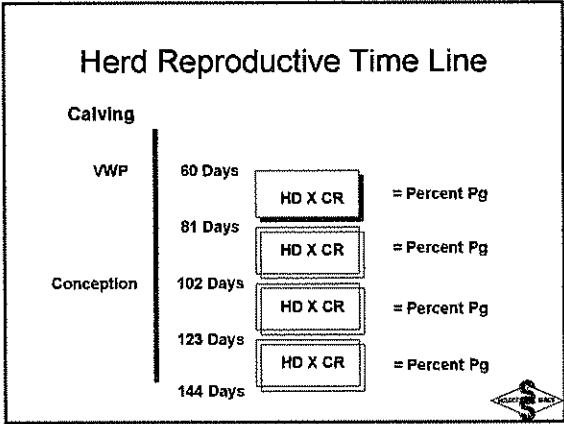
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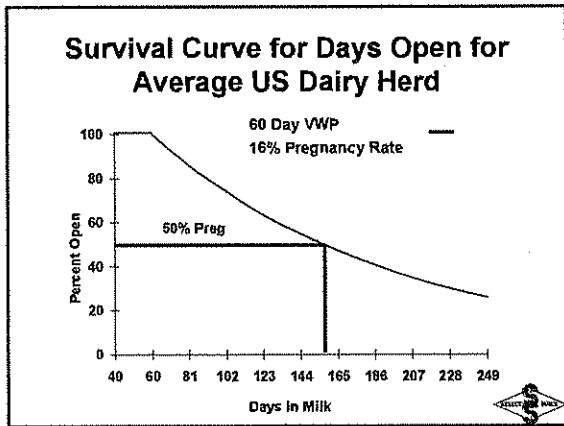
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### The Average Herd

Cycle #	# eligible	AISR	# bred	Con Rate	# preg	Preg. rate
1 (21 days)	100	40%	40	40%	16	16%
2 (42 days)	84	40%	34	40%	13	16%
3 (63 days)	71	40%	28	40%	11	16%
3 cycle totals	255	40%	102	40%	40	16%

What is a realistic goal?

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### The Total Ovsynch Herd

Cycle #	# eligible	AISR	# bred	Con Rate	# preg	Preg. rate
1 (21 days)	100	100%	100	30%	30	30%
2 (42 days)	70	0%	0	NA	0	0%
3 (63 days)	70	100%	70	30%	21	30%
3 cycle totals	240	71%	170	30%	51	21%




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### The Average Herd + Ovsynch

Cycle #	# eligible	AISR	# bred	Con Rate	# preg	Preg. rate
1 (21 days)	100	100%	100	30%	30	30%
2 (42 days)	70	40%	28	40%	11	16%
3 (63 days)	42	100%	42	30%	13	30%
Re-repeats	17	40%	7	40%	3	16%
3 cycle totals	229	77%	177	30%	57	25%




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### Pregnancy Rates to Ovsynch

	No. of Cows	Preg. Rate
<b>Bartolome, 2000</b>	209	31.5
<b>Britt, 1998</b>	98	47
<b>Burke, 1996</b>	171	29
<b>Cartmill, 1999</b>	188	31.3
<b>Cartmill, 2001</b>	207	33.3
<b>El-Zarkouny, 1999</b>	312	37.0
<b>Momcilovic, 1998</b>	118	33.0
<b>Navanukraw, 2002</b>	128	37.5
<b>Pancarcl, 2002</b>	179	37.1
<b>Pancarcl, 2002</b>	157	28.2
<b>Pursley, 1998</b>	732	29.0
<b>Stevenson, 1998</b>	115	35.6
<b>Stevenson, 1999</b>	228	31.6
<b>Total</b>	2913	31.8

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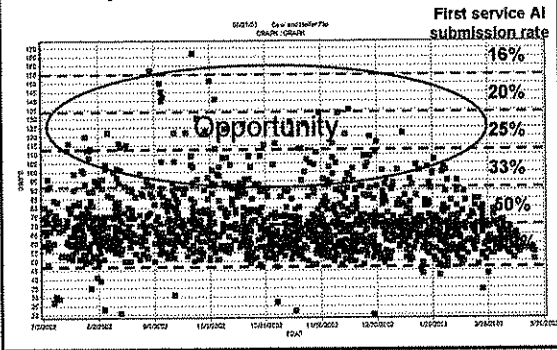
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How do you know if you need a synchronized breeding program?




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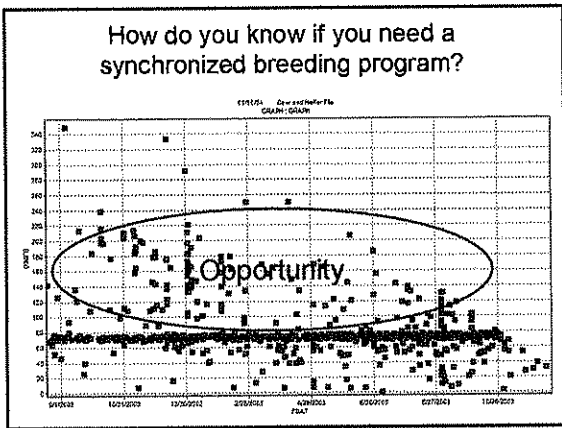
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How do you know if you need a synchronized breeding program?




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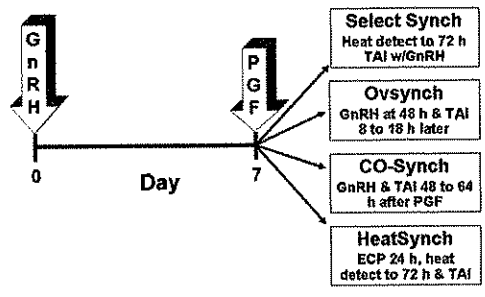
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### GnRH-PGF Protocols




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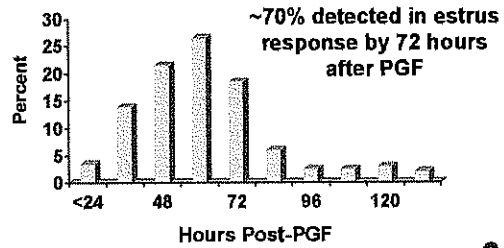
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### Synchrony of estrus after GnRH-PGF




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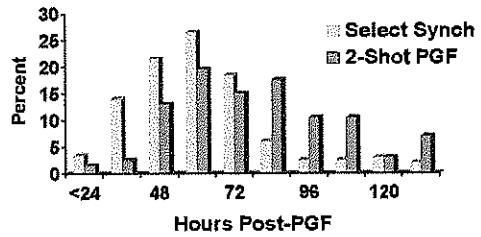
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### Select Synch versus 2-Shot PGF: Synchrony of Estrus



(Stevenson et al., 2000, JAS 78:1747)

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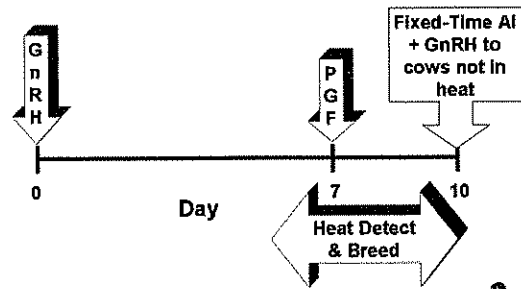
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### Select Synch




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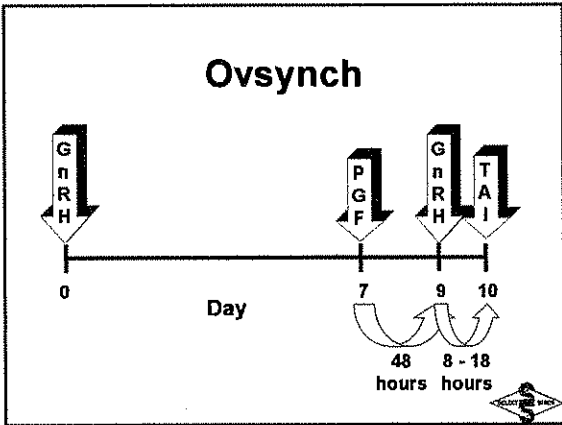
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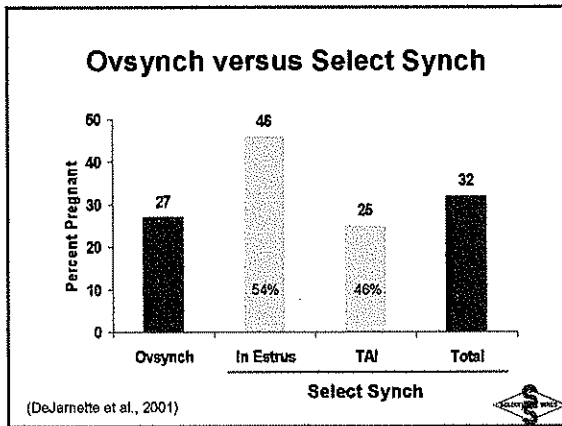
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### Select Synch vs. Ovsynch

**Advantages**

- Most cows (50-75%) bred to standing heats
  - Higher conception
  - More efficient use of expensive semen
  - Reduced hormone usage
- Timed-AI gives all cows chance to conceive
- Comparable pregnancy rates

**Disadvantages**

- Requires good estrous detection

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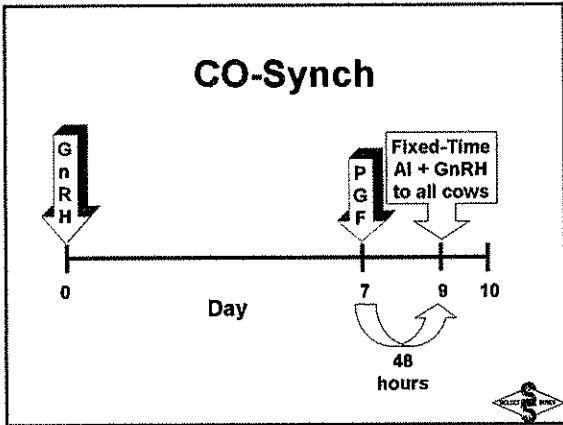
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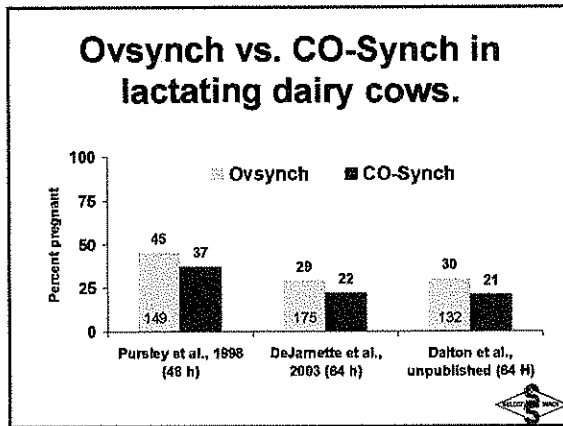
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### HeatSynch

Substitute estradiol cypionate (ECP) for last GnRH

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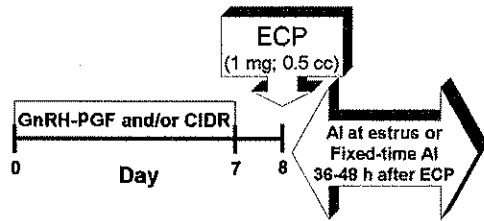
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## Estradiol cypionate (ECP)



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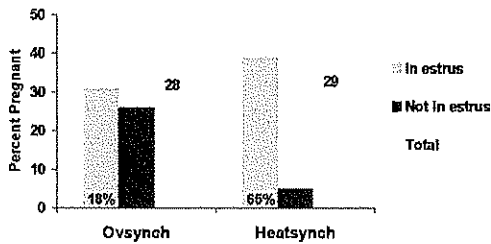
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## HeatSynch vs. Ovsynch



(Pancarci et al., 2002, J. Dairy Sci. 85:122-131)



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## HeatSynch vs. Ovsynch

### Advantages

- ECP less expensive than GnRH
- Greater estrous response/expression
- Comparable pregnancy rates
- Inseminator confidence

### Potential disadvantages

- Estrus associated mounting injuries
- Number of animal handlings
- Small dosage with small margin for injection error
  - (1 mg = 0.5 cc)
- Future availability of ECP????



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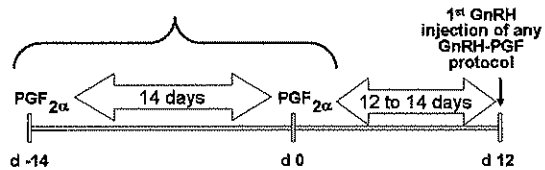
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## What is Presynch?




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## Effect of stage of estrous cycle at 1<sup>st</sup> GnRH injection on conception rates.

Day of the cycle	Herd distribution	Expected PR	Preg in a 100 cow herd
1 to 4	20 %	20 %	4
5 to 12	40 %	50 %	20
13 to 17	25 %	20 %	5
18 to 20	15 %	50 %	7
<b>Total</b>	<b>100 %</b>	<b>---</b>	<b>36%</b>




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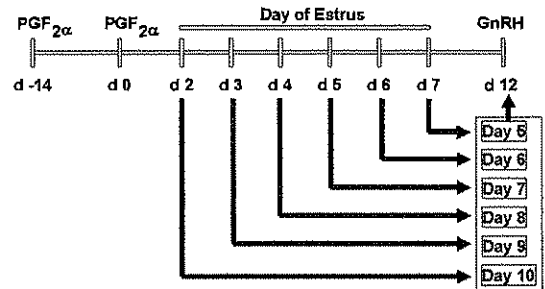
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## PRE-SYNCH




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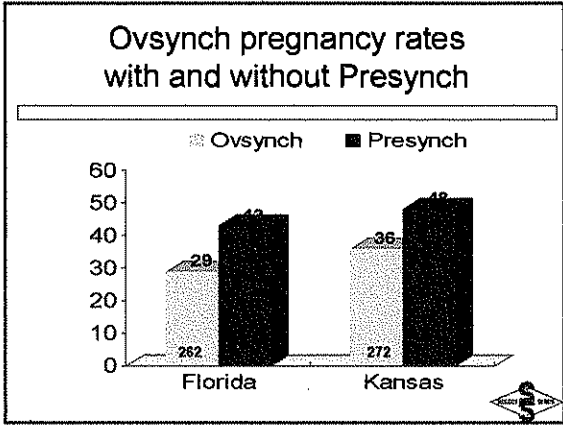
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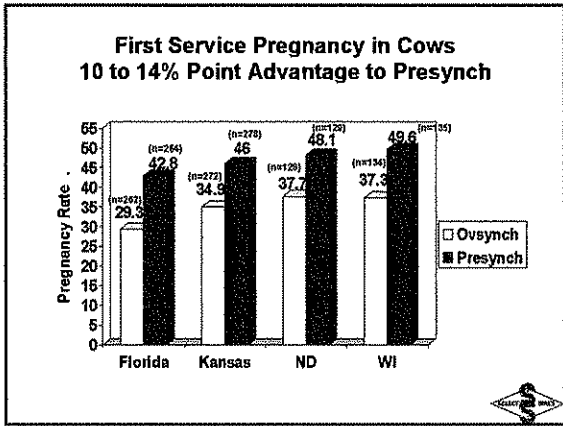
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### Presynch or PGF-based breeding program?

- Presynch
  - PGF given before VWP
  - Breeding cows at these heats results in:
    - Reduced conception in cycling cows - bred too early?
    - Reduced conception to Ovsynch - cycling cows already bred
    - "A wreck!!!"
- PGF-based breeding
  - PGF given at VWP and cows bred at estrus
  - Cows not bred within 3 weeks of VWP are treated with Ovsynch

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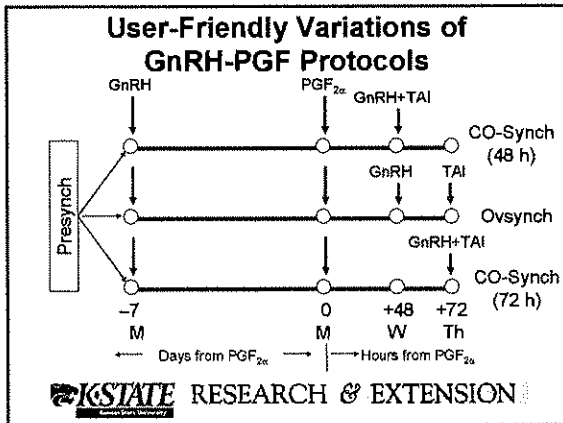
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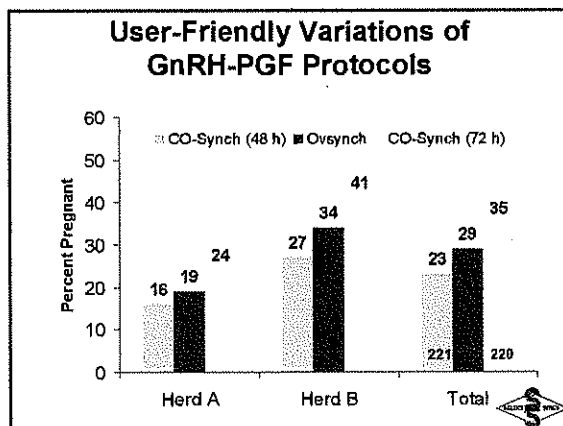
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### User-Friendly Variations of GnRH-PGF Protocols

- ALL COWS WERE PRESYNCHED!!!!
- If you DO NOT Presynch or heat detect, should you use 72 h CO-Synch???
- "Early heats"
- Heat detection for 72 h and then TAI (Select Synch) works with or without Presynch

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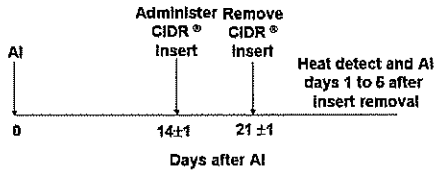
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**Labeled use in lactating dairy cattle is to synchronization returns to estrus**




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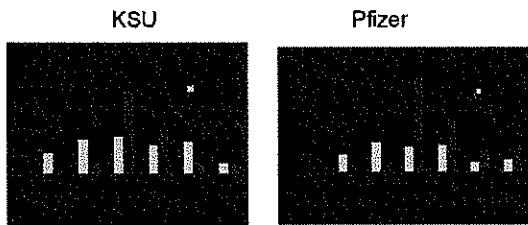
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**Synchrony of returns to estrus**




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**Use of CIDR for Resynch - KSU**

Item	Control	CIDR
PR after TAI	41% (327)	43% (297)
Return 20-25 days	29% (189)	32% (169)
CR of repeat A.I.	27% ( 55)	15% ( 54)
P4 conc., day 20	3.6 ± 0.2	4.1 ± 0.2*
Embryo surv. to d 57	52% (134)	63%* (127)

El-Zarkouny and Stevenson, 2001




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### Use of CIDR for Resynch-Pfizer

Item	Control	CIDR
PR after TAI	37% (863)	33% (881)*
Return, 21-25 d	19% (544)	34% (589)**
CR of repeat AI, 17-27 d	31% (194)	27% (266)
PR of repeat AI, 17-27 d	11% (540)	12% (583)

Chenault et al, 2003. J. Dairy Sci. 86:2039-2048.




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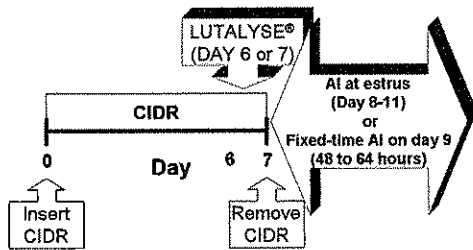
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### EAZI-BREED™ CIDR® Cattle Insert




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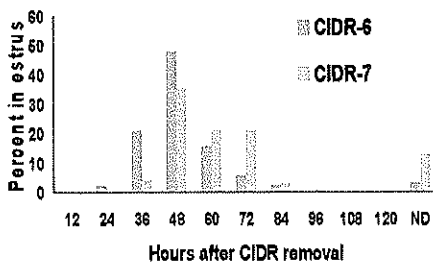
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### Effects of CIDR on synchrony of estrus in virgin heifers



(Select Sires, Inc., unpublished)




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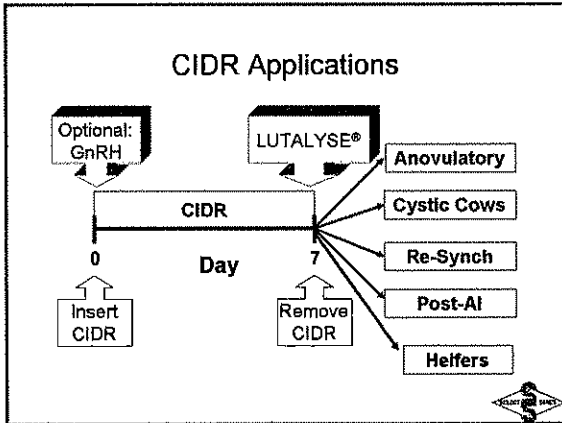
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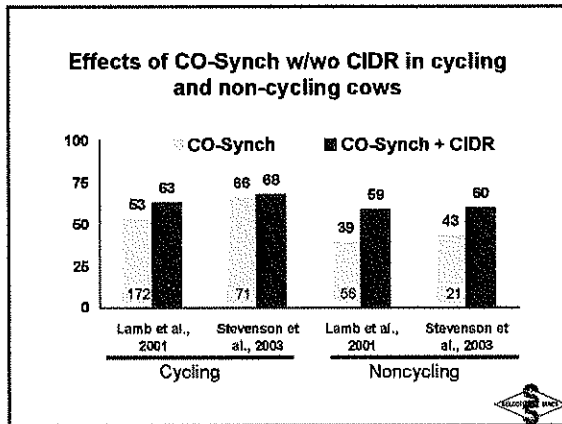
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### Days-in-Milk at Time of Service

	Early	Late
<b>Pursley, 1997</b>		
DIM	60-75	>75
Pregnancy Rate	26.0%	43.5%
<b>Pursley, 1998</b>		
DIM	50-75	76-100
Pregnancy Rate	36%	47%
<b>LeBlanc, 2002</b>		
DIM	< 71	>71
Pregnancy Rate	39.8%	33.3%

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## When should I start Ovsynch?

Effects of milk production level and days in milk at AI on Ovsynch conception rates.

Days in milk at Ovsynch TAI	Production level at 5 weeks after calving		
	Low <25 kg (n = 301)	Average 25 to 30 kg (n = 492)	High >30 kg (n = 270)
53 to 59	14		
73 to 81	35	32	28
94 to 102			41

(Adapted from Tenhagen et al., 2003, Therio 60: 1527-1537)




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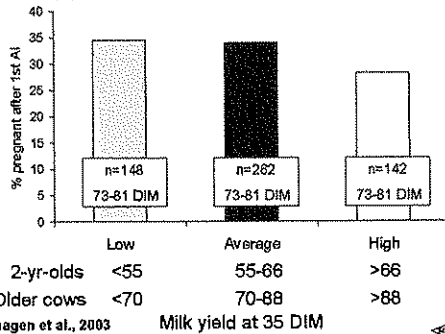
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## Does Milk Yield Influence Conception Rates When VWP's are Similar?




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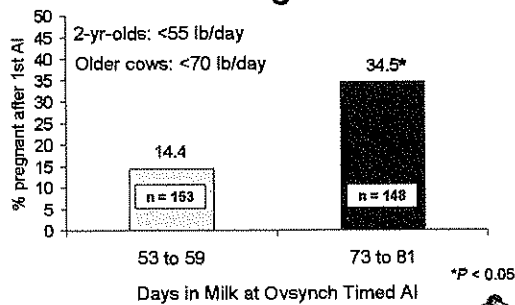
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## Low-Producing Cows: Increasing VWP?




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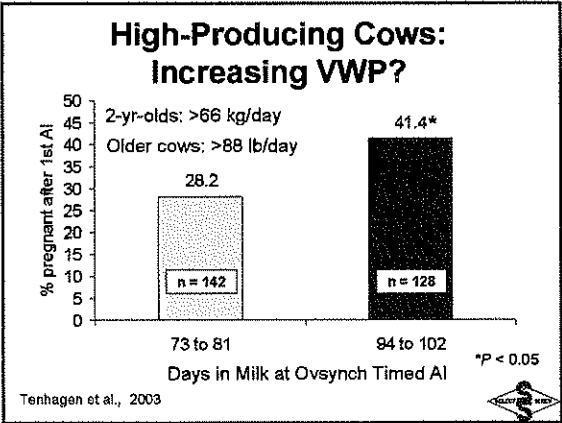
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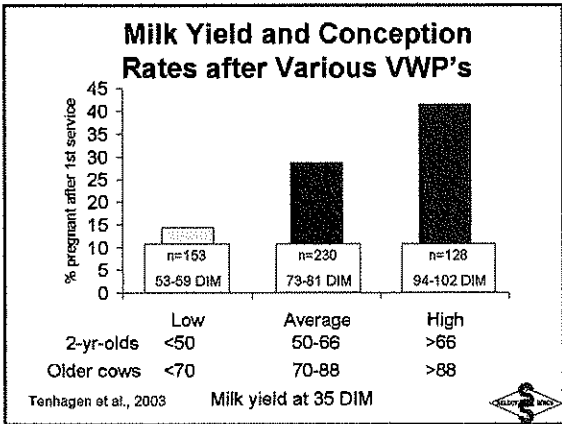
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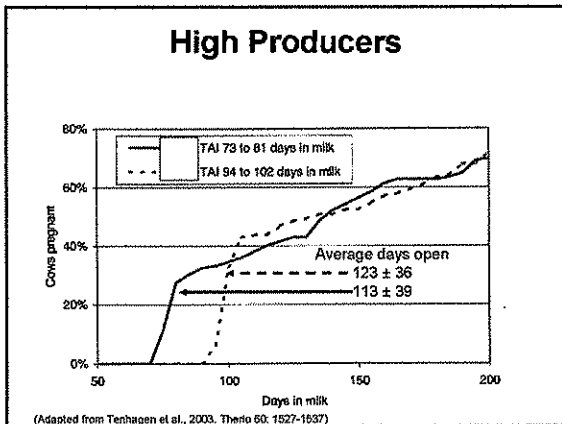
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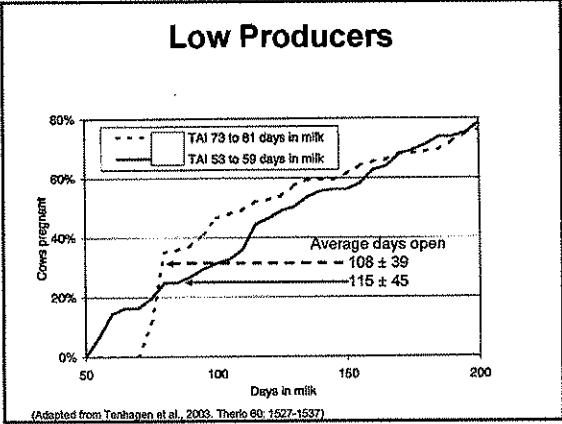
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- ### Days-in-Milk at Time of Service
- Take home messages:
    - With Systematic Breeding programs, Like Ovsynch, one has control over when cows are bred for the first time.
    - Waiting until 65 to 70 DIM to breed usually results in better conception rates
      - Response are different for Ovsynch vs. Observed heat at same DIM
      - More cows are cycling
      - More uterine infections have resolved




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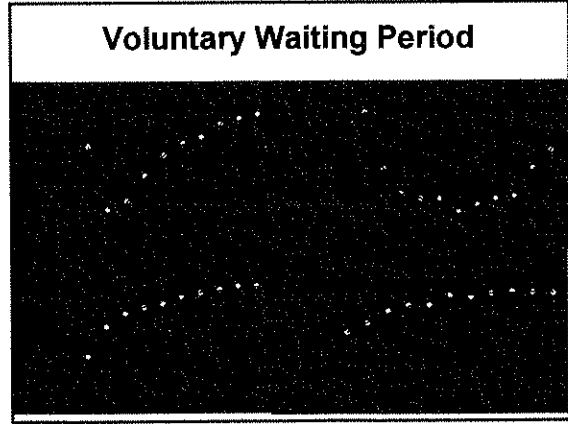
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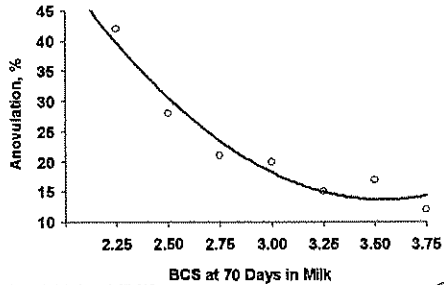
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### Incidence of non-cyclic cows



Santos et al., 2004, J. Dairy Sci. 87: 688




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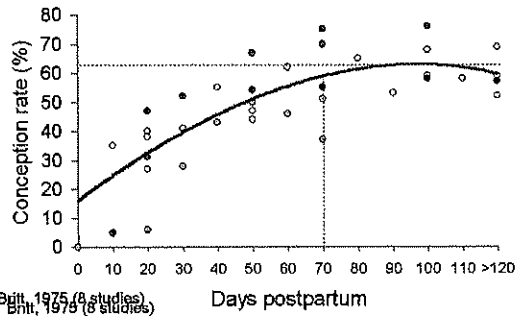
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### Conception Rates First Service at Various Postpartum Intervals



Britt, 1975 (8 studies)  
Britt, 1978 (8 studies)

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### Date of Conception & Calving Interval

- 45 days @ Conception = 10.7 month CI
- 60 days @ Conception = 11.2 month CI
- 75 days @ Conception = 11.7 month CI
- 85 days @ Conception = 12 month CI
- 100 days @ Conception = 12.5 month CI
- 125 days @ Conception = 13.3 month CI




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**Effect of Compliance on  
Pregnancy Rates**

**95% Compliance at each injection**

**PreSynch-OvSynch: 5 injections**

**Compliance = .95 X .95 X .95 X .95 X .95 = 77%**

**Compliance = .90 X .90 X .90 X .90 X .90 = 59%**




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**Effect of Compliance on  
Pregnancy Rates**

- Poor injection compliance results in lower pregnancy rates.
- For every 10 Percentage point increase in program compliance, there was a 2 Percentage in pregnancy rate.




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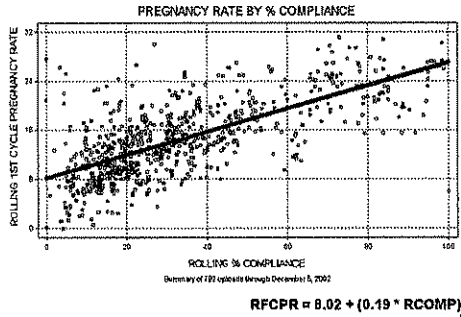
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### Effect of Compliance on Pregnancy Rates




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### Never bet the bank on what happens in a single location

#### Timed AI Pregnancy Rate

Location	Imaginary TRT 1	Imaginary TRT 2
A (n=83)	60%	45%
B (n=130)	35%	63%
C (n=44)	77%	38%
D (n=162)	50%	55%
All (n=419)	53%	53%

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## Post Breeding Strategies

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## Introduction

- Conception failure is coincident with less than normal concentrations of P4 as early as d 6 after AI (Thatcher et al., 2001).
- Blood P4 (timing and magnitude) generally reaches greater concentrations earlier in pregnant than nonpregnant cows.
- Embryo development is related to concentrations of P4 and ability of the conceptus to secrete the antiluteolytic hormone, interferon- $\tau$  (Mann et al., 1999).
- Exogenous P4 stimulated embryo development (Thatcher et al., 1994).

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## Controlling pregnancy loss after AI

Reference	Period of embryonic loss	Cows pregnant at 1 <sup>st</sup> diagnosis	Pregnancy loss (%)
Vasconcelos et al., 1997	d 28 to d 98	1,601	19.6
Pursley et al., 1998	d 30 to calving	285	22.0
Fricke et al., 1998	d 28 to d 56	89	13.5
Santos et al., 2000	d 28 to d 90	171	17.4
Moreira et al., 2000a	d 27 to d 45	139	20.7
Moreira et al., 2000b	d 32 to d 74	211	13.7
Stevenson et al., 2000	d 28 to d 45	203	15.8

- Follow-up pregnancy check at 60 to 90 days  
 - Current research: hCG, GnRH, or CIDR 5 or 7 days after AI

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## Possible Methods

- How might P4 be stimulated early after AI?
  - Induce ovulation of a secondary CL (e.g., GnRH or hCG)
  - Increase function of the primary CL in terms of greater luteal volume and ability to biosynthesize more P4 (e.g., GnRH or hCG)
  - Provide supplemental progestin (e.g., via a CIDR insert or as a dietary supplement)

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## Evidence for hCG

- Treatment of lactating dairy cows on d 5 after AI with 3,300 i.u. of hCG (Chorulon) increased conception rates at 28, 45, and 90 d after first postpartum AI (cooler weather only)
- hCG improved conception rates in cows losing body condition between AI and d 28 after AI.
- hCG induced accessory CL in 86% of cows and increased concentrations of blood P4 by 4 mg/mL.

Santos et al., 2001

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## Evidence for P4

- Treatment of lactating dairy cows between d 5 and 12 or d 12 and 19 increased conception rates, but blood P4 was only increased in the earlier treatment (Robinson et al., 1989).
- Treatment with CIDR inserts for 6 to 12 d applied before mid cycle (beginning 4 to 9 d after AI) improved conception rates compared with controls (74.6%; n = 466 vs. 66.1%; n = 461; Macmillan and Peterson, 1993).

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## Evidence for GnRH

- GnRH or its agonists induced accessory CL when administered while a dominant follicle was viable on d 5 to 12 of the estrous cycle (Pursley et al., 1995; Vasconcelos et al., 1999).
- A GnRH agonist (8 µg of Buserelin) was equally effective as 3,000 i.u of hCG for inducing accessory CL when injected on d 5 or 6 (Schmitt et al., 1996).

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## Hypothesis

Increasing endogenous concentrations of P4 in lactating dairy cattle after insemination will spare embryonic loss and improve overall conception rates.

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## Presynch – GnRH & AI 72 hours

### Objectives

- Simplify and optimize synchronization protocol
- Determine average DIM that cyclic activity is initiated
- Determine if GnRH administered 5 or 7 days following AI increases progesterone concentration and pregnancy rate

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## SYNCHRONIZATION PROTOCOL

AVERAGE DAYS IN MILK and DAY of WEEK

40	54	68	75	78	85
TUE	TUE	TUE	TUE	FRI	FRI
14 days	14 days	7 days	3 days	7 days	
PGF	PGF	GnRH	PGF	GnRH & TAI	GnRH

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## SYNCHRONIZATION PROTOCOL

AVERAGE DAYS IN MILK and DAY of WEEK

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TUE	TUE	TUE	TUE	FRI	FRI
14 days	14 days	7 days	3 days	7 days	
PGF	PGF	GnRH	PGF	GnRH & TAI	GnRH

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## Presynch – GnRH & AI 72 hours

### Injection & Breedings

- All first services will occur on Friday morning with GnRH given immediately following AI.
- Cows maybe bred on Wed or Thurs prior to scheduled breeding if detected in STANDING HEAT.
- GnRH will be randomly assigned to cows 5 or 7 days after AI.

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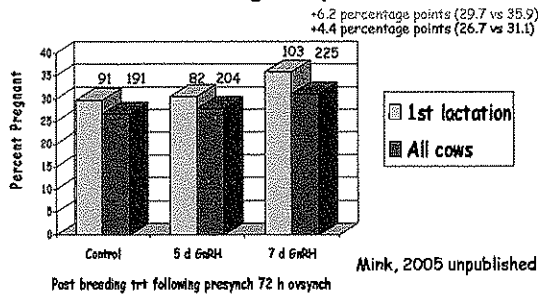
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Effect of GnRH administration either 5 or 7 days post breeding on First Service Pregnancy Rate




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Conception Rates and Embryonic Survival after Post-AI Interventions

J. S. Stevenson<sup>1</sup>, D. E. Tenhouse<sup>1</sup>,  
M. A. Portaluppi<sup>1</sup>, J. M. DeJarnette<sup>2</sup>,  
and S. Kacuba<sup>2</sup>

<sup>1</sup>Dept. of Animal Sciences and Industry

<sup>2</sup>Select Sires Inc.




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Objectives

To increase conception rates, we attempted to increase endogenous post-insemination concentrations of P4 in lactating dairy cattle by:

- Administering hCG once between 5 and 8 d after AI.
- Administering GnRH once between 5 and 8 d after AI.
- Applying supplemental P4 via the CIDR insert for 7 d beginning at 5 and 8 d after AI.

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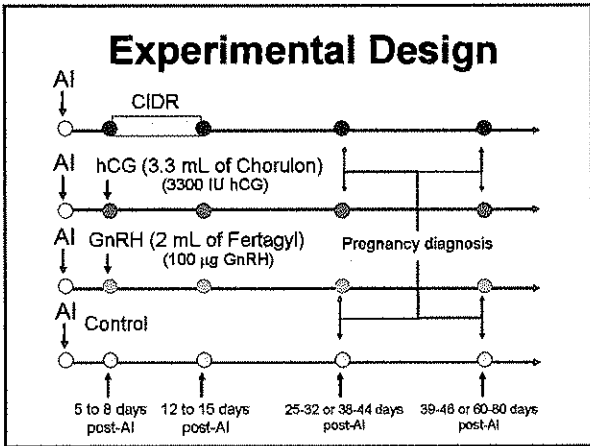
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### Experiments

**Exp. 1. Treatments applied to 2875 cows in 5 herds:**  
 One WI herd (December 2003 to July 2004)  
 Conception rates and embryo survival  
 Four KS herds (August 2004 to July 2005)  
 Conception rates and embryo survival

**Exp. 2. Treatments applied to 748 cows in 3 herds:**  
 Blood collected at treatment (d 0) and 7 d later to assess concentrations of progesterone

**Exp. 3. Treatments applied to 162 cows in 1 herd:**  
 Scan ovaries on d 0 and 7 after treatment to assess numbers of ovarian follicles  $\geq 5$  mm and numbers and diameters of original and induced CL

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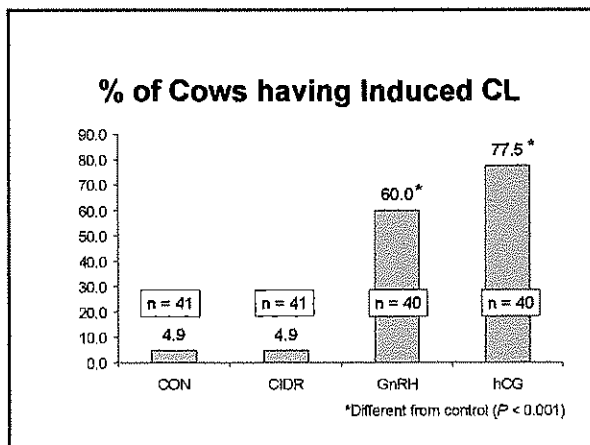
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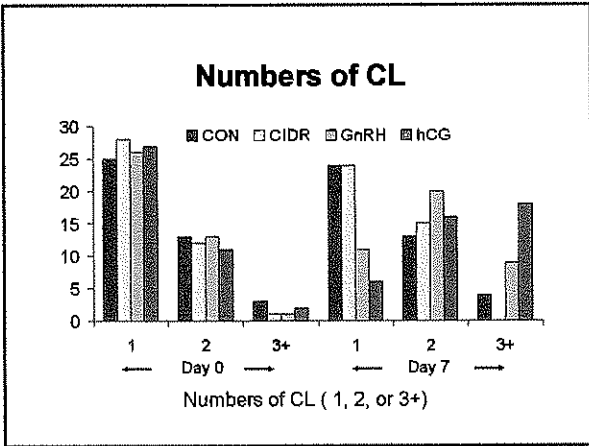
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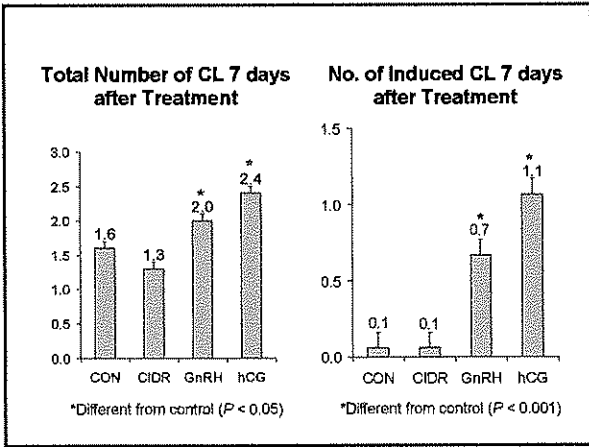
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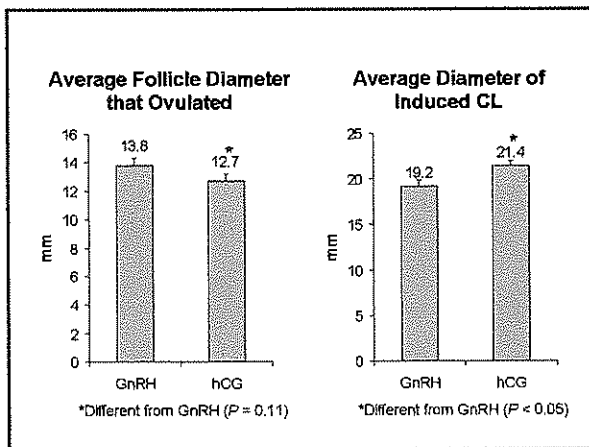
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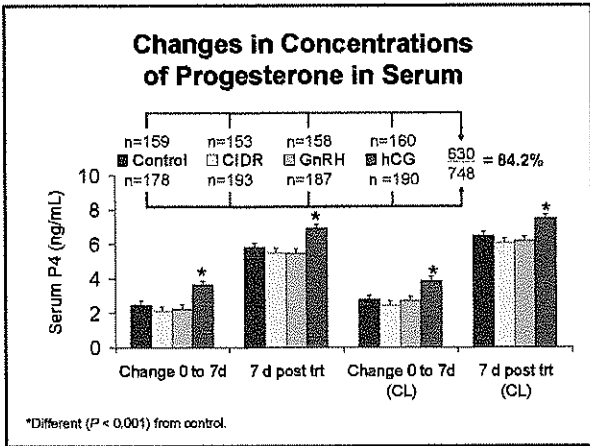
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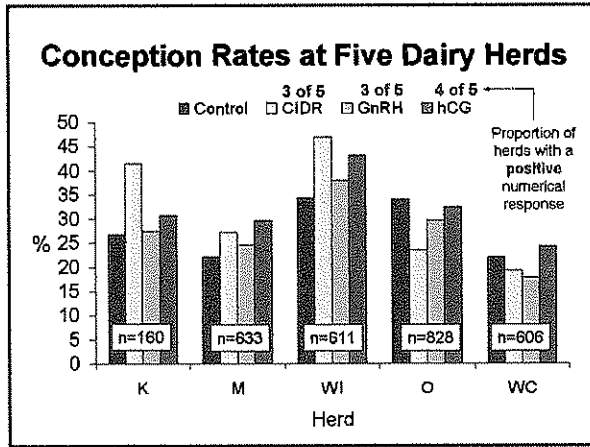
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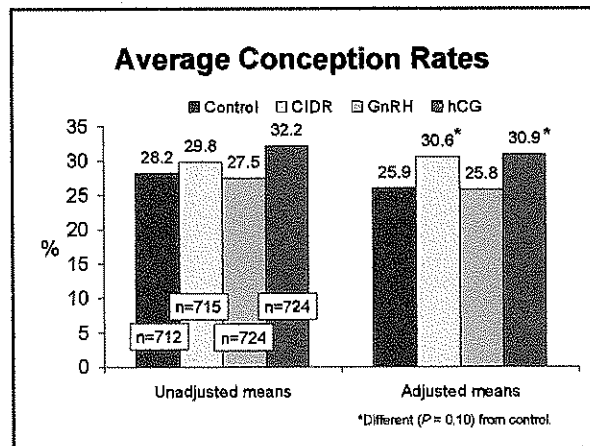
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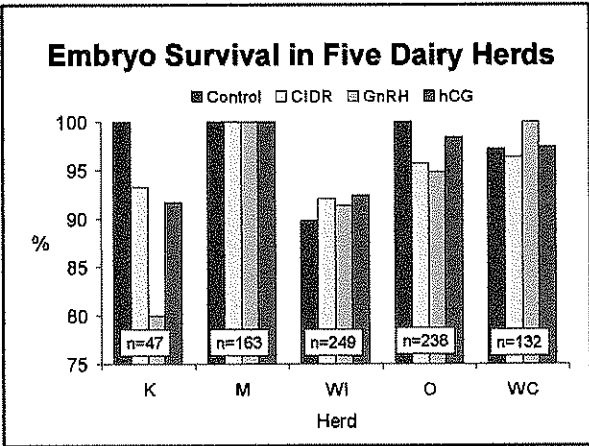
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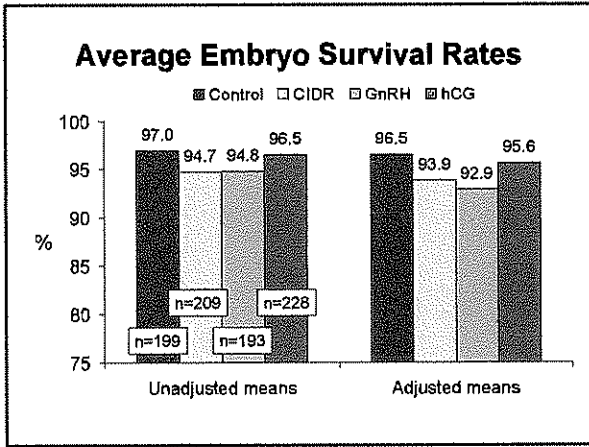
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DAIRY HERD ANALYSIS PROGRAM

Select Sires Inc.

Logic Solutions, LLC

Copyright © 2004

Version 1.6.2

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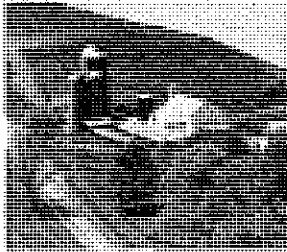
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Tom & Jean Ann Alexander  
Logic Solutions, LLC  
Cherry Grove Farm Inc.  
Fairfield, Virginia



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**Developed to Assist in the  
Analysis  
And Implementation of  
Management  
Decisions of the Dairy Farm**

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**DC-305, DHI-Plus, and  
PCDART**

All Data Recorded In Database  
Export Text File (.csv)  
MICROSOFT EXCEL  
Import External Data Into  
Spreadsheet  
Analyze Data With Worksheet  
Formulas

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**Dairy Herd Analysis Program  
Reproduction Module**

**Herd Input Sheet – Current Status and Goals**

**Runs in Real Time**

**Reproductive Statistics**

**Barnsheet that Features Excel Auto Filter**

**Sort By Multiple Criteria**



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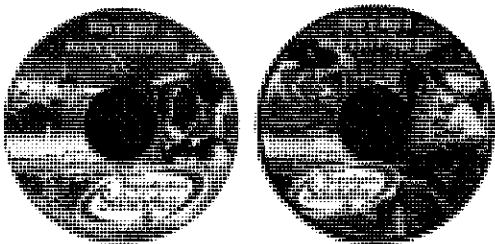
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**SRS Analysis Program**



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FILEOUTCH ID BDAT FDAT DDAT LACT  
 PEN HDAT BRCOD DIMFB TBRD REPRO  
 SCC FOR LACT >= 0

BRCOD = BRECD = BREEDING TRIGGER OR CODE

DIMFB = BRED1 = Days in Milk @ 1<sup>st</sup> AI

LACT = 0 (Heifers Only)

LACT > 0 (Cows Only)

LACT >= (Both Cows and Heifers)

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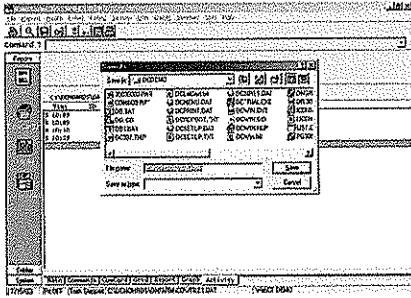
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### Name the File (farm name & date)




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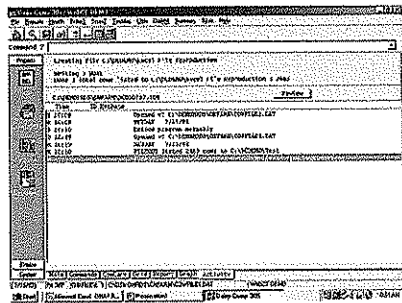
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### File Output




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## Import Desired File

- ◆ Delete File Name if the desired file is highlighted.
- ◆ Change the File Type to All Files
- ◆ Double Click on desired file to import

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## PCDART FILE for SRS

Item No	Item Name	Quantity	Unit	Cost
1011	...	1	...	...
1012	...	2	...	...
1013	...	3	...	...
1014	...	4	...	...
1015	...	5	...	...
1016	...	6	...	...
1017	...	7	...	...
1018	...	8	...	...
1019	...	9	...	...
1020	...	10	...	...
1021	...	11	...	...
1022	...	12	...	...
1023	...	13	...	...
1024	...	14	...	...
1025	...	15	...	...
1026	...	16	...	...
1027	...	17	...	...
1028	...	18	...	...
1029	...	19	...	...
1030	...	20	...	...
1031	...	21	...	...
1032	...	22	...	...
1033	...	23	...	...
1034	...	24	...	...
1035	...	25	...	...
1036	...	26	...	...
1037	...	27	...	...
1038	...	28	...	...
1039	...	29	...	...
1040	...	30	...	...
1041	...	31	...	...
1042	...	32	...	...
1043	...	33	...	...
1044	...	34	...	...
1045	...	35	...	...
1046	...	36	...	...
1047	...	37	...	...
1048	...	38	...	...
1049	...	39	...	...
1050	...	40	...	...
1051	...	41	...	...
1052	...	42	...	...
1053	...	43	...	...
1054	...	44	...	...
1055	...	45	...	...
1056	...	46	...	...
1057	...	47	...	...
1058	...	48	...	...
1059	...	49	...	...
1060	...	50	...	...

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## PCDART FILE for SRS

- Standard Reports
  - General and Review
  - WASH and Event Management
  - Need Activity and Status
  - Mapbox
  - With Production and Under Health
  - Production
  - Reproduction
  - Reproductive Management

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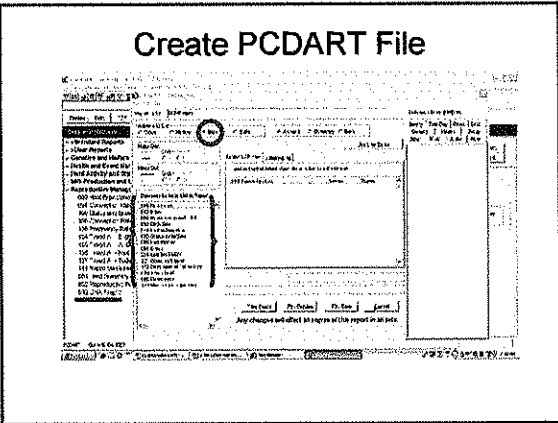
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## Create PCDART File




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## PCDART File Database Items

- 50 - Cow ID
- 99 - Birth date
- 74 - Last calving date
- 96 - Status code/date
- 8 - Lactation number
- 4 - Group
- 244 - Last bred MDY
- 221 - Breeding Trigger
- 176 - Days open at 1<sup>st</sup> service
- 16 - Times bred
- 5 - Repro code
- 414 - Test Day # 2 SCC
- 424 - Test Day # 3 SCC
- 985 - Switch (SCCS to SCC)

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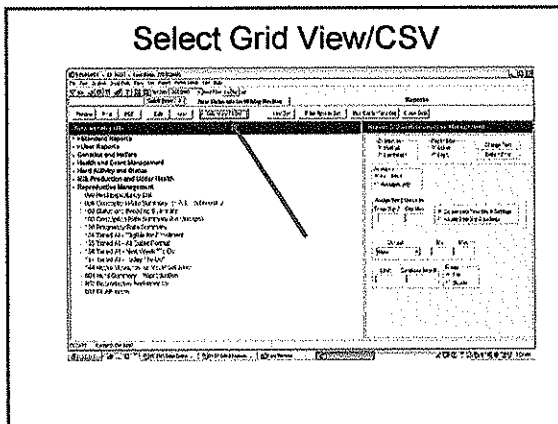
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## Select Grid View/CSV




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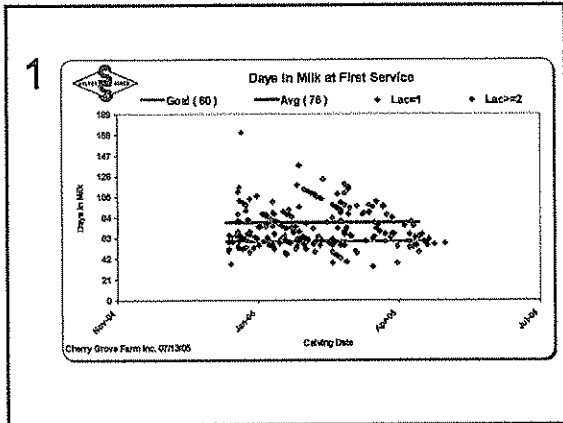
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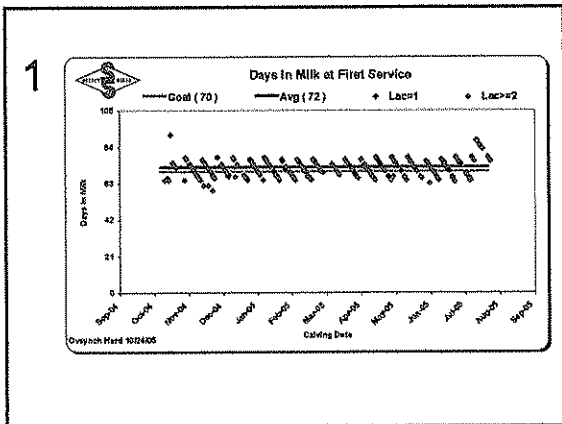
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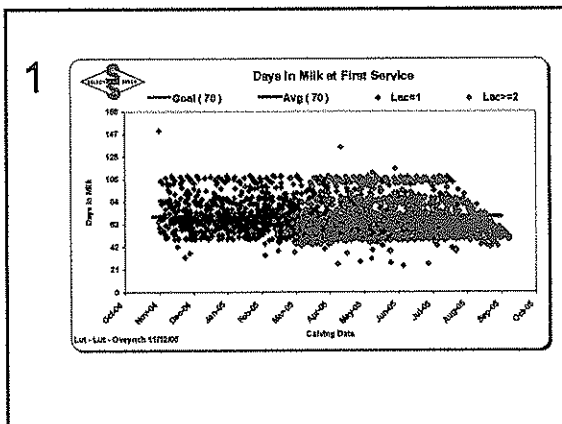
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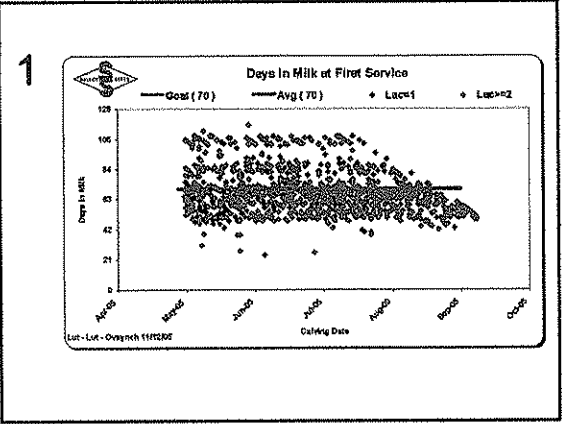
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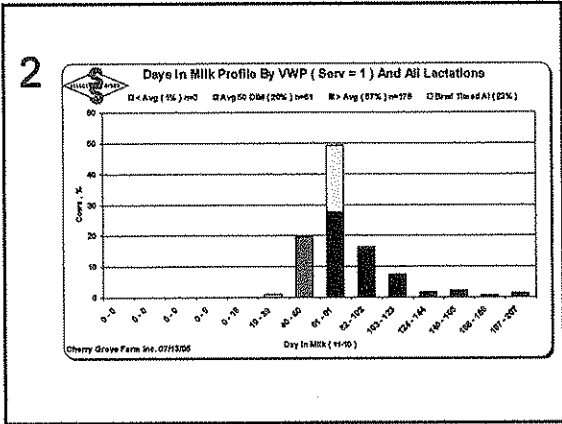
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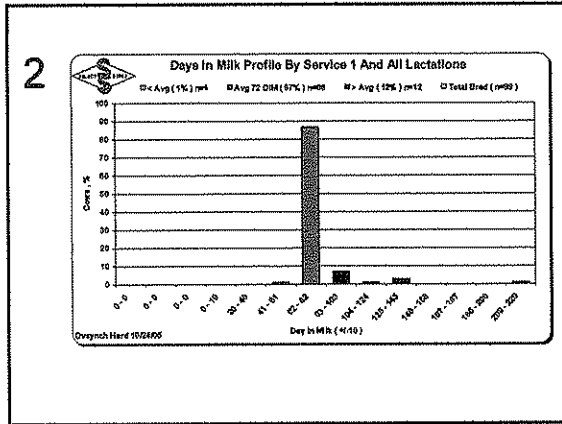
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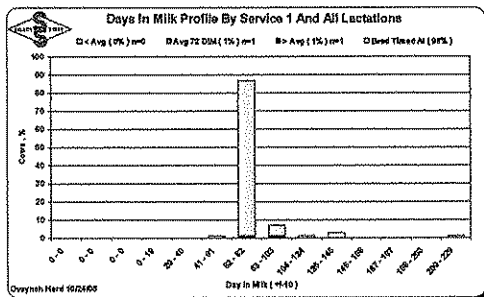
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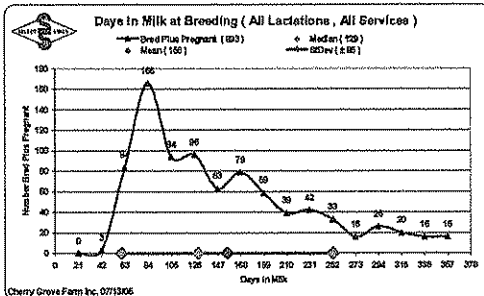
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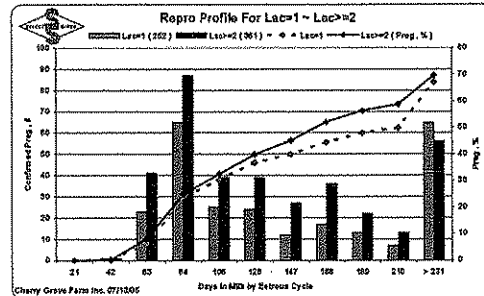
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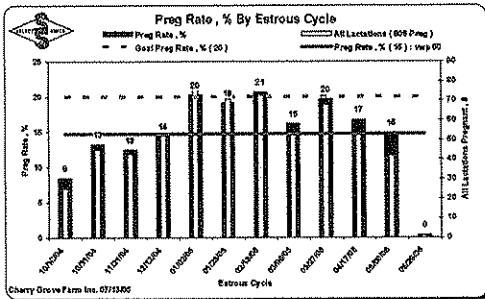
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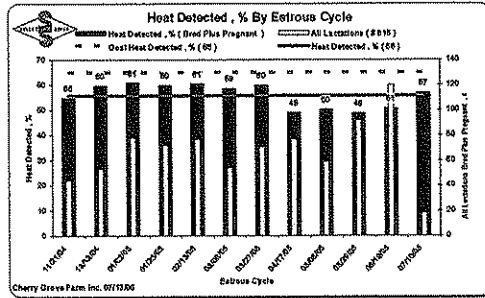
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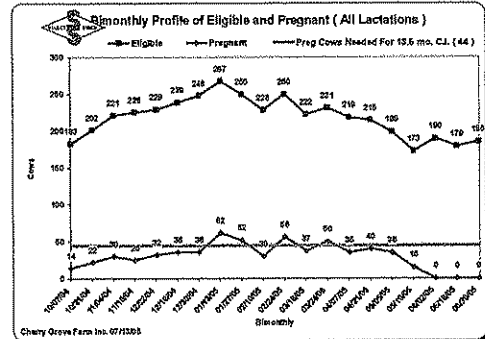
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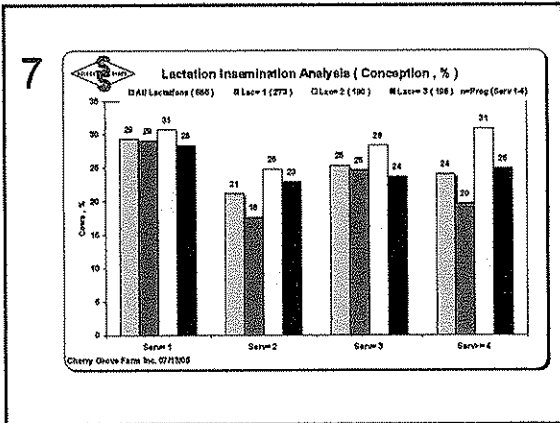
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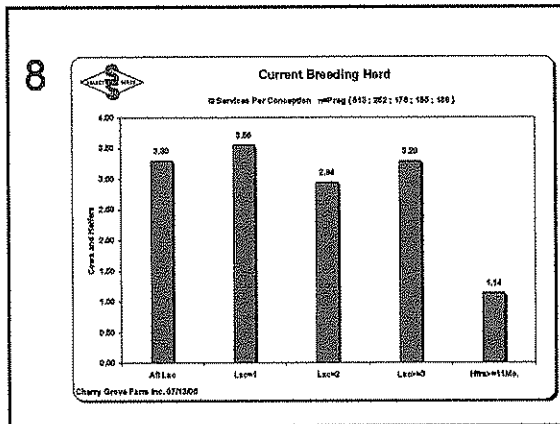
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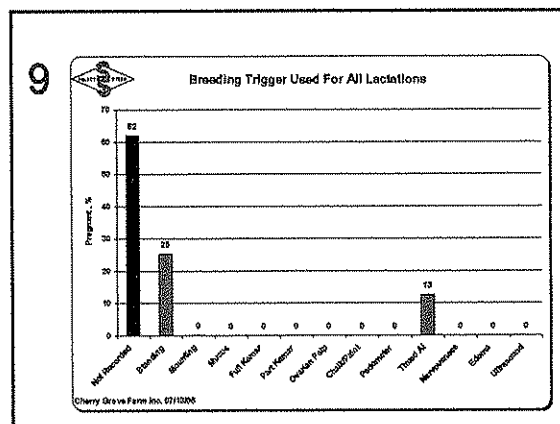
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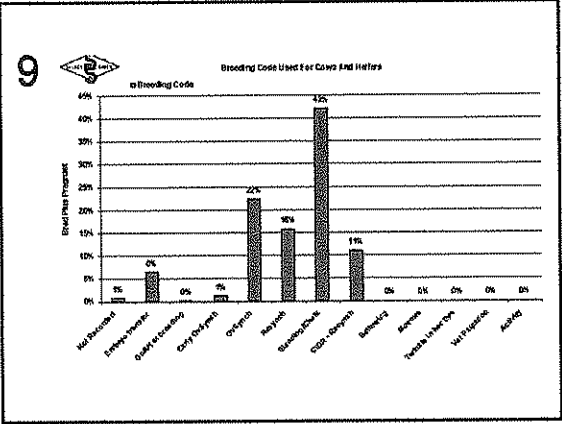
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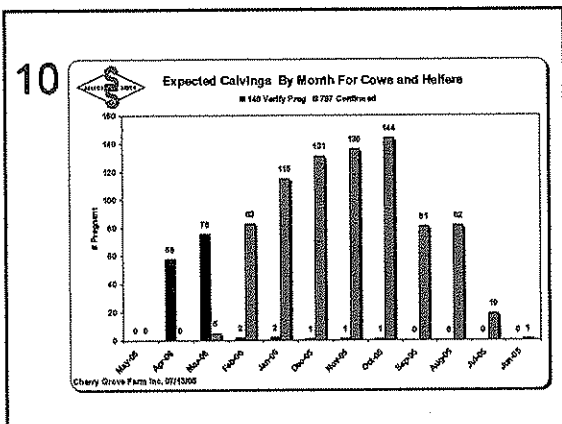
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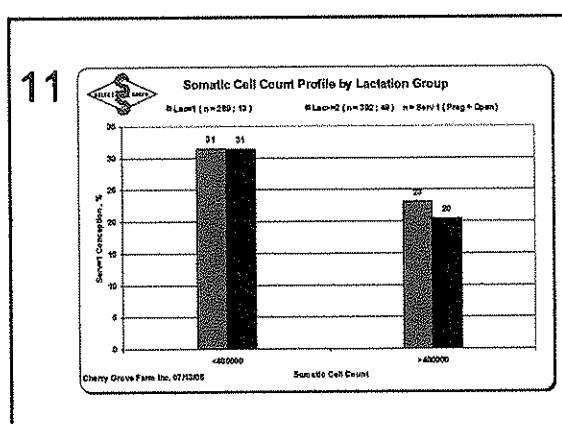
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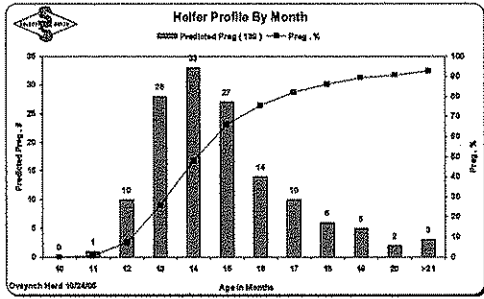
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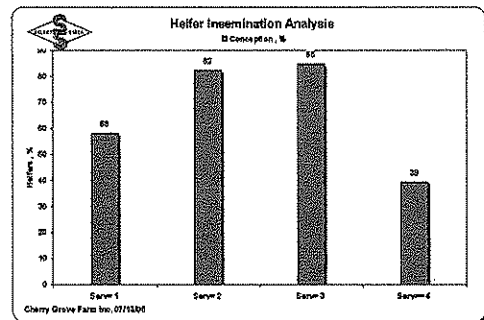
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**Select Reproductive Solutions™**  
 DAIRY HERD ANALYSIS PROGRAM  
 Select Sires Inc.  
 Logic Solutions, LLC  
 Copyright © 2004  
 Version 1.6.1

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# Barn Ventilation Spreadsheet

## Inputs:

width	35	ft.
length	120	ft.
height	15	ft.
height of trusses	0	ft.

<u>Exhaust</u>		
number fans	8	
cfm output per fan	17500	cfm

## Solutions:

Current exhaust	140000 cfm	<i>^all fans running</i>
Maximum exhaust needed	63000 cfm	<i>^for extremely hot summer days</i>
difference	77000 cfm	

if greater than zero, acceptable

### Inlet Needed (square feet)

Total Barn Volume 63000 cubic ft

<i>Cold: &lt; 32 Heat Index</i>	4200	cfm
<i>Mild: 32-80 Heat Index</i>	15750	cfm
<i>Hot: &gt;80 Heat Index</i>	63000	cfm

	Windspeed		
	2.1mph	5.7mph	9.0mph
21	<b>8.4</b>	5.25	
78.75	<b>31.5</b>	19.688	
315 sq ft.	<b>126.0 ! sq ft.</b>	78.75 sq ft	



^the first box represents how many **cfm** need to be exhausted.

^the second box represents how much **inlet** is needed to maintain either **2.1, 5.7, or 9.0 mph** average windspeed.

^ideally, inlets should be opposite to the exhaust fans to push the fresh air down the barn.

^on 'Hot' days, Heat Index greater than **80**, the volume of the barn should be exhausted **every minute!**

! allow for this much inlet for 'Hot' days, this will allow for enough inlet while maintaining 5.7 mph average windspeed.

### Calculating Current Inlet Area

	ft x ft		
Inlet 1	12	9	108 sq ft.
Inlet 2	8	2	16 sq ft.
Inlet 3	0	0	0 sq ft.
Inlet 4	0	0	0 sq ft.
Inlet 5	0	0	0 sq ft.
Inlet 6	0	0	0 sq ft.
total inlet			124 sq ft.
inlet for 'Hot' days			126.0 sq ft.
difference			-2 sq ft.

^needs to be close to zero; open or close inlets to correct.